THE UNIVERSITY OF CHICAGO

PRICE FORMATION AND FLUCTUATION IN PTOLEMAIC EGYPT

A DISSERTATION SUBMITTED TO

THE FACULTY OF THE DIVISION OF THE HUMANITIES

IN CANDIDACY FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

DEPARTMENT OF NEAR EASTERN LANGUAGES AND CIVILIZATIONS

BY

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CHICAGO, ILLINOIS

JUNE 2018

For my best friend,

Dr. Dan Cooper

1984–2016

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ACKNOWLEDGMENTS

Of course I must begin by thanking those who have funded this research, namely the Cross and Rantz scholarship funds. Thank you for supporting research in Egyptology and endeavoring to keep this field in existence.

My deepest thanks go to the members of my committee: my chair, Brian Muhs, as well as my readers, Alain Bresson and Janet Johnson. I was incredibly fortunate when Brian joined the University of Chicago miraculously as I was beginning to work on a dissertation proposal. I had already been in awe of his work on Ptolemaic money and taxes for years, and there is no other scholar who could have led me through this project with equal acumen. Thank you for all our long conversations on Friday mornings, conversations that inevitably meandered to your work at Nordstrom and my work for whoever my latest client was, but which always came back to the Ptolemaic economy and somehow stayed relevant. Thank you to Jan for teaching me Demotic over a decade ago and for trusting me to work as a Research Assistant on her Chicago Demotic Dictionary. The time I spent poring over index cards in the CDD office, working on the entries for money and numbers, were the years when I truly learned the language. Finally, thank you to Alain, whose kind words have supported me so much over these many years. Thank you for your 2008 course on Money in Ancient Greece, which inspired me to understand the origins of money and the role of monetization from angles I had never before considered. Thank you all, finally, for reading hundreds of pages in just a few short weeks in this final stage—I cannot express how thankful I am for your support.

It would be impossible to thank all the other faculty who have inspired me over the years, but I must call out a few select individuals. Thank you to Hratch Papazian for teaching me almost

every phase of Egyptian from the very beginning of graduate school, and to Susan Rotroff for teaching me Greek in the first place as an undergraduate. Then thank you to the professors who ran the American Society of Papyrologists' 2008 Summer Institute at Stanford—Joe Manning, Mark Depauw, and Arthur Verhoogt—for giving me a strong foundation in papyrology as a discipline. Special thanks to Mark for building the Trismegistos database that made this dissertation possible and for instilling in me a strong belief in the digital future of papyrology. Thanks as well to François Gaudard, my compatriot at the CDD, who has always been an encouraging friend, happy to pore over the meaning of a stray mark on a papyrus scan with me.

I probably spent more of my actual time in graduate school teaching rather than researching, and I must absolutely thank my fellow instructors and students for continually inspiring me and reminding me why this material is just so fascinating. I have learned so much from my fellow faculty in Self, Culture, and Society in the Social Sciences Core and in Greek Thought and Literature and Human Being and Citizen in the Humanities Core. In particular, I must thank Pablo Maurette for the four years we spent teaching hundreds of students how to write together. Along the way, my students have provided me with endless fodder for fascinating conversations, both in the classroom and out. They are too numerous to list here, but I can point out those former students who I am thankful to now call my friends—and even to see begin to pursue PhDs of their own. Thank you to Omar Safadi and Taiyuan Pai for your endless interest in discussing theories of capitalism as you have grown up and become a part of 'the system' yourselves.

At a practical level, certain individuals have provided me with extra support over the years that made it possible for me to finish this project. I would particularly like to thank my therapist, Sarah, who has heard more about my dissertation than anyone else, and Leslie New in the

Financial Aid office, who helped me figure out how to pay my bills with only a patchwork of part-time jobs. In these final weeks, I also could not have made it to the end without my editor, Daniel Webb, who has helped me format an endless list of tables to fit the University's precise requirements under a great deal of time pressure. I must also thank my coworkers, fellow Advanced Degree Consultants, and case teams at the Boston Consulting Group, where I have found my stride in this final academic year for their constant encouragement as I continued to revise chapters in hotel rooms around North America at the end of long work days.

Ultimately, I could not have survived this thirteen-year journey without my two greatest friends and colleagues, Natasha Ayers and Kathryn Bandy. At this point we have become old war buddies from our time in the trenches of the OI together, and I am so thankful that we have stayed so close as our lives have taken us in directions we never would have expected as starry-eyed 22-year-olds. I know I am not alone in finding grad school to be the most personally challenging years of my life, and I have benefitted to no end from the solidarity of other classmates as well, especially Rozenn Bailleul-LeSuer, Elise MacArthur, and Solange Bumbaugh.

Big thanks and affection, too, go to my boyfriend, Todd Gold, who has supported me through these first months of dating—which happened to coincide with my final months of work on my dissertation. He has actively encouraged me to write rather than spend time with him, coaching me all the way by sending me videos of an intense Vince Lombardi, always pushing me to keep my head in the game.

Obviously I would not be here at this final stage without the support of my parents, my brother Pat, and my many aunts, uncles, and cousins. Thank you for believing that I really would finish one day and for being the first ones to congratulate me as I've hit each milestone. Thank

you most of all for raising me in a home filled with books and stories of different cultures, and for encouraging me to always ask more questions.

As I finally finish this project, my late partner and best friend, Dan Cooper, is on my mind most of all. He was the only one who could use reason to convince me I was capable of finishing this dissertation when it felt like a logical impossibility. He was by my side for many years, and although he did not survive to see me finish, I know he would have been cheering me on until the end if he could. I will miss him forever, and this dissertation is dedicated to him. A thousand of bread and beer to the ka of Dan, wherever he may be.

CHAPTER ONE

Introduction

1.1 Introduction

This dissertation seeks to identify fluctuations and volatility in the prices of commodities in early Ptolemaic Egypt and to explain the possible causes of such variability. An understanding of the interplay between market forces and institutional influence on the prices is fundamental to understanding the ancient Egyptian economy and ancient economies in general. In tabulating and analyzing ancient prices, I address the key economic question of how prices were formed, including the role of the state and other social institutions in regulating the extent to which prices could vary. The factors that could have influenced price variability are endless--inundation levels would have had the largest impact on harvest levels, and certain crops may have been more or less affected by these environmental factors based on their own biology, for example. This dissertation approaches price variability from an alternative angle, however, interrogating the extent to which the Ptolemaic state was effective in overriding the variability caused by such infinite factors through its interventions towards price stability (e.g., fixing prices or managing production of certain commodities). In the end, I note that Ptolemaic prices were highly variable, and I evaluate the possible reasons for this high variability. Coupling the quantitative price data with qualitative evidence from many texts, I argue that the state's ostensible interventions were not effective. I further emphasize the incompleteness of information available to ancient individuals as they set and accepted prices, as well as possible imbalances in access to that information. This dissertation argues for the importance of acknowledging the vast differences in the amount of information available to people acting in ancient and modern economies and discusses the potential effects of

engaging in transactions with high uncertainty, such as speculative effects. Thus, while this study encompasses only one society, it sheds light on issues fundamental to the study of economies generally by using a blend of quantitative and qualitative methods to understand both concrete and theoretical questions about how economies work.

For many years, there was considerable debate about whether price-making markets existed in the ancient world at all. Some, such as Mikhail Rostovtzeff and David Warburton, held that ancient economies differed from their modern counterparts in scale alone. Others, most notably Karl Polanyi and Moses Finley, vehemently argued the opposite, that since ancient societies were so culturally distinct from our own, it naturally follows that their economic behavior must have functioned in vastly different and not entirely predictable ways. In this view, price-making markets were only developed in early modern Europe and to write a history that sees them operating in the ancient past would be to create a mere fantastic projection of scholars' own understanding of how an economy must be structured.

More recently, however, the existence of such price-making markets in antiquity is less frequently contested. Yes, Polanyi and Finley were correct to understand that economic behavior is culturally embedded and that we cannot imagine that the economy is based on fixed natural laws. But all economies, including modern ones, are shaped by social institutions, which are themselves based in specific historical, geographic, and cultural contexts. Ancient economies are thus not so vastly distinct from modern ones that they cannot be compared; comparison is always possible so long as the relevant social elements are taken into account. Moreover, history shows us that price-making markets did in fact exist in the ancient Mediterranean world. So the current task within the fields of both economic history and economics generally is no longer merely to identify markets but to attempt to explain *how* they formed and shaped pricing activity. This dissertation

represents an analysis of the various factors that affect prices in one particular society: that of Egypt during the early reigns of the Ptolemaic dynasty.

Prices mean nothing in isolation, so an investigation of market forces and their impact on price formation and fluctuation must include a broad swath of data. Ancient Egypt has preserved a great deal of data about prices, but for much of its history this data comes from a small set of unique, relatively isolated periods and places. Not until the Ptolemaic period is there considerable data about prices simultaneously from multiple places in Egypt. The vagaries of preservation, helped along by the extensive Ptolemaic bureaucratic and documentary systems, have smiled upon this time and place, and the result is a great deal of extant textual material. Studies of Ptolemaic Egypt also benefit from the wonders of the Trismegistos online metadata database project, which contains information from a number of databases of ancient texts, including the Database of Demotic and Abnormal Hieratic Texts and the Heidelberger Gesamtverzeichnis, thus tabulating essentially all known Greek and Demotic texts from the period.[1] For my purposes, I started by searching Trismegistos for all texts written in Demotic and Greek from Egypt that dated to the early Ptolemaic period, from the Macedonian conquest in 332 BCE to the end of the Great Revolt in 186 BCE. This search yielded a total of 10,430 texts. Of that total, I was able to check 8,557 texts; my dissertation is based on over a thousand prices that I found in those texts.[2] Investigations of Ptolemaic Egypt benefit from the relatively enormous quantity of textual artifacts from this time and place.

At this point, economic history needs quantitative studies to provide solid evidence for the various theories of ancient economic forces that have been proposed. Such work has already

[1] Trismegistos Texts. www.trismegistos.org
[2] For a more detailed discussion of my methodology for data collection, see Appendix 1, "Publications Consulted," and Appendix 2, "Texts Cited for Price Data."

begun. Richard Saller has quantified the question of growth in the Roman world.[3] Hélène Cadell and Georges Le Rider have tabulated grain prices for early Ptolemaic Egypt, and Dorothy Thompson and Willy Clarysse have quantified Ptolemaic demographics.[4] The field seems to be moving in the direction of data, and this development is the key to any current or future scholar's ability to compose accurate theories of ancient economic behavior. For that reason, this dissertation is based on a rich compendium of data on prices from throughout the early Ptolemaic period, a fertile source of newly tabulated quantitative information.

1.2 Scope and Methodology of the Current Investigation

While previous investigations of the Ptolemaic economy have certainly proven fruitful, no such comprehensive quantitative study has yet been attempted. The vast majority of research has focused on evidence written in Greek, entirely ignoring the 3,118 Demotic texts of the period - nearly a third of the 10,430 documents that I found. This practice of exclusion of evidence written in one language within what was essentially a bilingual society is bound to provide only half the picture. To that end, this study draws together texts written in both Greek and Demotic to gain a larger perspective on the Ptolemaic economy. I meticulously checked each of the 8,557 I was able to access in both languages to find any mention of prices. For each price, I checked the editor's transliteration and translation against the original (wherever possible) to determine the most likely interpretation of the price by correcting any errors. I limited my search to texts written in Demotic

[3] Richard Saller, "Framing the Debate over Growth in the Ancient Economy," in *The Ancient Economy: Evidence and Models*, eds. J. G. Manning and Ian Morris (Stanford: Stanford University Press, 2005): 223-238.
[4] Hélène Cadell and Georges Le Rider, *Prix du blé et numéraire dans l'Égypte Lagide de 305 à 173,* Papyrologica Bruxellensia 30 (Brussels: Fondation Égyptologique Reine Élisabeth, 1997); Willy Clarysse and Dorothy J. Thompson, *Counting the People in Hellenistic Egypt*, 2 vols. (Cambridge: Cambridge University Press, 2006).

and Greek and did not include texts in other languages primarily because those were the most common languages of the period and because of my lack of expertise in such languages, although in the future such a complete tabulation would be ideal.

In order to investigate the impact of various market and institutional forces from a quantitative perspective, I have constructed an Excel database to tabulate all the price data I was able to find from Demotic and Greek texts that reference prices from Egypt proper and that date to the early Ptolemaic period, 332-186 BCE. It certainly would have been easier to narrow my focus to a more specific range of dates, a specific location, or a specific archive, but a smaller corpus would have been far less useful. Ultimately, prices represent relative values, and without proper sources for comparison, the mere prices themselves would have been meaningless.

Likewise, I included a wider range of commodities in my analysis of prices than has ever been previously collected for the Ptolemaic period. Where other scholars, such as von Reden and Cadell and Le Rider, limited their analysis to grain prices, or others, like Maresch, included only those most common staple goods, I included the prices of all things that could be considered commodities.[5] In drawing this limitation, I use the definition of a commodity as a thing whose particular qualities do not affect the price consumers are willing to pay for it: in other words, an undifferentiated good. These commodities include raw materials and fresh crops, such as wheat, but also things that required some processing, such as wine, cheese, and papyrus rolls. By limiting my analysis to commodities and excluding unique goods, such as land and jewelry, I have been

[5] Sitta von Reden, "Grain prices in the eastern Mediterranean (c. 420-30 BC)," in Dominic Rathbone and Sitta von Reden, "Mediterranean grain prices in classical antiquity," in *A History of Market Performance: From Ancient Babylonia to the modern world*, eds. R. J. van der Spek, Bas van Leeuwen, and Jan Luiten van Zanden (London: Routledge, 2015), 156-170; Cadell and Le Rider, *Prix du blé et numéraire dans l'Égypte Lagide de 305 à 173*; Klaus Maresch, *Bronze und Silber: Papyrologische Beiträge zur Geschichte des Währung im ptolemäischen und römischen Ägypten bis zum 2. Jahrhundert n. Chr.* (Cologne: Westdeutscher Verlag, 1996).

able to focus my understanding of price variability to reasons other than the particular qualities of the things themselves. If I had included non-commodities, with their more complex pricing dynamics, it would have been more difficult to tease out why certain prices were more variable than others, since the cause of different prices would be tied in part to the specific qualities of each particular thing. Such an analysis of the prices of unique goods may be interesting fodder for a series of smaller studies in the future, but since each individual price and its context would require a great deal of interpretation, non-commodities do not fit into the scope of the present study, with its extremely large, wide-ranging data set.

1.3 Outline of the Dissertation

My dissertation consists of eight chapters, which belong to two parts. In Part I, the first chapters set the foundation for understanding the price data in terms of theory, history, language, and metrology. In Part II, my final three chapters present and interpret the Ptolemaic price data and reflect back on the historical and theoretical concerns of the earlier chapters.

Following the present Chapter 1, which is intended to be a broad introduction to the subject matter of the dissertation, Part I consists of a more in-depth introduction to the main concepts and theoretical debates surrounding prices in antiquity as well as a background economic history of the period in question and its expressions of value. Within Part I can be found Chapter 2, "Approaches to Value and Price Formation," which provides a summary of the history of key ideas and terminology in the study of prices, regardless of the era of those prices.

Then Chapter 3, "Ancient Prices," turns to the ancient world specifically and discusses how those theories have been applied to prices from ancient cultures. This chapter contains an

overview of the debate between the so-called "modernists" and "primitivists" as well as a thorough review of previous attempts to study prices from ancient Egypt.

Next, Chapter 4, "Pricing in the Ptolemaic Economy: Price-Shaping Factors over Time and Space," narrows in more particularly on Ptolemaic Egypt and provides a survey of the key economic developments in the period. While of course it would be impossible to completely describe any economy, this chapter uses the framework for economic change established by the economist Douglass North to hypothesize and reflect on those demographic, technological, and institutional factors of Ptolemaic Egypt that were most likely to influence prices.

Finally, Chapter 5, "The Language of Value: Terminology and Translation," discusses the etymology and specific meanings of the terms used to express value in both Demotic and Greek in Ptolemaic Egypt. This chapter attempts to establish the relative monetary value of Greek and Demotic units of account, as well as the relative capacity of the various measures of volume that commonly appear in the price data. This background information is necessary so that the prices written in different languages, using different units of value and of volume, could be converted into comparable forms.

Once the core debates, history, and terminology of the period have been outlined in Part I, Part II can proceed with an analysis of and reflection upon the price data, in Chapters 6-8. Chapter 6, "Inflation in Ptolemaic Egypt," returns to the debate concerning the timing and causes of the Ptolemaic price increases. I use five new economic indicators in order to more precisely understand how and when prices increased. I then establish a framework of the three primary types of inflation understood by modern economists in an attempt to better situate my understanding of the Ptolemaic price increases. I argue that, while it is not possible to determine the cause of the price increases with certainty, the primary cause was most likely the change in

accounting standards that took place during the reign of Ptolemy IV. That shift could very well have been coupled with some real inflation, particularly cost-push inflation, that may have been related to speculation.

In Chapter 7, "Commodity Price Variability in the Ptolemaic Period," I present all the data on Ptolemaic commodity prices and analyze the volatility of those prices in light of the institutional controls described in Chapter 4. In particular, I test the hypothesis that the state's interventions in stabilizing prices were effective by testing the degree to which the prices of more directly regulated commodities (e.g., sesame, for which the price was fixed) were more stable than unregulated commodities. I note and explain the unexpectedly high levels of variability in most Ptolemaic prices, including prices that were supposedly fixed. In the end, I analyze some of the possible causes of this variability and reflect that, while the supply and demand for many commodities had the potential to be elastic, there was actually great inelasticity in practice.

Finally, I present my conclusions in Chapter 8. This chapter establishes the primary contribution of my dissertation, namely the high variability in Ptolemaic prices in the face of state interventions. These interventions were not successful in overriding the many environmental and other factors that led to this variability; I weigh the possibility that the state intervened and failed vs. that ostensible state interventions were not heavily enforced. Ultimately, I consider the relationship between price variability and the unreliability of information available to people in this society, arguing that in the face of such limited information, people were not as responsive in letting supply be elastic (e.g., by spending from grain reserves) as they technically could have been. I conclude by reflecting on the significance of this new understanding of the unpredictability of Ptolemaic prices through the lens of both history and economic theory.

CHAPTER TWO

Approaches to Value and Price Formation

"Price is what you pay; value is what you get."

- Warren Buffett[1]

2.1 Introduction

The following chapter represents the foundation of my investigation of Ptolemaic prices. I will start with the basics by first presenting and discussing the history and the current state of definitions of value, how value is derived, and how prices relate to value. Once these definitions have been explored in detail, then the question of the relevance of these modern theories to ancient societies can be examined in Chapter Three.

2.2 Aspects of Value

2.2.1 Introduction

Value is a multifaceted term. A thing can be judged in terms of its economic value, aesthetic value, moral value, intellectual value, social value, etc. Aesthetic value derives from an object's beauty. Moral, intellectual, and social value derive from an object or action's contribution to moral, intellectual, or social endeavors. Economic value's derivation is less certain, but it relates to an object's utility, labor, and/or exchange. Any discussion of value involves some sort of judgment along one or more of these scales. The current study is an investigation of economic value, which cannot possibly encapsulate all dimensions of a given object's value.

[1] Warren Buffet, "2008 Letter to the Shareholders of Berkshire Hathaway Inc.," February 27, 2009, <http://www.berkshirehathaway.com/letters/2008ltr.pdf>.

Economic value itself has multiple dimensions. It can be understood with reference to several dichotomies: use vs. exchange value, individualistic vs. relational value, and functional vs. symbolic value. Ultimately I will focus on use vs. exchange value as the fundamental structuring dichotomy for understanding economic value more generally.

2.2.2 Use Value and Exchange Value

The primary dichotomy to consider under the heading of economic value is the distinction between use value and exchange value. A thing can be valuable to an individual because of its own particular use. For example, a hammer is valuable to a carpenter because it helps that carpenter to hammer nails and build buildings. Exchange value, on the other hand, does not relate to the value an individual can obtain from keeping a thing and using it, but rather defines the possibility that the individual could gain other things by trading the thing away. For this reason, exchange value is sometimes also referred to as investment value. If an individual buys a house with the expectation that he will be able to sell it and earn a future profit, he buys that house for its exchange value, not its use value, which would be obtained if he bought the house to live in it. The distinction between use value and exchange value can be traced back to Aristotle, who in the *Politics* wrote that:

ἑκάστου γὰρ κτήματος διττὴ ἡ χρῆσίς ἐστιν, ἀμφότεραι δὲ καθ᾽ αὑτὸ μὲν ἀλλ᾽ οὐχ ὁμοίως καθ᾽ αὑτό, ἀλλ᾽ ἡ μὲν οἰκεία ἡ δ᾽ οὐκ οἰκεία τοῦ πράγματος, οἷον ὑποδήματος ἥ τε ὑπόδεσις καὶ ἡ μεταβλητική. ἀμφότεραι γὰρ ὑποδήματος χρήσεις: καὶ γὰρ ὁ ἀλλαττόμενος τῷ δεομένῳ ὑποδήματος ἀντὶ νομίσματος ἢ τροφῆς χρῆται τῷ ὑποδήματι ᾗ ὑπόδημα, ἀλλ᾽ οὐ τὴν οἰκείαν χρῆσιν: οὐ γὰρ ἀλλαγῆς ἕνεκεν γέγονε. τὸν αὐτὸν δὲ τρόπον ἔχει καὶ περὶ τῶν ἄλλων	For of each possession there is a double use; they both are related to it and similarly not related to it, but one is the familiar to the thing, the other the unfamiliar. For example, a sandal is a thing that is worn and a thing that is exchanged, for both are uses of the sandal. And the one who trades a sandal to one who wants one in exchange for money or food does use the sandal as a sandal, but (this is) not the familiar use, for it was not produced for the purpose of exchange. The same manner is held also for

κτημάτων. ἔστι γὰρ ἡ μεταβλητικὴ πάντων, ἀρξαμένη τὸ μὲν πρῶτον ἐκ τοῦ κατὰ φύσιν, τῷ τὰ μὲν πλείω τὰ δὲ ἐλάττω τῶν ἱκανῶν ἔχειν τοὺς ἀνθρώπους[2]	other articles of property. For exchange exists for all things, having begun at first out of the natural order, since men had more than enough of some things and less than enough of others.

The sandal can be used for its use value or its exchange value; according to Aristotle, both are legitimate uses of the sandal. Exchange value was born out of the natural order, as some men had more than enough of some things (and presumably were willing to trade those things with others).

Naturally, there is overlap between use value and exchange value. An individual can buy a house both to live in it now, using it as shelter, and still have the expectation that he can sell it for a profit in the future. Anything could have use and/or exchange value; these dimensions of value are not based on any inherent characteristics of the things, but rather the intent of their purchaser. Use value and exchange value thus represent two sides of how anything could hold economic value for its owner.

2.2.3 Individualistic Value and Relational Value

A second aspect of economic value also relates to the intent of a thing's buyer, what sort of use value the thing will have for him. If he buys the thing to satisfy his own desire, then he buys it for its individualistic value. However, if he buys it because doing so will improve his social status, making others think something about him, then he is buying relational value. So if an individual buys beautiful furniture for her home because it pleases her to live around beautiful things, that furniture has individualistic value for her. But if she buys that same furniture because she intends to entertain guests and wants them to see her as someone with excellent taste, then the furniture's value is relational. Naturally, many things will have both individualistic and relational value; these

[2] Aristotle, *Politics* 1.1257a, 6-16.

are not distinct categories but merely different aspects of use value. The same thing can be useful to an individual for her own private use and for her to send social signals. And again, individualistic and relational value are not immutable or based on any intrinsic qualities of a thing; they simply relate to the intent of the individual who buys the thing.

2.2.4 Functional Value and Symbolic Value

A third analytic dichotomy may be drawn between functional value and symbolic value, also aspects of use value. If an individual buys a thing because that thing will allow him to do something functional, to change the current state of the universe in some physical way, he is buying it for its functional value.[3] So if he buys a saw to cut down trees, that saw has functional value. Symbolic value, in contrast, refers not to the physical qualities of the thing but to its deeper meaning, both individually and socially constructed. Family heirlooms, even if they are worthless for exchange, may have symbolic value to the family members who own them because they find memories and emotion contained within them. Likewise, a young athlete who has just become successful and purchases a watch covered in diamonds is buying it not just for its functional value in telling the time but more for its symbolic value: it reminds him of his success, and, perhaps more significantly, the diamond watch signals that success to others he encounters socially. The watch has both functional and symbolic value, so it is clear that there can be overlap between these aspects of use value.

[3] Patrik Aspers and Jens Beckert, "Value in Markets," in *The Worth of Goods: Valuation and Pricing in the Echonomy*, eds. Jens Beckert and Patrik Aspers (Oxford: Oxford University Press, 2011), 13.

2.2.5 Conclusion

Under the heading of "economic value," we thus find multiple dimensions, based on the intent of a thing's owner and the meaning that owner attaches to the thing. Any thing can have both exchange value and use value, and use value itself can take multiple forms. In the current investigation of ancient prices, exchange value is of course more relevant than use value, so exchange value will be the focus of the study. However, there is a relationship between use and exchange value; the two aspects of value are not entirely distinct but rather influence each other. The nature of the relationship between use and exchange value, and the question of whether use value determines exchange value, shall be explored further below.

2.3 The Derivation of Exchange Value

2.3.1 Introduction

Where does exchange value come from? When an individual obtains a thing with the expectation that he will be able to exchange it later, what quality or qualities of the thing allow him to reach such an expectation? These questions have been explored with different answers over time. The results of these explorations include the utility theory of value, the labor theory of value, marginal utility theory, and theories relating to the formation of preferences.

2.3.2 Aristotle and Utility

Exchange only occurs because a thing is useful, so exchange value stems from use value, according to the utility theory of value. One of the earliest writers on the subject was Aristotle. He believed that an object's value derives from its usefulness, and usefulness derives from its ability to produce a good (i.e., functional value). In the *Topics*, he writes, "the pleasant stands in the same

relation to pleasure as the useful to the good; for in each case the one is productive of the other."[4] So a thing that is useful produces the good. Then in his discussion of the good in the *Nichomachean Ethics*, he explains that "things can be called good in two senses: some as good in their own right, and other as means to secure these."[5] Something can be good in its own right, or it can be good because it is useful, i.e., it produces something else good in its own right. Aristotle derives value (goodness) from a thing's ability to produce something good, its utility.[6]

This use value is not objective, but rather varies from person to person and from time to time based on each individual's needs. Aristotle writes, "Utility is an impermanent thing: it changes according to circumstances."[7] One sort of 'circumstance' that can alter the utility of an object is its quantity. So "external goods have a limit, like any other instrument, and all things useful are of such a nature that where there is too much of them they must either do harm, or at any rate be of no use, to their possessors," Aristotle writes in a statement that might be seen as a precursor to marginal utility theory.[8] Another factor affecting use value is the conspicuousness of this use value: an object is more valuable if it can be used publicly, since there is an added social element to its use value (i.e., relational value). He writes, "those things which we are seen to possess are better than those which we are not seen to possess, since the former have the air of reality. Hence wealth may

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[4] Aristotle, *Topics* 124a (translation mine). See Barry J. Gordon, "Aristotle and the Development of Value Theory," *Quarterly Journal of Economics* 78, no. 1 (1964): 117.
[5] Aristotle, *Nichomachean Ethics* 1096b.
[6] The respective values of different things can be compared based on how "good" they are. Aristotle posits, "if one thing is a greater and the other a lesser good than the same thing, the greater good is preferable; or if one of them is greater than a greater good" (*Topics* 118b). Since what is useful is good, it follows that values of different things vary based on how useful they are.
[7] Aristotle, *Nichomachean Ethics* 1156a.
[8] Aristotle, *Politics* 1323b.

be regarded as a greater good if its existence is known to others."[9] Thus utility can vary based on the situation in which a thing exists.

For exchange to take place, according to Aristotle, utility is not itself enough. The element of demand is also a necessary ingredient for the creation of exchange value. He writes, "That it is demand, forming as it does a single standard, that holds such associations together is clear from the fact that when neither party, or only one party, needs the services of the other, they make no exchange."[10] Thus exchange value is predicated on demand, which is naturally itself predicated on utility. Utility is still the basic creator of value.

2.3.3 The Labor Theory of Value: Smith and Marx

Contrary to Aristotle, Adam Smith, as he wrote *The Wealth of Nations* (1776), thought that exchange value derived not from utility, but from labor. He wrote:

> the value of any commodity, therefore, to the person who possesses it, and who means not to use or consume it himself, but to exchange it for other commodities, is equal to the quantity of labour which it enables him to purchase or command. Labour, therefore is the real measure of the exchangeable value of all commodities.[11]

Essentially, if a thing required no labor either to create it or to purchase the rights to it, it would have no value. So an apple fallen from a tree on public land would technically have no value to the man who happens to be sitting beside it. He could eat the apple without consuming any value because the apple contained no labor. But if the same apple were high up on the tree, it would take labor for the man to pick it. Likewise, if the tree were owned by someone else, it would take

[9] Aristotle, *Rhetoric* 1365b.
[10] Aristotle, *Nichomachean Ethics* 1133b.
[11] Adam Smith, *The Wealth of Nations* (New York: Modern Library, 2000 [1776]), 33.

labor to pay for the right to pick the apple. In either scenario, the apple has taken on exchange value through labor.

The "real price" of a thing ultimately is "the toil and trouble of acquiring it," in Smith's view.[12] What someone will actually pay for a commodity, or the lengths to which he will go to obtain it, consists of the labor that buying the commodity will save him from expending to create or acquire it himself. This idea differs from the Aristotelian concept of demand or need (χρεία) as the extra ingredient necessary for the existence of exchange value. Where Aristotle thought that an individual must *need* a thing in order to exchange for it, Smith thought that the individual would only buy a thing if doing so would save him the *labor* of making it himself.

Smith distinguished between two types of value: real value and nominal value. A thing's "real price" is "always of the same value," since that value is based on the labor-time the thing contains.[13] He continued, "labour, therefore, it appears evidently, is the only universal, as well as the only accurate measure of value, or the only standard by which we can compare the values of different commodities at all times and places."[14] However, Smith recognized that, practically speaking, individuals do not reckon prices in terms of labor, but rather money. Therefore, a thing has both a "real price," a fixed value based on labor-time, and a "nominal price," a changing value based on the amount of money paid for the thing. Nominal prices change over time and place, not because the real value of the thing has changed, but because of the fluctuating values of the precious metals contained in the coins themselves.[15] Smith thus believed that prices may change, but everything has its own fixed, inherent value.

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[12] Ibid.
[13] Ibid., 37.
[14] Ibid., 41.
[15] Ibid., 37-38.

Smith saw a sharp distinction between utility and exchange value, arguing that "the things which have the greatest value in use have frequently little or no value in exchange; and on the contrary, those which have the greatest value in exchange have frequently little or no value in use."[16] Smith's argument against the more ancient theory of value based on utility is most persuasive when he pointed out that "nothing is more useful than water: but it will purchase scarce any thing; scarce any thing can be had in exchange for it. A diamond, on the contrary, has scarce any value in use; but a very great quantity of other goods may frequently be had in exchange for it."[17] Emil Kauder has written, rather dramatically, that "with these few words Adam Smith had made waste and rubbish out of the thinking of 2,000 years."[18] However, Smith's inability to see the relationship between use value and exchange value is ultimately a result of his limited understanding of use value. He could only see functional value as use value, and he did not take into account all of the other possible dimensions of utility, such as symbolic value or relational value. Smith's focus on functional value led him to completely separate utility from exchange, ultimately giving too much credit to labor alone as the source of exchange of value.

While Karl Marx may have disagreed with Smith on many other topics, Marx agreed with the idea that exchange value ultimately derives from labor.[19] In Volume 1 of his *Capital* (1867), he acknowledged that a thing's utility gives it a "use-value," but also argues that labor is logically

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[16] Ibid., 31. See also Aristotle, *Rhetoric* 1364a, where Aristotle anticipated this possibility but did not effectively work through its complexity.
[17] Smith, *Wealth of Nations*, 31-32.
[18] Emil Kauder, "Genesis of the Marginal Utility Theory: From Aristotle to the End of the Eighteenth Century," *Economic Journal* 63, no. 251 (Sept. 1953): 650.
[19] Of course Marx's theories are based on the historically specific form of capitalism that he saw operating around him, and they should not be over-generalized (as opposed to Smith's more transhistorical ideas). They are included here simply for their high level of influence on thought relating to the concept of value.

prior to this use-value.[20] He wrote, "a use-value, or useful article, therefore, has value only because human labour in the abstract has been embodied or materialised in it."[21] Labor is what creates utility, essentially, so labor is what really gives a thing value.[22]

It may seem that Marx's theory of value is purely based on labor, like Smith's. But utility did matter to Marx. He wrote that "nothing can have value, without being an object of utility."[23] If a thing does not have utility, i.e., if it is useless, then the labor it took to produce it "does not count as labour, and therefore creates no value."[24] Labor does not create value without first creating utility. Both labor and utility are therefore necessary for value to exist in a thing, in Marx's view. Just as labor without utility would be without value, Marx likewise believed that utility without labor does not constitute value. For example, "air, virgin soil, natural meadows, &c." do not have value because their "utility to man is not due to labour."[25] This apparently counterintuitive idea springs from Marx's notion that "value" in capitalism is essentially exchange value, which can only exist in a commodity produced for exchange. Value is not possible without social life, without other people with whom to exchange.

So while labor and utility are both necessary to produce value, their coexistence in a thing does not necessarily indicate that that thing must have exchange value. Marx wrote, "whoever directly satisfies his wants with the produce of his own labour, creates, indeed, use-values, but not commodities. In order to produce the latter, he must not only produce use-values, but use-values

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[20] Karl Marx, *Capital: A Critique of Political Economy*, vol. 1, trans. Edward Aveling (Mineola, New York: Dover Publications, 2011 [1867]), 42.
[21] Marx, *Capital*, 45.
[22] Ibid., 50.
[23] Ibid., 48.
[24] Ibid.
[25] Ibid., 47.

for others, social use-values."[26] Labor and utility do not create value for a thing unless that thing is intended for exchange. Marx thus emphasized the *social* dimension of economic value. Production does not happen in a vacuum, and if a thing is produced for exchange, an increasing amount of labor put into production will not yield an infinitely increasing value. For that reason, Marx wrote that "that which determines the magnitude of the value of any article is the amount of labour socially necessary, or the labour-time social necessary for its production."[27] Ultimately, Marx's is not merely a labor theory of value, but rather a theory of exchange value that requires both labor and utility, in that order.

While an intent to exchange is necessary for the creation of value, in Marx's theory, by the time a thing reaches the market, its value has already been defined. Market forces themselves, such as the wants of buyers and sellers, play an insignificant role in the creation of value. Rather, value is created in production.[28] It was only with the rise of neoclassical economics and the development of marginal utility theory that the market's role in valuation came to be considered.

2.3.4 Marginal Utility Theory (Neoclassical Economics)

Although the labor theory of value was broadly accepted for most of the nineteenth century, not all economists were convinced. In 1833, Richard Whately wrote in his *Easy Lessons on Money Matters for the Use of Young People*, "It is not ... labour that makes things valuable, but their being valuable that makes them worth laboring for."[29] With this statement, written decades before *Capital*, Whately presented essentially the reverse of Marxist theory. Whately's

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[26] Ibid., 48.
[27] Ibid., 46.
[28] Aspers and Beckert, "Value in Markets," 9.
[29] Richard Whately, *Easy Lessons on Money Matters for the Use of Young People* (London: J.W. Parker, 1833), 33, quoted in Richard S. Howey, *The Rise of the Marginal Utility School: 1870-1889* (New York: Columbia University Press Morningside Edition, 1989), xvi.

book was not widely influential, and may have easily been forgotten, were it not for a young William Stanley Jevons, who read the book as a child and kept the idea in mind. In the late nineteenth century, Jevons became one of the founders of a new school of thought, often referred to as neoclassical economics, which based value not on labor but on "marginal utility." Marginal utility theory finds disagreement with the labor theory of value in viewing utility as logically prior to labor. Since labor only produces value if it produces something that can satisfy an individual's wants and needs, then value must derive from that utility, not from the labor itself.[30]

The marginal utility theory was developed independently by three scholars writing around the same time: Jevons, in his *Theory of Political Economy* (1871); Carl Menger, in his *Grundsätze der Volkwirtschaftslehre* (1871); and Léon Walras, in his *Élements d'économie politique pure* (two parts, published in 1874 and 1877).[31] Jevons, Menger, and Walras believed that value was determined by utility, but that utility took on a new dimension. Menger did not use the term "utility" but instead spoke of the satisfaction of needs, just as Jevons and Walras referred to a good's "power to satisfy wants."[32] Traditionally, utility was understood as the overall, total usefulness an individual gains from consuming a thing. Those of the marginal utility school realized that a thing's utility is not constant or static, so they focused instead on the changes in utility and how those relate to changes in consumption.[33] For example, a loaf of bread may be incredibly useful to an individual who is starving, but its usefulness would not be so intense for an individual who has already eaten and still has thousands of loaves of bread in his stores. Jevons put

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[30] Howey, *Marginal Utility School*, 42.
[31] William Stanley Jevons, *The Theory of Political Economy*, 1st ed. (London: Macmillan, 1871); Carl Menger, *Grundsätze der Volkwirtschaftslehere* (Wien: W. Braumüller, 1871); Léon Walras, *Élements d'économie politique pure, ou Théorie de la richesse sociale*, 1 vol. in 2 pts. (Lausenne: L. Corbaz, 1874-1877).
[32] Howey, *Marginal Utility School*, 40-41.
[33] Ibid., 1.

forth this concept of diminishing utility "as a general law, that *[utility] varies with the quantity of commodity, and ultimately decreases as that quantity increases.*"[34] Utility is not an intrinsic quality of a thing.

If utility is not intrinsic, and value is based on utility, then value itself is not intrinsic. According to marginal utility theory, value can only be understood in relative terms. It cannot be understood based on one fixed measurement like labor-time. This idea situates economic value firmly within the sphere of market exchange, abandoning the concept of real value as something separate from market price, a concept which Smith had argued for previously.[35]

This integration of value concepts with market exchange was not entirely smooth, however. Jevons, Menger, and Walras all noted that an individual could find utility in a thing not because he can consume it himself, but rather because he can exchange the thing for other things that would be more directly useful to him.[36] So clearly the founders of the marginal utility school of thought were interested in market exchange as a form of utility, and they believed that utility created exchange value. Thus exchange value is itself a factor that determines exchange value, a logical dilemma that none of these scholars directly addresses.[37]

Despite such circular reasoning, marginal utility theory has been enormously influential in the development of modern theories of value, primarily because of its abandonment of the concept of fixed, inherent value. Now it is possible to speak of changes in the *value* of things over time and space, not just variation in the quantity of money they command. Moreover, since the development of marginal utility theory, economists no longer have been restricted to investigating

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[34] Jevons, *Theory*, 62; as cited in Howey, *Marginal Utility School*, 41.
[35] Aspers and Beckert, "Value in Markets," 9.
[36] Howey, *Marginal Utility School*, 42-43.
[37] Ibid., 44

only how market actors minimize costs, but also how they maximize utility.[38] Now individuals in the market themselves become active in defining value, since their specific desires matter and affect this newly subjective utility.

2.3.5 Sociological Approaches: The Formation and Fluctuation of Preferences

Marginal utility theory has been extremely influential in the development of economics as it is known today. The idea that value and prices shift based on fluctuations in demand is still largely accepted. However, Aspers and Beckert find fault with marginal utility theory in that it only looks at the relationship between changes in demand and changes in prices.[39] The two affect each other, but price fluctuation is not the only factor that affects demand. Essentially, marginal utility theory sees individuals entering the market with fixed preferences for certain things, and they buy based on changes in price and the limitations of their budgets. Aspers and Beckert counter this idea, writing that

> such a theory remains incomplete because it remains silent on the origins of preferences. ... And to the extent that market equilibria are affected by endogenously changing preferences, a theory that exogenizes preferences cannot reach its goal of explaining the observable equilibria. It is this systematic point at which sociological approaches to the question of valuation in the economy set in.[40]

[38] Ibid., 1.
[39] Aspers and Beckert, "Value in Markets," 9-10.
[40] Ibid.

Value can no longer be studied solely based on economic models, and recent work on the subject incorporates economic theory and sociology, from which vantage point preference formation can be understood more effectively.

The utility that, we have seen, determines an individual's demand for a thing is not purely functional, so preferences cannot be viewed purely through the lens of functional value.[41] Rather, there are social components to utility that themselves affect individual preference. According to the bandwagon effect, for example, individuals have greater demand for a thing if they perceive it to be popular (i.e., they believe that many other individuals are buying it).[42] Conversely, social taboos might decrease an individual's demand for a thing.[43] A man who might otherwise be interested in purchasing pornography would be less likely to buy it (i.e., would have decreased demand for it) if he lived within a conservative culture that frowned upon pornography. The taboo would not even have to be that extreme. An individual might not buy a certain style of clothing if she perceives that other people are not buying that style, that the style is unpopular. Many coats might have the same functional utility: they can keep a person warm. But social taboos would render certain coats less desirable if the consumer perceives that others are not wearing coats like those. Essentially, demand can decrease if an individual thinks other people are not buying that given thing.

While some individuals might have stronger or weaker preferences for a thing because they desire to be like other people, other individuals are more interested in setting themselves apart. For

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[41] For a comprehensive investigation of preference formation (and preference reversals) from a psychological perspective, see Sarah Lichtenstein and Paul Slovic, eds., *The Contruction of Preference* (Cambridge: Cambridge University Press, 2006).
[42] H. Leibenstein, "Bandwagon, Snob, and Veblen Effects in the Theory of Consumers' Demand," *Quarterly Journal of Economics* 64, no. 2 (1950): 190-199.
[43] Leibenstein, "Bandwagon, Snob, and Veblen Effects," 196-199.

example, the snob effect refers to some individuals' desire to be different from others.[44] Such individuals will have a stronger demand for a thing if they think others are *not* buying it. The snob effect is effectively the opposite of the bandwagon effect. If a "snob" perceives that something is popular and trendy, his demand for that thing will actually decrease.

The Veblen effect demonstrates that the social dimension of prices also can affect consumer preferences.[45] An individual's demand for a thing might increase because the thing has a higher price, since that higher price would be perceived by others, and in possessing the thing, the individual's social status might rise. Items that are considered luxurious because of their expense often are more desirable than less expensive items that seem to have the same functional value, since the expensive items actually have an additional function: signaling status. This conspicuous consumption affects preferences because it can affect perceptions of social status.

Significantly, not all individuals are the same; studies of the last hundred years or so have shown us not only that utility extends beyond functionality, but also that different individuals are more or less affected by the various social dimensions of utility discussed above. After all, not everyone is so concerned with signaling wealth and status that she would buy expensive luxury items, even if she could afford them. George Akerlof and Rachel Kranton have coined the term "Identity Economics" to describe this interplay between individual identity and economic behavior.[46] They explain, "People's identity defines who they are--their social category. Their identities will influence their decisions, because different norms for behavior are associated with different social categories."[47] Akerlof and Kranton are interested primarily in how socially

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[44] Ibid., 199-202.
[45] Ibid., 202-206.
[46] George A. Akerlof and Rachel E. Kranton, *Identity Economics: How Our Identities Shape Our Work, Wages, and Well-Being* (Princeton: Princeton University Press, 2010).
[47] Ibid., 13.

constructed identity shapes individual's behavior at work and school, but their theory applies to value studies as well. From their logic, it follows that the factors that determine who has what preferences (for example, who cares about status and who doesn't) are not just individually determined, but based on social identity. An individual's identity is shaped in part by her surroundings: the behavioral norms displayed by those around her as well as the ideals they hold about how people should be and act. So someone whose identity is wrapped around fitting into a social group that idealizes wealth would be more likely to have a preference for luxury goods.

Ulrich Witt has written further about this process of learning preferences, or "wants."[48] He first distinguishes between "innate wants," or needs, and "acquired wants." Innate wants can be fully satisfied (i.e., an individual can eat until he is full), but acquired wants are often theoretically insatiable. Wants can be satisfied either directly or through "tools," and individuals build up a knowledge of how best to satisfy their wants through both personal experience and inventiveness.[49] Witt makes use of psychology throughout his theory, particularly when he posits that acquired wants are acquired not just through acquisition of knowledge, but through associative learning and social conditioning. These acquired wants also tend to build upon each other, so the number of acquired wants is continually growing.[50] He continues, writing that an individual cannot possibly pay equal attention to all the information he comes across; in today's marketplace, it is impossible for an individual consumer to have full knowledge of all his available choices and their features.[51] He rather develops a specialized knowledge based on what he considers most relevant to him. This relevance is influenced by the groups of which he is a member, and "specialization in

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[48] Ulrich Witt, "Learning to consume -- A theory of wants and the growth of demand," *Journal of Evolutionary Economics* 11 (2001): 23-36.
[49] Ibid., 28.
[50] Ibid., 34.
[51] Ibid., 30.

consumption may become a collective 'sub-cultural' phenomenon specific to the respective groups."[52] Witt's theory thus takes Akerlof and Kranton's idea of socially-constructed identity as a factor affecting preferences a step further, making use of psychology to explain why demand is affected by one's membership in a given social group.

Ultimately, the recent work in value theory has demonstrated that value is a function of utility, and that utility is more complicated than it may initially seem. Individuals derive value from things for reasons that go far beyond simple functionality. Preferences are often based not only on which thing better serves a given purpose, but on a great deal of information, processed in part based on that individual's social identity.

2.4 Price

2.4.1 Definitions: Value vs. Price

Clearly, an individual's perception of a thing's value does not form in a vacuum. In this aspect, economic value and price are similar. But the two terms are not synonyms. If an individual can call a product "cheap" or "expensive," "a good deal" or "a rip-off," then that individual is distinguishing between the perceived value of the product and its price.[53] Valuation is a process that takes place within each individual's head based on information that individual has about the thing in an attempt to establish the thing's utility *for that individual*. The thing's price, on the other hand, "is the outcome of different assessments of the economic value of a product in the market process," which can differ from individuals' assessment of the thing's value for them.[54] An individual's assessment of a thing's economic value, as we have seen, is affected by social factors.

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[52] Ibid., 31.
[53] Aspers and Beckert, "Value in Markets," 27.
[54] Ibid.

But market prices are not just influenced by social life; the structure of the market itself, with its rules, institutions, networks, and conventions, determines price, but not value.[55]

2.4.2 Pricing Mechanisms

If prices are a function both of economic value (based on utility) and market forces, then how are set prices established? Ultimately, the answer to this question depends on the pricing mechanism used, which is dependent on the type of market in which the pricing activity is taking place. The three most common pricing mechanisms are negotiation, auction, and price setting by the seller.

When a seller and a buyer discuss what price should be paid for a thing, they are engaging in negotiation. Negotiation may seem like the most basic, straightforward pricing mechanism, but it can be carried out not only on the level of two individuals' sitting down and talking it over, but today also on the level of multinational corporations' engaging teams of lawyers and professional negotiators to work out a deal. Negotiation analysis lies mainly within the fields of psychology (decision analysis) and game theory, and there exists a large body of work in these fields on how exactly negotiations take place to the benefit of one or both parties.[56] The norms of the negotiation process, called "behavioral sequences," have been shown to differ across cultures.[57] In terms of price formation, however, the ultimately important behavior is that the buyer and seller alternate proposing prices at which they would be willing to buy and sell, respectively, until they reach an agreement beneficial to one or both parties.

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[55] Ibid.
[56] See, for example, James K. Sebenius, "Negotiation Analysis: A Characterization and Review," *Management Science* 38, no. 1 (1992): 18-38.
[57] Wendi L. Adair and Jeanne M. Brett, "The Negotiation Dance: Time, Culture, and Behavioral Sequences," *Organization Science* 16, no. 1 (2005): 33-51.

In an auction, the seller proposes a starting price, and then multiple buyers bid by agreeing to higher and higher prices, until either no buyer can be found to bid higher or time simply runs out.[58] The seller only has to consider the lowest price he would be willing to take, which is dependent upon his costs and his need for money, potentially as well as the individualistic value he places on the item. The potential buyers are the ones who actually form the market price.[59] They each decide individually the price they would be willing to pay, based on their demand and their resources.

Alternatively, and most commonly in our society, the seller simply sets a price, and the buyer can choose whether to take that price or not buy the thing; negotiation is not allowed. In this case, the seller is the one to form the price. He bases his price on his own costs, what it would be worth to him to lose ownership of the thing. Market forces also come into play, since he must consider not only what price a buyer would be willing to pay, but also what price will attract buyers at a desirable volume, depending on the thing he is selling.

Different pricing mechanisms can also operate simultaneously. For example, an items may have a set "sticker" price which differs from the market price, the amount the buyer actually pays for the thing.[60] The market price may end up effectively higher or lower than the set price because after the price is set, negotiation takes place. In such a situation, price setting and negotiation are actually not distinct but are both in operation.

The person who determines the price differs across the pricing mechanisms. In the case of negotiation, both buyer and seller work to form the price. At auctions, the potential buyers come

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[58] For a comprehensive work on auctions and the theory behind them, see C. Smith, *Auctions: The Social Construction of Value* (Berkeley: University of California, 1989).
[59] In some Dutch auctions, the auctioneer himself also plays a role in setting the price. If he deems the seller's start price too high, he may drop it until he can get a buyer to bid.
[60] Aspers and Beckert, "Value in Markets," 27.

to the final price. In most cases, though, the seller decides on the set price himself, and the buyer's input on that set price is restricted to his overall input on the market.

2.4.3 Price Formation

From this basic description of pricing mechanisms, it would seem that the determination of prices is in the hands of various individual agents, depending on the pricing mechanism used. However, even Adam Smith would acknowledge the role of other parties in price formation; individual agents do not determine prices on their own. For example, Smith wrote that landlords will hold back some of the supply of land for rent when demand is lower than supply in an attempt to keep the price of land (i.e., rent) high.[61] With this example, Smith demonstrated that individuals have to take the interests of other people into account when setting prices. In effect, the market exerts some influence in price formation; individual sellers and buyers cannot just decide on prices without reference to something social.

Émile Durkheim asserted that prices are social facts, i.e., that individuals confront prices as external features over which they do not have much control.[62] Essentially prices are outside the reach of the influence of individuals in the marketplace. Rather, prices reflect social norms based on public opinion of a thing's value. Thus prices are inherently *social* facts; they represent general social norms rather than an aggregate of individual judgments of value. Durkheim interprets these social norms rather specifically as based on "moral considerations of social solidarity."[63]

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[61] Smith, *Wealth of Nations*, 65.
[62] Jens Beckert, "Where do prices come from? Sociological approaches to price formation," *Socio-Economic Review* 9 (2011): 757-758. See Émile Durkheim, *The Division of Labor in Society*, trans. W. D. Halls (New York: Free Press, 1997 [1893]). For further discussion of economic features generally as social facts, see Philippe Steiner, "Le fait sociale économique chez Durkheim," *Revue française de sociologie* 33, no. 4 (1992): 641-661.
[63] Beckert, "Where do prices come from?," 780.

However, the social dimension of price formation need not be considered only from this moral perspective. At its most basic level, this social dimension is apparent when individuals get together and collude to fix prices. Even Smith was afraid of such collusion when he wrote of his concern that employers "are always and every where in a sort of tacit, but constant and uniform combination" to keep the wages of labor low.[64] Other social theorists, including Marx and Weber, expressed similar concerns. Today antitrust legislation attempts to limit monopolies and stimulate competition. All these concerns reflect the social dimension of price formation.

Social networks have an influence on economic behavior beyond the desire to maintain social solidarity through shared morality. Mark Granovetter has emphasized that "economic action is embedded in structures of social relations in modern industrial society," just as Karl Polanyi had claimed for historical or nonmarket societies.[65] Since Granovetter's 1985 call for sociologists to conduct research in economics and ignore perceived boundaries between the two fields, such work on the relationship between economic behavior and social behavior and structures has become more commonplace. For example, Paul Ingram and Peter Roberts have demonstrated that friendship among managers of competing hotels in Sydney actually improves their hotels' performance.[66] Brian Uzzi and Ryon Lancaster have observed something similar in corporate law firms.[67] Social embeddedness, in the forms of "embedded ties, board memberships, and status," affect price formation.[68] Likewise, Joel Polodny has focused specifically on status

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[64] Smith, *Wealth of Nations*, 76.
[65] Mark Granovetter, "Economic Action and Social Structure: The Problem of Embeddedness," *American Journal of Sociology* 91, no. 3 (1985): 481.
[66] Paul Ingram and Peter Roberts, "Friendship among Competitors in the Sydney Hotel Industry," *American Journal of Sociology* 106 (2000): 342-387.
[67] B. Uzzi and R. Lancaster, "Embeddedness and Price Formation in the Corporate Law Market," *American Sociological Review* 69 (2004): 319-344.
[68] Ibid., 319.

ordering and how it affects economic decision making.[69] Clearly, economic decisions are not made based on purely economic factors and a desire to maximize efficiency and profit; rather, economic life is socially embedded, and social factors must be given significant weight in any understanding of price formation and fluctuation.

Prices tend to form not just by the whims of individuals; they form out of networks which often are themselves based on trust. Market actors who are well acquainted with each other and who have developed a certain level of trust between each other will often feel less of a need to protect themselves against any potential risk involved in the transaction.[70] A buyer might be willing to pay a higher price to deal with a more trusted seller rather than run the risk of buying something more cheaply from a stranger. Likewise, a seller might be willing to sell his goods at a lower rate to a buyer he trusts to follow through on payment. Social networks also come into play in scenarios in which the buyer and seller have a relationship outside of the sale. Family members or friends might be willing (or might be expected to be willing) to do each other favors by sacrificing a bit economically in order to further cement the social bond between them.

The status of producers can also play a role in the prices they set. Producers whose status in the market is considered high are able to charge higher prices, regardless of the actual quality of their product.[71] Those high prices then continue to signal their high status. When producers set their prices, they are not just competing for revenue, but also social status.

Another factor that must be considered in terms of the role of networks in price formation is an individual's ability to assess a thing's value, and ability that depends on social technologies.[72]

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[69] Joel M. Podolny, *Status Signals: A Sociological Study of Market Competition* (Princeton: Princeton University Press, 2005).
[70] Beckert, "Where do prices come from?," 762-763.
[71] Ibid., 763-766.
[72] Ibid., 771-772.

For example, an individual without training could not accurately determine the price of a financial derivative, since the pricing of derivatives depends on a calculation model socially agreed upon by experts in that field. However, most people have some idea of how houses are priced, based on location, square footage, comparable sales, etc., so most reasonably knowledgeable individuals would have some idea of what a house "should" cost, based on those factors. Practically speaking, individuals do set prices for things they sell, but they do so based on socially constructed means of calculating of market value, and it is impossible to set an accurate price for a thing without knowledge of those means of calculation. Such knowledge generally comes from interaction within a given social network.

Social life can be seen as regulated by institutions to a certain extent, so the role of institutions in price formation has been discussed at length, especially within the field of institutional economics.[73] Institutions may have the authority to regulate market competition (for example, via antitrust laws or intellectual property laws). Other laws, such as those regulating the minimum wages for labor or minimum quality standards, influence a producer's costs and therefore what price he will be able to charge for his finished product. Taxation policies developed and enforced by institutions can have similar effects on price formation. State institutions also have control over monetary policy, which affects inflation and deflation, thereby influencing price levels. Institutions thus can influence price formation both directly and indirectly.

The role of culture in price formation cannot be discounted; after all, culture determines whether a thing can even be considered a commodity and be given a price at all. Our society, while capitalist, sets certain limits on commoditization and price setting. At this time in the United States, it is considered immoral to sell (and therefore put a price on) people, body parts, sexual

[73] Ibid., 766-771.

services, or illicit drugs, for example. These things are seen as un-sellable either because they are considered, in some sense, sacred (e.g., you cannot sell a baby) or socially undesirable (as in the case of drugs). In either case, though, culture defines what can be a commodity and have a price.

Olav Velthius has demonstrated that price formation, where its operation is culturally sanctioned, is further affected by culture.[74] In his investigation of contemporary art markets, he reaches the conclusion that market settings are just as infused with culture as any other setting. As with any other type of social interaction, economic activity involves rituals and symbols that transfer meaning between individuals.[75] The connections between these individuals require maintenance, which itself involves complex social processes. Velthius writes that "prices have symbolic meanings as well as economic ones," noting that the very history of an artist's career might be explained in terms of the prices his artwork fetched over time.[76] He explains that culture can restrain economic life by limiting what types of things might be bought and sold and by dictating the proper setting for buying and selling (in some cases, a sparse, white gallery, for instance). Culture can also be enabling, he writes, "since it provides economic actors with the tools to shape markets, social relationships, and contexts of commoditization, in legitimate and meaningful terms."[77] Essentially, economic activity and prices have *meaning*; they are not mere mathematical products of a market based only on self interest. Prices both create and are created in part by cultural symbols beyond mere math.

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[74] O. Velthius, *Talking Prices: Symbolic Meanings of Prices on the Market for Contemporary Art* (Princeton: Princeton University Press, 2005).
[75] Ibid., 3.
[76] Ibid., 4.
[77] Ibid.

Ultimately, price formation is affected by structural factors; as Pierre Bourdieu has written, these factors "create the space."[78] The structure of the economic field is defined by the distribution of resources and costs. This structure then organizes the relationships between the various agents, as well as their power dynamics and their differential opportunities for profit. Official institutions are certainly involved in this structure, but they do not define it. Rather, the unequal distribution of capital and other resources "weighs, quite apart from any direct intervention or manipulation, on all the agents engaged in the field; and the worse placed they are within that distribution, the more it restricts the *space of possibilities* open to them."[79] The range of choices available to individual agents is not unlimited, and the limitations are just as important as the options themselves with relation to the development of supply and demand patterns. Prices are socially constructed; and power structures play a significant role in defining the economic field in which everything is taking place.[80] Bourdieu concludes, "it is not prices that determine everything, but everything that determines prices."[81]

2.4.4 Price Fluctuation

For the most part, prices are not fixed, but rather display changes over time and space. These fluctuations are due in part to shifts in supply and demand. The theory of supply and demand was proposed by John Locke in his 1691 letter, *Some Considerations of the Consequences*

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[78] Pierre Bourdieu, "Principles of an Economic Anthropology," in *The Handbook of Economic Sociology*, eds. N. J. Smelser and R. Swedberg (Princeton: Princeton University Press, 2005) <http://credoreference.com.proxy.uchicago.edu/entry.do?id=9831263>.
[79] Pierre Bourdieu, "Principles of an Economic Anthropology," emphasis his.
[80] See also Marx, *Capital.*
[81] Pierre Bourdieu, "Principles of an Economic Anthropology."

of the Lowering of Interest and Raising the Value of Money.[82] Here, he wrote that "the price of any commodity rises or falls, by the proportion of the number of *Buyers* and *Sellers*; This rule holds Universally in all Things that are to be bought and Sold."[83] Thus from the beginning the theory of supply and demand was considered a universal law of human behavior. Locke continued, writing that demand is based on utility and preference: "The Vent of any Thing depends upon its Necessity or Usefulness, as Convenience, or Opinion guided by Phancy or fashion shall determine."[84] Ultimately Locke thought that people would pay any price for things considered necessary for survival, but that demand for mere conveniences would be based on those conveniences' relative desirability vis-à-vis other conveniences. Prices rise when supply falls because everyone who is able will pay more for necessary things and many people will also pay more for merely desirable things. Locke neatly summarized his theory of supply and demand thus: "And therefore in any one of these Commodities, the value rises only as its quantity is less, and vent greater."[85] When supply is low and/or demand is high, prices rise.

Nearly a century later, Smith echoed Locke's ideas in his *Wealth of Nations*. Smith distinguished between a commodity's natural and market price. The natural price is based on the "ordinary or average .... rates of wages, profit, and rent, at the time and place in which they commonly prevail."[86] A thing is sold at its natural price when its price is exactly "what is sufficient to pay the rent of the land, the wages of the labour, and the profits of the stock employed in

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[82] John Locke, *Some Considerations of the Lowering of Interest and Raising the Value of Money*, in *Locke on Money*, vol. 1, ed. Patrick Hyde Kelley (Oxford: Clarendon Press, [1691] 1991), 207-342.
[83] Ibid., 243-244 (emphasis and capitalization his).
[84] Ibid. 244 (capitalization his). Locke was using an archaic meaning of the word "vent," similar to modern English "vend." This use was common from c. 1550-1750 and referred to the "readiness or profitability of trade," or "the fact, on the part of commodities, of being disposed of for sale or finding purchasers." *Oxford English Dictionary*, s.v. "vent, n.^{3}," http://www.oed.com/view/Entry/222208?rskey=ckuVMo&result=3&isAdvanced=false#eid.
[85] Locke, *Some Considerations*, 245.
[86] Smith, *Wealth of Nations*, 62.

raising, preparing, and bringing it to market, according to their natural rates."[87] The natural price essentially consists of what it cost to produce the thing and bring it to market, along with a necessary amount of profit to support the stockholder(s). If everything were in perfect equilibrium and commodities were sold "precisely for what [they are] worth, or for what it really costs the person who brings [them] to market," they are sold at their natural prices.[88]

However, this perfect equilibrium rarely exists, so Smith set up a thing's "market price" in opposition to the "natural price." The market price is "the actual price at which any commodity is commonly sold," and it can be above, below, or equal to the natural price. The market price fluctuates according to "the proportion between the quantity which is actually brought to market, and the demand of those who are willing to pay the natural price of the commodity."[89] The only demand that matters is the "effectual demand," which represents not only a desire to possess the commodity ("absolute demand"), but also the practical ability to pay for it. When "the quantity of any commodity which is brought to market" is less than the effectual demand, the price rises because some people are willing to pay more rather than lose the ability to obtain the thing altogether.[90] Likewise, when the quantity brought to market is greater than the effectual demand, all the demand is satisfied, but some supply is left over and must be sold to those who are only willing to pay a lower price. If the quantity brought to market and the effectual demand are in equilibrium, then the market price will be equal to the natural price. Smith believed that the market would naturally gravitate towards the natural price because that price ultimately would be in the best interest of each of the parties involved in producing and buying the commodity, so

[87] Ibid.
[88] Ibid.
[89] Ibid., 63.
[90] Ibid., 64.

supply and demand would rise and fall but would tend towards equilibrium.[91] Smith thought that it is human nature for individuals to act in their own self-interest, and that as every individual works for his own benefit, "he intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention."[92] By endeavoring for his own self-interest, "he frequently promotes that of the society more effectually than when he really intends to promote it."[93] Without any effort, supply and demand tend to find a balance, in Smith's logic.

This tradition of explaining price fluctuation based simply on supply and demand continued with little change for centuries. In 1958, Hubert Henderson explained supply and demand via three laws of economics, comparable to the fixed laws of physics:

I. When, at the price ruling, demand exceeds supply, the price tends to rise. Conversely when supply exceeds demand the price tends to fall.

II. A rise in price tends, sooner or later, to decrease demand and increase supply. Conversely a fall in price tends, sooner or later, to increase demand and to decrease supply.

III. Price tends to the level at which demand is equal to supply.[94]

Thus Henderson was still mirroring Locke and Smith's points, which were still seen as "laws," as the basic framework of all of economics. Henderson compared economic laws to physical laws, thus essentially equating economics itself to physics. He mused, "the perception of the even, elliptical courses of the heavenly bodies led to the statement of the law of gravitation and the laws

[91] Ibid., 65.
[92] Ibid., 485.
[93] Ibid.
[94] Hubert Henderson, *Supply and Demand* (Chicago: University of Chicago Press, 1958), 15.

of motion. In economics similar laws have long since been enunciated."[95] He and other researchers into economics in his time saw economics as a science. It was clear and quantifiable, regulated by laws and models. The simplicity of the laws made Henderson see them as representing some sort of universal truth, and thus being able to describe and explain the world more fully.

But today, studies of price fluctuation are moving beyond the simplicity of just understanding the rises and falls of supply and demand to investigating the deeper causes of these shifts.[96] Demand is determined by individuals as they process the worth of things to them based on the valuation processes discussed above. This valuation is related to both use value and exchange value, individualistic value and relational value, functional value and symbolic value. As a result, demand is in part socially constructed. It also exists in the context of the market, so prices and their accessibility to buyers also play a role in demand shifts. Because of this social dimension of price fluctuation, in some situations prices may fluctuate very little, or not at all. Karl Polanyi argued that in pre-capitalist societies, prices were not formed and did not fluctuate based on supply, demand, or what would be most efficient economically. Rather, prices, if they existed, were determined based on social norms, i.e., tradition or command, in the absence of price-setting markets.[97] Granovetter and Swedberg have written that networks embedded in societies can "restrain the pure economic forces," so prices may not shift, even if fluctuation would be more efficient based on the 'laws" described above, if tradition or some other social force restrains such fluctuation.[98]

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[95] Henderson, *Supply and Demand*, 15.
[96] Aspers and Beckert, "Value in Markets," 28. See above under Sociological Approaches: The Formation and Fluctuation of Preferences.
[97] Beckert, "Where do prices come from?," 761.
[98] Mark S. Granovetter and Richard Swedberg, "Introduction," in *The Sociology of Economic Life*, eds. Mark S. Granovetter and Richard Swedberg (Boulder: Westview Press, 1992), 9.

Prices do not just flow up and down based on clear mathematical projections of rational individuals concerned only with maximizing efficiency within a perfect market. Rather, prices are socially constructed, so to understand price fluctuation, one must first understand the social norms and culture behind a given market. As Beckert writes, "The mechanism of supply and demand stands at the very end of a long chain of price-determining factors that are largely shaped through political influences, market structures and cultural frames constituting the perception of the value of goods."[99]

2.5 Conclusion: Modern Theories of Exchange Value

Through an investigation of multiple theories of value, we have seen that economic value stems from a thing's utility. Utility is not an innate characteristic of a thing, but rather it varies from situation to situation. The sociologists Patrik Aspers and Jens Beckert define economic value as "the assessment of goods or services in terms of how much money an actor is willing to surrender to obtain property rights to the good in question."[100] Value is based on this individual assessment of utility, but price is more general, as an overall assessment of what the thing could sell for in the market. The most recent research on value and prices investigates the role of social networks, institutions, and culture on price formation and fluctuation. Sociology has brought a great deal of insight to the investigation of prices over the last three decades, but so far, it has focused mainly on economic life in modern Western societies.

For that reason, a debate opened up in the twentieth century regarding the applicability of modern economic theory to non-Western societies. If economic activity is based on social networks, institutions, and culture, then how could economic 'laws' developed based on modern

[99] Beckert, "Where do prices come from?," 770.
[100] Aspers and Beckert, "Value in Markets," 8.

capitalist society in the West be considered universally relevant? Further, how significant are such material concerns for human activity generally? Marcel Mauss wrote that "It is only our Western societies that quite recently turned man into an economic animal," proposing that only modern Western society has emphasized practical, rational economic activity to the extent that the market has become central to social life.[101] This perspective was argued most vehemently by Karl Polanyi in the mid-20th century. Throughout his works, Polanyi contended that the market is not a central feature of all societies, and the concept of an 'economic man' driven by his Smithian propensity to "truck, barter, and exchange one thing for another" is not a universal fact of human existence. Marshall Sahlins has continued to argue for this point of view regarding theories of market activity as marginal in certain cultures. Ultimately, according to Sahlins, man's material activity is not his most important quality. Economic life does not define culture; rather, the important fact is "not that this culture must conform to material constraints but that it does so according to a definite symbolic scheme which is never the only one possible."[102] Sahlins has argued for the meaningful over the material as the defining characteristic of human activity, an argument antithetical to most modern economic thought. The universality of modern economic theory is thus not unanimously accepted.

In the end, an individual's actions are shaped by the culture in which he was raised and the society in which he lives, and economic activity is no different. No matter what the society, whether it be Western or not, economic life is embedded in culture and is just one facet of social life. However, this embeddedness need not imply that modern economic theory holds no relevance for non-Western cultures. Ultimately its relevance needs to be investigated and thoroughly tested;

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[101] Marcel Mauss, quoted in George Dalton, "Introduction," in *Primitive, Archaic, and Modern Economies: Essays of Karl Polanyi*, ed. George Dalton (New York: Anchor Books, 1968), ix.
[102] Marshall Sahlins, *Culture and Practical Reason* (Chicago: University of Chicago Press, 1976), viii.

theorizing regarding whether supply and demand would make sense in a given culture is useless without specific studies of that culture's economic activity. This dissertation represents such an attempt to move beyond mere agnosticism by quantifying economic behavior in a non-Western society to explore how culture affects that activity and whether the 'laws' modern economics presents can still be considered germane in a different society. Because my investigation will focus on Ptolemaic Egypt, it must also consider the history of the debate surrounding the applicability of modern economic theory not just to different cultures, but to ancient societies (those of ancient Egypt and Greece, in particular) more specifically.[103] This debate about ancient economics—and, by extension, prices—forms the subject matter of the following chapter.

[103] The debate regarding the application of modern economic theory to ancient cultures has also explored its relevance to Mesopotamian, Roman, and other cultures, but those are less relevant to my dissertation on Ptolemaic Egypt and will therefore be omitted here.

CHAPTER THREE

Ancient Prices

3.1 Introduction

While a great deal of work has been done in the past few centuries to develop an understanding of what prices are, what they represent, and how they form and fluctuate, and some consensus has been reached on at least the fundamental concepts of modern economics, as discussed in the previous chapter, the theories underpinning studies of ancient economies are much more controversial. The core question is to what extent the principles of modern economic theory can, to any extent, be applied to the study of ancient societies. On one side, many have argued that the laws of economics are essentially as universal as the laws of physics. Certainly, different societies have had different economic structures, but whether organized around subsistence-level agriculture, an industrialized market, or something in between, all economies follow the same rules.[1] However, others have written that ancient cultures are so vastly different from our own that research into their economic activity requires an entirely new theoretical framework. Any study of ancient prices rests to a large extent on the principles discussed in this debate over economic theory.

3.2 The Applicability of Modern Economic Theories to the Ancient World

The notion that ancient economies functioned according to different rules first appeared in the late 19th century. For the most part, the earliest scholars to put forth this point of view were scholars of ancient Greece and Rome, since at that time, scholarship was biased towards the

[1] B. Marie Perinbaum, "Homo Africanus: Antiquus or Oeconomicus? Some Interpretations of African Economic History," *Comparative Studies in Society and History* 19, no. 2 (April 1977): 168.

reading of Greek and Latin sources. The Ptolemaic dynasty spoke Greek and had part of its origins in Greek culture, so Ptolemaic Egypt still is often studied from a Classical perspective. For that reason, and for their later influence on other theorists of ancient economies more generally, the theories of these early Classical scholars are worth discussing in what is ostensibly an investigation of prices in ancient Egypt.

Many 19th and early 20th century historians agreed on a linear view of the history of economic development and envisioned this development in largely evolutionary terms. Primitive household economies eventually evolved into modern market economies, and all economies could be situated at different points along essentially the same path, developing more and more efficient structures along the way. Others, in the historical school of economics, centered in Germany, focused on historical specificity. Each economy must be understood according to the institutions and limitations of its own time and place. Economic evolution does not occur inevitably, but based on specific historical developments. As a result, this evolution was not necessarily clean or linear, but could involve considerable overlap between inefficient and more modern structures, with different economic institutions developing at different rates and along different lines within different societies. The focus of the historical school of economics was thus on specificity and difference, as opposed to linear models of economic history, focused on the essential objectivity of the process.

Still, scholars in both the linear and historical schools of thought did hold to the notion of a fundamental split between primitive and modern economic structures. Even members of the historical school who argued fervently for historical contingency attempted to classify elements of ancient economies along largely binary lines as primitive or modern. Rather than diving into that historical specificity and attempting to describe ancient economies on their own terms, there was a

tendency to focus on questions of when modern economic structures developed historically, and arguments centered around when in time to place the split between primitive and modern structures.

In his work *Economic Life in Classical Antiquity*, published in 1864-1867, Karl Rodbertus put forth his view that the shift could not have occurred before the early modern period. He argued that an economy based on barter or trade in kind necessitated a different social structure from a monetized economy. The structure he saw operating in classical antiquity was one based around the *oikos*, or household, so economics only operated on a small scale, with production and distribution centered within each individual household. Long distance exchange should not be imagined as any sort of real market activity, but rather a sort of redistribution between households connected by familial or other social bonds. Individuals did not exchange to gain a profit in money, but rather for reasons of social status or reciprocity. Through an analysis of the Roman tribute system, he likewise emphasized the differences between Roman and modern, Western taxation systems, reaching the conclusion that Roman taxation had entirely different goals and that modern ideas of macroeconomics should be excluded from studies of ancient history.[2] The shift from an economy based on barter to one that used money was more a shift in social structure than an advance in technology, and that social shift happened in the early modern era.[3]

Karl Bücher also focused on the historical specificity of ancient societies' economies, and he likewise placed the shift from primitive to modern economies post-antiquity; for him, complex economic structures did not develop until after 1000 CE in Europe. He published *Die Einstehung der Volkwirtschaft* in 1893, and in this work, he aimed to develop a theory of economic

[2] Harry W. Pearson, "The Secular Debate on Economic Primitivism," in *Trade and Market in the Early Empires: Economies in History and Theory*, eds. Karl Polanyi, Conrad M. Arensberg, and Harry W. Pearson (Glencoe, Illinois: Free Press, 1957), 4.
[3] Ibid., 5.

development from antiquity to his own time.[4] According to Bücher, a *Volkwirtschaft*, or a complex economy with connections beyond the level of a city, could not have developed until the Middle Ages.[5] Before that time, economic life was limited to subsistence and household-level production. Any potential exchange between households was certainly not market-driven. Bücher explained that he did not include the Classical Greek and Roman civilizations in his analysis, and he denied the existence of any significant trade or monetary policy in the ancient world.

Eduard Meyer was the first to place the date of the shift away from primitive to more modern economic structures within antiquity. In 1895, when he addressed the third meeting of the German historians at Frankfurt, he put forth his view that many ancient societies featured economic institutions that were essentially modern.[6] Meyer pointed out that documents relating to private financial transactions date back thousands of years, and that already in the ancient Near East, there was a system of commerce in which precious metals served as a form of money. Long distance trade was not necessarily all based on social bonds between households, and more modern market forces were likely in effect already; the profit motive, too, was not a modern invention. He emphasized the "fundamentalen Bedeutung des Handels und des Geldes in der alten Geschichte" in an attempt to prove that there is no reason to assume that the ancient world functioned economically according to entirely different principles from those of modern economies.[7] In this sense, Meyer's work was a departure from that of Rodbertus and Bücher, but he clearly still saw a binary divide between primitive and modern economic structures. For him, noting the existence of modern economic features like money and trade was enough evidence to

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[4] Karl Bücher, "Die Einstehung der Volkwirtschaft," in *The Bücher-Meyer Controversy*, ed. Moses I. Finley (New York: Arno Press, 1979 [1906]), 85-150.
[5] Pearson, "Secular Debate," 6.
[6] Eduard Meyer, "Die Wirtschaftliche Entwicklung des Altertums," in *Kleine Schriften*, (Halle: Verlag von Max Niemeyer, 1924), 89.
[7] Ibid., 88.

prove that the fundamentals of the modern capitalistic market were also at play, in other words, that trade and money worked the same way in the past as they do today.[8] This unstated assumption weakens Meyer's thesis. Nevertheless, the data recovered by historians and archaeologists that Meyer put forth clearly refuted Bücher's view that economic institutions known in the modern world did not exist pre-modernity.

Writing in the early 20th century, Max Weber took a more measured approach. He accepted that there were similarities between the economies of ancient Greece and Rome at the height of their success and that of Europe in the late Middle Ages, but he did not go as far as Meyer and equate features of ancient economies with their fully modern versions. Instead, Weber emphasized that ancient society was very different from his own. In particular, he focused on the "monopoly" of the political sphere in the ancient world, a monopoly which redistributed wealth among its citizens or subjects.[9] Significantly, Weber believed that the debate over the presence of modern economic patterns in the ancient world should shift from the search for the *presence* of capitalist activity to an analysis of the *social significance* of that activity. In his view, the "impulse to acquisition" has been essentially ubiquitous, and "capitalism and capitalistic enterprises, even with a considerable rationalization of capitalistic calculation, have existed in all civilized countries of the earth [(including Egypt)], so far as economic documents permit us to judge."[10] However, he noted that the *primacy* of trading activity and the push to make one's assets grow through this activity is a peculiar product of early modern European, specifically Protestant, societies. Essentially, Weber accepted the existence of capitalist features in societies such as ancient Egypt as a given but noted that the people of ancient Egypt would not have felt the same ethical drive to

[8] Pearson, "Secular Debate," 7-8.
[9] Max Weber, *General Economic History*, trans. Frank H. Knight (Glencoe, Illinois: Free Press, 1950 [1927]), quoted (without page reference) in Pearson, "Secular Debate," 9.
[10] Weber, *Protestant Ethic*, xxxi & xxxiii.

work as people in modern Western societies do. This shift in the dialogue towards the question of social significance is crucial, but Weber still implicitly assumed that economic institutions functioned the same way in societies at different times and in different places: he simply concerned himself with how fundamental a role that functioning would play in broader social and ethical life. There are major problems with this assumption; the presence of market features in an ancient economy does not necessarily imply that such a market operated based on the same principles as that of any other economy, ancient or modern. Certainly, similar economic structures in different economies do not necessarily have the same social significance, but that distinction does not go far enough. The actual operation and practical function of the market still remained to be analyzed in greater detail.

Michael Rostovtzeff joined the conversation in the 1920s and made a serious attempt at just such an analysis. In 1941, he published his classic *Social and Economic History of the Hellenistic World*, and his work focused on the Hellenistic and early Roman periods, since he saw those times as the apex of ancient economic development. In defiance of Rodbertus's view of the primacy of the ancient household, Rostovtzeff saw the *oikos* as an ideal type which never actually existed.[11] Ancient people did trade with each other, and the antisocial behavior implied by the *oikos* principle runs counter to all we know of ancient trade, especially between Greece and the Near East. In the end, he argued that "by the Hellenistic period the economy of the ancient world was only quantitatively, not qualitatively, different from that of modern times."[12] Hellenistic societies had modern features that operated quite similarly to how those features operated in the 20th century, and the only difference is one of scale, in Rostovtzeff's view. While he might have

[11] Pearson, "Secular Debate," 9-10.
[12] M. Rostovtzeff, Review of *Griechische Wirtschafts- und Gesellschaftsgeschichte*, by J. Hasebroek. *Journal of Institutional and Theoretical Economics* 92 (1933): 335.

been more willing than others to acknowledge complexity in ancient economies, he still approached them from the binary primitive/modern standpoint, concluding that they were modern.

In the mid-20th century, Polanyi saw the work of scholars like Rostovtzeff as standing too close to an acceptance of modern economic features and principles in societies other than our own, and, by extension, an acceptance of the applicability of modern economic theory to the research of ancient historians. Rather, Polanyi's work stemmed from his fundamental opposition to Adam Smith's famous belief in the inherent human "propensity to truck, barter, and exchange one thing for another."[13] Polanyi (and later Finley) rediscovered the work of Rodbertus and Bücher and used it in the development of his new school of thought by focusing on what he saw as a clear split between scholars who, in his view, misunderstood ancient economies as essentially modern and those who, in his view, properly understood that the economic principles of his time could not possibly have developed before the modern era and that therefore all ancient economies were primitive. The ultimate distinction between the two economic types, according to Polanyi, were that modern economies operate according to the known laws of economics, whereas primitive economies were 'embedded' in their own particular cultural practices and social institutions. As Polanyi enthusiastically described, Bücher had hit on something crucial when he declared that "the whole of history apart from those last centuries had economies the organization of which differed from anything assumed by the economist. And the difference, we now begin to infer, can be reduced to one single point—they possessed no system of price-making markets."[14]

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[13] Adam Smith, *The Wealth of Nations*, 14.
[14] Karl Polanyi, Conrad M. Arensberg, and Harry W. Pearson, "The Place of Economies in Societies," in *Trade and Market in the Early Empires: Economies in History and Theory*, eds. Karl Polanyi, Conrad M. Arensberg, and Harry W. Pearson (Glencoe, Illinois: Free Press, 1957), 241.

Polanyi was aware that marketplaces existed in the ancient world, but he dismissed them as highly restricted and ultimately uninfluential. Especially at times when different cultures with different economic systems came into contact, as was clearly the case in Ptolemaic Egypt, a buffer zone was necessary to limit the effect of that contact, in Polanyi's view.[15] Ultimately, Polanyi believed that ancient economic life was institutionally controlled, based on a redistributive system, and was not managed by individuals acting in their own self-interest to any significant degree. This principle is best summarized by his statement that "The economy, then, is an instituted process."[16] For that reason, market principles could not possibly have been important: the conditions of possibility for the modern market were not in existence until modernity. Even when individuals did meet for the purpose of exchange, Polanyi wrote, "Such meetings do not, like price-making markets, produce rates of exchange, but on the contrary they rather presuppose such rates. Neither the persons of individual traders nor motives of individual gain are involved."[17] Without the law of supply and demand operating and influencing market activity, prices could not have been determined by the decisions of individual actors based on the activity of the market. Bargaining in a marketplace was over the quality and/or quantity of goods or over the means of payment, rather than the price itself.[18] Ultimately, Polanyi wrote, "Outside of a system of price-making markets economic analysis loses most of its relevance as a method of inquiry into the working of the economy."[19]

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[15] S.C. Humphreys, "History, Economics, and Anthropology: The Work of Karl Polanyi," *History and Theory* 8, no. 2 (1969): 185.
[16] Karl Polanyi, "The Economy as Instituted Process," in *Trade and Market in the Early Empires: Economies in History and Theory*, eds. Karl Polanyi, Conrad M. Arensberg, and Harry W. Pearson (Glencoe, Illinois: Free Press, 1957), 248.
[17] Ibid., 258.
[18] Ibid., 262.
[19] Ibid., 247.

In 1973, Moses Finley published *The Ancient Economy*, in which he explored the economy of the ancient Greco-Roman world from Polanyi's perspective of embeddedness.[20] He noted that in ancient Greek and Latin, there was no word even approximating modern notions of what in English we would call 'the economy.' According to Finley, this lexicographical difference was not due to "an *intellectual* failing" on the part of Greek and Roman authors; rather, it was based on "*institutional* behaviour."[21] The fact that we do not find words for 'the economy' or 'the market principle' in Greek and Latin is not because Greek and Roman writers were ignorant of how their economic system worked; rather, these words would have little meaning to them because 'the economy' the way it is understood in modern economics did not yet exist. As Richard Saller has pointed out, Finley denied that ancient Greece and Rome had integrated markets to the extent that markets functioned as a "single unit of supply and demand."[22] Finley further argued, following Polanyi, that Greek and Roman economic life cannot possibly be understood with reference to the 'laws' of modern Western economics. Instead, "different concepts and different models" must be sought to understand the ancient economy.[23] Ian Morris has written that "no book of this century has had such a great influence on the study of Greek and Roman economic history" as Finley's *Ancient Economy.*[24] As Jean Andreau has explained, Finley's work resulted in a

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[20] M. I. Finley, *The Ancient Economy* (Berkeley: University of California Press, 1973).
[21] Ibid.,, 22-23 (emphasis his).
[22] Richard Saller, "Framing the Debate Over Growth in the Ancient Economy," in *The Ancient Economy: Evidence and Models*, eds. J. G. Manning and Ian Morris (Stanford: Stanford University Press, 2005), 225.
[23] Finley, *Ancient Economy*, 27.
[24] Ian Morris, Foreword to M. I. Finley, *The Ancient Economy*, updated edition (Berkeley, University of California Press, 1999), ix.

major reorganization of research into ancient Greek and Roman economic life, wherein scholars attempted either to build upon or refute his ideas.[25]

Polanyi and Finley's separation of ancient and modern economies based on the idea that ancient economies were embedded in social relations is now thought to be erroneous because of its implicit assumption that modern economies are not similarly embedded. As Mark Granovetter describes, "This view sees the economy as an increasingly separate, differentiated sphere in modern society, with economic transactions defined no longer by the social or kinship obligations of those transacting but by rational calculations of individual gain."[26] This assumption in part derives, according to Granovetter, from the unwillingness of sociologists to investigate economic concerns out of deference to economists, who sociologists in the mid-twentieth century believed better understood the complex forces of the market, and therefore economic behavior. When economists realized that people did not behave perfectly in their own rational self-interest, they developed complex theories of "selective rationality," but Granovetter suggests that people are basically rational, and that seemingly nonrational behavior can be seen as more rational "when situational constraints, especially those of embeddedness, are fully appreciated."[27] The separation between "interests" and "passions," developed in the 17th and 18th centuries, influenced economists to ignore the "passions," i.e., social motives, focusing only on purely economic "interests."[28] Paul Samuelson summed this distinction up nicely when he wrote that "many economists would separate economics from sociology upon the basis of rational or irrational

[25] Jean Andreau, "Twenty Years after *The Ancient Economy*," in *The Ancient Economy*, eds. Walter Scheidel and Sitta von Reden (New York: Routledge, 2002), 34.
[26] Granovetter, "Economic Action and Social Structure," 482.
[27] Ibid., 505-06.
[28] Ibid., 506.

behavior."[29] In the early twentieth century, Weber and Veblen did both criticize economics for ignoring social and cultural factors, but economic sociology as such, with its acceptance of the embeddedness of all economies, ancient and modern, Western and non-Western, did not become a popular discipline until the last quarter of the twentieth century. Once we abandon the idea that modern economic behavior operates separately from social structures, then the distinction between ancient and modern economies on the basis of embeddedness is flawed. Economies have always been embedded in the societies in which they function, so the binary classification system of primitive vs. modern is essentially meaningless.

While Polanyi and Finley's belief in the historical specificity of economic theory was highly influential for decades, in recent years, most Egyptologists have taken a more measured approach. In 1991, Barry Kemp pointed out that there has never been an instance, ancient or modern, of an economy entirely driven by market forces, so the distinction between "modern" market-driven economies and ancient, non-market-driven economic activity is largely mistaken.[30] Thus, in his view, it is plainly incorrect to use only notions of "the market" to explain any ancient economic activity. Explanations of ancient economies as being completely redistributive and controlled by the state likewise move too far in the opposite direction. After all, even modern attempts to create an economy completely controlled by the state have not been able to achieve this purity. Because the state cannot be perfect in its understanding and prediction of the needs and desires of its individual subjects or citizens, so-called "black markets" naturally arise to fill the gaps the state has left in the economic system.[31] On the other hand, modern states that aim, at least theoretically, for market freedom, still maintain significant administered areas, such as the armed forces, social

[29] Paul Samuelson, *Foundations of Economic Analysis* (Cambridge: Harvard University Press, 1947), 90.
[30] Barry Kemp, *Ancient Egypt: Anatomy of a Civilization* (London: Routledge, 1991), 233.
[31] Ibid., 233.

insurance, and some control over the activities of private businesses.[32] Modern economies are not wholly market-driven or wholly state-controlled, but all contain some mix of the two, in varied proportions. Ancient economies were similar in this regard. Certainly the ancient Egyptian economy involved a high level of state control and redistribution. However, Kemp believed that Polanyi and his disciples had gone too far in their minimization of the significance of the economic power of individual demand.[33]

Also writing in the 1990s, David Warburton strongly reaffirmed the utility, in fact the necessity, of modern economic theory for studying the ancient Egyptian economy. He criticized Polanyi's work because, while highly influential, it had impeded understanding of ancient economies rather than helped it. According to Warburton, Polanyi's supporters could not even agree amongst themselves about his analytical tools because his "theory is not an economic theory so much as a social model describing relationships."[34] Polanyi described a system externally based on theoretical assumptions (rather than evidence), but he did not provide a framework for understanding the system's functionality; he simply rejected the tools of analysis used by economists. However, since Polanyi's theory is essentially just a social model, the behavior he described can still be included within studies based on modern price theory, for example. Warburton accepted that culture affects economic behavior, so culture and social conventions can merely be considered some of the many factors that influence prices.[35] Therefore, Polanyi's assumptions about cultural embeddedness can fit within modern economic analysis, so Polanyi's core belief that modern economic tools cannot explain economies other than our own is proven

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[32] Ibid., 233-34.
[33] Ibid., 234.
[34] David Warburton, *State and Economy in Ancient Egypt: Fiscal Vocabulary of the New Kingdom* (Fribourg, Switzerland: University Press, 1997), 99.
[35] Ibid., 92.

faulty. Ultimately, Warburton emphasized that it was time for the scholarship to move beyond a rigid acceptance of Polanyi because "the employment of Polanyi's categories has not improved the level of discussion," especially in the many cases Warburton presented of studies in which evidence that could not be explained by Polanyi's ideas was deemphasized or twisted.[36]

Since a large part of Warburton's critique of Polanyi was based on Polanyi's rejection of modern economic analysis without providing viable alternative tools, Warburton of course needed to suggest an alternative. Critically, he pointed out that 'modern economic theory' is by no means a clearly defined monolith; there is still a great deal of disagreement about how modern economies function, and there is no one accepted definition of even basic terms such as "price."[37] On a basic level, Warburton believed that ancient economic behavior was "to all intents and purposes economically rational," with prices determined by the market.[38] Its distinction from the market-driven economy of the West in the twentieth century is simply one of scale. Moving beyond the basics, Warburton believed that Keynesian theory, centered on the premise of the rational stimulation of the economy on the part of the state, was the best way to explain the economic success of New Kingdom Egypt. As such, his focus was primarily macroeconomic. While Warburton's work represents a pivotal step forward in providing a stronger, more specific theoretical framework for understanding the Egyptian economy on a macro level, more work still remains to be done in terms of ancient Egyptian microeconomics and in terms of the role of private trade in economic development on both levels.

One major problem with the work of most of the above theorists, regardless of the camp in which they reside, is the fact that, generally speaking, these papers are theoretically-oriented and

[36] Ibid., 111.
[37] Ibid., 77.
[38] Ibid., 103.

lack adequate quantitative data. Likewise, studies of the Egyptian economy on a quantitative level have, to a large extent, shied away from an explicit discussion of the role of theory in analysis. Jac. Janssen, in his study of prices from Ramessid Egypt, proudly declared that an "absence of theory lies at the base of the present book."[39] While it is of paramount importance that a scholar not be so married to a certain theory that he finds himself forcing the evidence to fit that particular theory even when it logically challenges that theory, it is similarly inadvisable for a study to begin without any acknowledged theoretical framework. As Warburton pointed out, it is not only inadvisable, but functionally impossible for a scholar to write without any reference to theory, because preconceived notions of what the data mean or even what questions to ask of the data are impossible to escape.[40] Janssen himself demonstrated the veracity of Warburton's assertion when he "repeatedly found evidence confirming the market, yet denie[d] the validity of the evidence by asserting the primary nature of the redistribution system."[41] Admittedly, the tendency to avoid theory is not intended to be permanent. Janssen avoided theory on the pretext that his work was merely a collection of data that future scholars could use to write a full economic history of Egypt, and, by extension, develop a more detailed theory of its functioning.[42] However, since even a basic collection of data is based on the researcher's view of which data are interesting and how they should be organized for presentation, a publication of data without a discussion of the theoretical assumptions of the study effectively bars non-specialists, such as those based in the social sciences,

[39] Jac. J. Janssen, *Commodity Prices from the Ramessid Period: An Economic Study of the Village of Necropolis Workmen at Thebes* (Leiden: E.J. Brill, 1975), 1.
[40] Warburton, *State and Economy*, 76.
[41] Ibid., 79.
[42] Janssen, *Commodity Prices*, 1.

who cannot read the texts and examine the material for themselves, from approaching that data from their own perspective and potentially challenging those theoretical assumptions.[43]

Unlike many Egyptologists, Classicists at the end of the 20th century largely turned away from the 'primitivist'/'modernist' debates. These debates, particularly centered on the work of Finley, were so fierce in the 1970s and 1980s that Keith Hopkins referred to them as an "academic battleground."[44] However, most recent articles on the economics of ancient Greece or the Hellenistic world tend to ignore or only briefly mention the old debates, instead recapping the evidence within more specific fields than 'ancient economics' writ large. Helen Parkins has referred to this shift as a "sea-change; gone, for the most part, is the apparent confidence of the 1970s and early 1980s in applying all-encompassing models, and in its place is greater caution."[45] Jean Andreau has similarly called for a move away from the binary debates of the twentieth century because they "would end by considerably impoverishing historical analysis."[46] Rather than engaging with the debate by trying to decide "which of these two pictures ... is the more accurate," Classicists have realized that neither of the two pictures is entirely correct, avoiding sweeping theories in favor of more specific, and even quantitative, investigations, the variety of which is too vast to be adequately described here.[47]

The debates of the 19th and 20th centuries are over. Ancient and modern economies cannot be split on the basis of whether they are socially influenced or purely rational. The binary notions of the primitive vs. the modern or the embedded vs. the disembedded as distinct categories for

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[43] Warburton, *State and Economy*, 79-80.
[44] Keith Hopkins, "Introduction," in *Trade in the Ancient Economy*, eds. P. Garnsey, K. Hopkins, and C. R. Whittaker (Cambridge: Cambridge University Press, 1983), 1.
[45] Helen Parkins, "Time for Change? Shaping the Future of the Ancient Economy," in *Trade, Traders and the Ancient City*, ed. Helen Parkins (London: Routledge, 1998), 2.
[46] Andreau, "Twenty Years After Moses I. Finley's *The Ancient Economy*," 35.
[47] Parkins, "Time for Change?," 4.

understanding economic development have been abandoned. In the 21st century, now the focus of economic history has shifted to the fundamental postulate that all economies are structured by social and political institutions, so they must be analyzed with regard to that institutional influence. This concept is at the heart of the New Institutional Economics, which seeks to analyze the effects of institutions on economic activity. Social and political institutions shape the various costs and risks associated with different sorts of transactions, and because they have the power to raise and lower these costs and risks, institutions can exert a strong influence, consciously or not, over what sorts of transactions are favored in the marketplace. One of the strongest voices to apply the New Institutional Economics to economic history has been Douglass North, and he explains that in his work he has "placed institutions at the center of understanding economies because they are the incentive structure of economies."[48] The choices actors make are shaped by their perceptions of the likely outcome of those choices, and those perceptions are themselves shaped by the social and political institutions structuring the world in which those actors operate. Thus, an understanding of economic history must not be limited to economic models alone, but must also integrate historical data on demographics, the development of human knowledge and technology, as well as the development of institutional frameworks that shape a society's incentive structure.[49] All three of these factors influence actors' perceptions of their world and therefore in turn their economic decision making, as well as the extent of the limitations on such decision making.

This integration of economic models with historical data lies at the heart of the current study. I am not concerned with proving the presence of modern economic ideas in ancient Egypt, but rather with understanding how the development of Ptolemaic society influenced the economic

[48] Douglass North, *Understanding the Process of Economic Change* (Princeton: Princeton University Press, 2005), vii.
[49] Ibid., 1.

changes of the period. These data on prices clearly cannot be understood on their own without a simultaneous analysis of this one society's demographics, technology, and institutions, all of which were in flux throughout the Ptolemaic period (and which are discussed in greater detail in the following chapter). Likewise, I do not see Ptolemaic society as one that is so historically specific as to defy interpretation through any means known to the field of economics. Both history and economics must be brought to bear in an analysis of the rich data that exists on Ptolemaic prices.

3.3 Previous Work on Ancient Prices

3.3.1 Review of Literature on Ancient Egyptian Prices from Other Periods

Ancient Egyptian prices have been studied in the past, with varying degrees of recourse to modern economics. Wilhelm Spiegelberg published the first study of ancient Egyptian prices in 1896.[50] Entitled "Vorstudien zu einem Tarif des Neuen Reiches," a chapter within his *Rechnungen aus der Zeit Setis I*, Spiegelberg's study consists of a short list of New Kingdom prices, expressed in gold, silver, or copper. Spiegelberg was concerned with the lack of understanding of value, especially of the relative value of the three metals, in his day, and his short study is mainly a call for other scholars to compile more such lists, with greater detail and analysis, in the future.

In 1934, Jaroslav Černý published a short article, "Fluctuations in Grain Prices during the Twentieth Egyptian Dynasty," in which he listed and conducted a basic analysis of prices of emmer (*bdt*) and barley (*it*) from various sites dating to the Twentieth Dynasty.[51] He recognized that grain prices did change over time and attempted to provide an explanation for the causes of

[50] Wilhelm Spiegelberg, *Rechnungen aus der Zeit Setis I* (Strassburg: Karl J. Trübner, 1896), 87-93.
[51] Jaroslav Černý, "Fluctuations in Grain Prices during the Twentieth Egyptian Dynasty," *Archiv Orientální* 6 (1934): 173-178.

the rises and falls in those prices. However, in this article, Černý only investigated changing prices in grain, as expressed in their relative values in deben of copper. He also made the unstated assumption that the value of copper remained constant over the course of the Twentieth Dynasty.

Černý followed up his short initial article with a much more detailed study, "Prices and Wages in Egypt in the Ramesside Period," published twenty years later.[52] In this study, he attempted to supplement the economic information already known from the Great Harris Papyrus and Papyrus Wilbour with data on prices and wages from Ramessid ostraca. As Černý himself pointed out, this represented the first study of ancient Egyptian wages, since Spiegelberg had only investigated prices.[53] Revising his unstated assumption of the consistency of the value of metals in the 1934 article, in his second article, Černý discussed the relative values of copper, silver, and gold, acknowledging that these values can change over time. While he noticed some changes, he concluded that over the centuries of the New Kingdom, these relative values generally remained remarkably stable.[54] He was also the first to recognize and discuss the different systems of valuation, based on metals, grains, or *sn.w* ("pieces"). Since he was using all of the prices he could find from the Nineteenth and Twentieth Dynasties, a large corpus of material for a still relatively short article, Černý did not list every price, but rather the highest and lowest prices for each of a selected sample set of commodities, as well as the "usual price" (i.e., the modal value) for the most popular commodities. He was certainly limited by the size of the article, but the highest and lowest values are not the most statistically representative data to present, and median prices would have been much more useful than modes. Despite this shortcoming, Černý's article is the true foundation for any future work on ancient Egyptian prices.

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[52] Jaroslav Černý, "Prices and Wages in Egypt in the Ramesside Period," *Cahiers d'histoire mondiale* 1, no. 4 (April 1954): 903-921.
[53] Ibid., 904.
[54] Ibid., 904-906.

The next Egyptologist to develop an interest in prices was Wolfgang Helck, who published his five-volume *Materialien zur Wirtschaftsgeschichte des Neuen Reiches* between 1960 and 1964.[55] This immense work presents material on a number of economic issues in ancient Egypt, of which prices are only one. In the fifth volume, he lists many commodities and provides a short description along with their stated values in a number of texts, where available. Helck's work presents a major step forward in its level of detail and in the high number of the commodities listed. However, as Janssen points out, Helck's study contains many errors, probably because of the large volume of information he was working with. Janssen noticed that Helck at times would count one text twice, and that Helck included a number of faulty translations, so Janssen concluded that Helck's work was "inadvisable to use … without carefully checking every point."[56] Beyond these often serious errors in data collection, what Helck's study primarily lacks is analysis. He collected a great amount of information but did not perform any statistical calculations or attempt to answer larger questions about the Egyptian economy. The value in Helck's work lies in its scale, larger than any previous work on prices by far, demonstrating the large amount of data that is available. Janssen did not admit to the inspiration, but Helck's list of individual commodities with information about them no doubt played a role in inspiring his work.

Perhaps the most significant work on ancient Egyptian prices to date is Jac. J. Janssen's *Commodity Prices from the Ramessid Period*, published in 1975.[57] Here he compiled approximately 1250 prices from one village, Deir el-Medina, dating to the Ramessid period. Janssen included a chapter for each category of commodity, within which he described each

[55] Wolfgang Helck, *Materialien zur Wirtschaftsgeschichte des Neuen Reiches*. 5 vols. (Wiesbaden: Akademie der Wissenschaften und der Literatur in Mainz in Kommission bei Franz Steiner Verlag, 1960-64).
[56] Janssen, *Commodity Prices*, 5.
[57] Ibid.

commodity in detail, based on descriptions from the ostraca. He also listed every text in which a given term is found, its date, and the prices mentioned, along with some discussion of the relative values of seemingly similar commodities. While Janssen was mainly concerned with prices, he also provided a brief overview of the data on wages "in order to offer some insight into the cost of living."[58] He recognized that price data are rather meaningless without some standard to with which to judge the prices' relative value, and the best standard is data on wages, which allow modern scholars to have a better idea of how expensive various commodities were in terms of labor. Janssen's work also extends beyond mere lists of numbers; he used the data to analyze the types of transactions taking place, the various measures of value themselves, the wealth of the Deir el-Medina workmen, and 'normal' prices that will allow for an understanding of relative values of commodities mentioned in other texts. He used his data further to attempt to answer bigger questions of the ancient Egyptian economy, including the questions of the development of 'money' and the reasons for price fluctuation. Janssen's work provides valuable insight, but he investigates only one small, exceptional village, whereas this dissertation represents an attempt to understand prices from all of Egypt.

Moving beyond these studies of New Kingdom prices, in the 1990s, Bernadette Menu published a few articles on prices in the Late Period. She pointed out that while Janssen may have had at his disposal a wide variety of prices from Deir el-Medina, prices from the first millennium BCE mainly relate to goods necessary for the functions of the temples: land, animals, labor, etc.[59] In 1992, she published a study of exchanges of livestock, followed in 1997 by a study of prices for

[58] Ibid., 455.
[59] Bernadette Menu, "Le prix de l'utile en Égypte au 1er millénaire avant notre ère," in *Économie Antique: Prix et formation des prix dans les économies antiques*, eds. Jean Andreau, Raymond Descat, and Pierre Briant (Saint-Bertrand-de-Comminges: Musée archéologique départmental de Saint-Bertrand-de-Comminges, 1997), 247.

the sale and rent of land.[60] Menu's corpus was relatively small, including both stelae and papyri. Despite the fact that she compiled data on land prices, Menu believed that all land belonged to the king, so these 'sale prices' really just represented payments for the rights to *use* a given piece of property and the rights to its produce; the 'sale' did not indicate permanent ownership or any reference to the concept of private property. Prices were affected by two factors: the agricultural quality of the land and the legal status of that land.[61] As Menu highlighted, the price history of pre-Ptolemaic Egypt is complicated by the likely different attitudes of native and Ptolemaic kings towards private property, especially regarding land. Menu's work may provide interesting fodder for comparison with Ptolemaic prices and the factors influencing them.[62]

The price history of Roman Egypt has likewise also been investigated before, although generally from the Classical perspective rather than the Egyptological. In 1936, Allan Chester Johnson published a volume on the economy of Roman Egypt within Tenney Frank's series, *An Economic Survey of Ancient Rome*.[63] Johnson included not only evidence of prices, but data relating to all quantifiable aspects of economic life preserved in documentary texts written in Greek and Latin. Because his subject of inquiry was so broad, Johnson did not attempt to create tables of prices, as other authors have done, but rather included translations of all economic texts he was aware of, including those which mention prices. In 1949, he published *Byzantine Egypt:*

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[60] Bernadette Menu, "Les échanges portant sur du bétail," in *Atti Sesto Congresso internazionale di egittologia*, vol. 1 (Torino: International Association of Egyptologists, 1992), 459-463; Menu, "Prix de l'utile," 245-275.
[61] Menu, "Prix de l'utile," 259.
[62] Andrew Monson has also argued that property rights and tax rates affected the price of land in the Ptolemaic and Roman as well as earlier periods. See Andrew Monson, *From the Ptolemies to the Romans: Political and Economic Change in Egypt* (Cambridge: Cambridge University Press, 2012), 193-198.
[63] Allan Chester Johnson, *Roman Egypt to the Reign of Diocletian*, vol. 2 of *An Economic Survey of Ancient Rome*, ed. Tenney Frank (Baltimore: Johns Hopkins Press, 1936).

Economic Studies with Louis C. West, in which he included a chapter on commodity prices.[64] In this book, Johnson and West mainly include simple lists of prices, organized first by commodity, then listed by date.

Decades later, in 1991, Hans-Joachim Drexhage published a massive volume of prices, rents, wages, and loans from Greek texts in Roman Egypt.[65] This work contains detailed tables of prices of wine, oil, grain, and other foods, houses and land (including rents), slaves, animals, transportation, textiles, loans, wages, and everything else he could find that could possibly be termed a "price" (with the exception of data on taxes). Not surprisingly, Drexhage, like Johnson before him, included only data from texts written in Greek and Latin, leaving out anything in Demotic or other Near Eastern languages. Drexhage's work represents an impressive collection of data in the Classical languages, along with some basic interpretation thereof. These data represent one of the core texts in the price history of ancient Egypt.

In 1985, the papyrologist Roger Bagnall published a monograph concerning prices in Roman Egypt, entitled *Currency and Inflation in Fourth Century Egypt*.[66] In this work, Bagnall presented an overview of the monetary history of Egypt in the fourth century CE by tabulating lists of prices from Greek texts and interpreting them with reference to the reforms of Diocletian and other known historical developments. Bagnall explained that the first two-thirds of the fourth century represented a period of tremendous inflation in Egypt. He advocated the theory that changes in prices reflected the debasement of coins, writing, "in general commodity prices were adjusted to reflect changes in metallic composition of coins," and the relationship between

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[64] Allan Chester Johnson and Louis C. West, *Byzantine Egypt: Economic Studies* (Princeton: Princeton University Press, 1949), 175-197. See also Louis C. West and Allan Chester Johnson, *Currency in Roman and Byzantine Egypt* (Princeton: Princeton University Press, 1944).
[65] Hans-Joachim Drexhage, *Preise, Mieten/Pachten, Kosten und Löhne im römischen Ägypten bis zum Regierungsantritt Diokletians* (St. Katharinen: Scripta Mercaturae Verlag, 1991).
[66] Roger S. Bagnall, *Currency and Inflation in Fourth Century Egypt* (Chico, CA: Scholars Press, 1985).

debasement and prices could be the result either of inflationary mechanisms or simple reactions and changes in attitude towards coins on the part of the populace.[67]

Dominic Rathbone has also investigated prices in Roman Egypt. In 1996, he published an article on the supposed inflation of the third century CE, in which he advocated a shift from Classical scholarship's general reliance on 'official' texts, specifically Diocletian's Price Edict of 301, to the less common incorporation of other evidence in writing the monetary history of Roman Egypt.[68] One year later, in 1997, Rathbone called the push to research the issue of inflation in the third century CE an "obsession of twentieth-century economics" and moved instead to more fundamental concerns.[69] He emphasized his desire "to try to establish to what extent prices were formed by a free monetised market mediating supply and demand (exchange-value), or were affected by state operations such as taxation and compulsory purchases, or were customary or notional (use-value), perhaps little more than a monetised gloss on an economy in kind."[70] In his view, while the possibility of understanding the potential third century inflation was clearly enticing, such research could not be carried out before a more thoroughly evidenced basic understanding of the mechanics of the Roman Egyptian economy were understood.

To this end, in his 1997 article, Rathbone collected prices of wheat, wine, and donkeys from Greek texts from Middle Egypt dating from 30 through 295/96 CE, leaving out the Demotic evidence as well as texts from Upper and Lower Egypt, while acknowledging that

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[67] Ibid., 53-54.
[68] Dominic Rathbone, "Monetisation, not price-inflation, in third century A.D. Egypt?" in *Coin Finds and Coin Use in the Roman World: The Thirteenth Oxford Symposium on Coinage and Monetary History, 25.-27.3.1993: A NATO Advanced Research Workshop*, eds. Cathy E. King and David G. Wigg. (Berlin: Gebr. Mann Verlag, 1996), 321-339.
[69] Dominic Rathbone, "Prices and price formation in Roman Egypt," in *Économie Antique: Prix et formation des prix dans les économies antiques*, eds. Jean Andreau, Raymond Descat, and Pierre Briant (Saint-Bertrand-de-Comminges: Musée archéologique départmental de Saint-Bertrand-de-Comminges, 1997), 183.
[70] Ibid., 183-184.

unfortunately there are virtually no extant prices from Lower Egypt from this period. This article is incredibly careful and nuanced as it addresses the issues of money supply and monetization, the existence of supply and demand mechanisms, and the role of the state in fixing prices or regulating the market. He concludes that "the broad level of prices at a given time was determined primarily by regional factors of supply (stocks and harvest) and demand."[71] This conclusion likely stems to a large extent from the nature of the commodities Rathbone analyzed. He explains that he chose wine, wheat, and donkeys because they are the three for which the most prices are attested in the extant texts and claims that "they may also give a reasonably representative idea of the process of price-formation in Roman Egypt because of their quite different characteristics as commodities."[72] While of course wine, wheat, and donkeys are different in terms of their use values, they are similar in that it is unlikely that any of their prices would provide an accurate representation of pricing dynamics beyond the regional level. Very portable, high-value goods would play a more significant role in larger, integrated markets than would difficult to transport, low-value goods. Rathbone acknowledges that most of the donkey prices he found represented sales of only one donkey recorded in one document at a time, which is unsurprising, since with the technology of the time, it is highly unlikely that anyone could make a profit on importing or exporting large quantities of donkeys. Since the supply of donkeys would therefore not be affected by broader, more integrated market activity, the price of donkeys was apt to be influenced primarily by regional factors. Wine was more likely to have been involved in integrated markets, and some wine was imported and exported, but the bulk of wine consumed in Roman Egypt was produced in Egypt. Rathbone notes that even though Middle Egyptian wine was low-quality, he found only

[71] Ibid., 197.
[72] Ibid., 184.

one attested price for a foreign wine in his corpus of over 150 wine prices, which he describes as a "puzzlingly low" number of imports.[73] Seemingly unaware of, or at least baffled by, the actually regionally limited range of the wine trade in Middle Egypt, Rathbone concludes that because even major crops like wine were regionally influenced, prices generally in Roman Egypt were controlled primarily by regional rather than more integrated factors. Significant amounts of grain, Rathbone's third commodity, were certainly exported, but this activity was a result of taxation from the Roman state, not sales. Therefore, when Rathbone concludes that prices in Roman Egypt were primarily governed by regional factors, it is still unclear whether his conclusion can be accepted, since his analysis focused on only three commodities and ones which had a particular tendency to be influenced by those regional factors. Perhaps if he had included price data on commodities more involved in large-scale integrated markets, such as pepper from India, his conclusion would have been somewhat different, although naturally his study was restricted by the commodities for which preserved price data from Middle Egypt exist.

While Rathbone's overall conclusion regarding the primacy of regional factors in price formation in Roman Egypt is dubious, those regional features are nevertheless worth understanding, so his study is still incredibly valuable. Rathbone explains that, at the most general level, the prices of wheat and wine were subject to seasonal variation in price based on natural changes in supply. Also speaking generally, the supply of donkeys, in contrast to that of wheat or wine, remained relatively constant throughout the year, but demand rose before the harvest and before the preparation of fields after the inundation. Donkey prices also varied based on the supply of fodder; if there was not much around to feed them, or if feed was expensive, people were not buying donkeys as readily and the donkey prices fell. Male donkeys and those of higher

[73] Ibid., 200.

quality also fetched a higher price because of the increased demand for them. While supply and demand were certainly in effect, Rathbone does not argue that the economy of Roman Egypt was based on a truly free market; he qualifies his discussion of the mechanics of the economy in this time with an analysis of market regulation on the part of the Roman state, especially in the case of wheat prices. Rathbone's investigation is certainly thought-provoking, but his corpus is quite limited. In this project, I took inspiration from many of the questions he raises and from his methodology, albeit when investigating a broader swath of textual material.

During my work on this dissertation, in 2015, Rathbone did expand his corpus when he partnered with Sitta von Reden to attempt to collect all the surviving price data for grains from "classical antiquity as a whole."[74] Rathbone's portion of their article focused on the prices from the Roman world, including Egypt, the province from which he found the most price data.[75] He endeavored to identify the major periods of changing grain prices and to explain their possible causes. In Egypt, he noted "two long central periods of stable prices of wheat," pointing out that "from the AD 70s to 160s the normal price fluctuated between 6 and 12 Alexandrian dr. per artaba, that is 13.0 to 26.0 g/hl, with a variation of plus/minus 33 per cent around the median price."[76] Later, from the 190s to around 270 CE, the price of wheat was roughly twice as high, with variation of 25% around the mean.[77] Rathbone suggested that this doubling "must be a result of the Antonine plague."[78] Then in the 270s CE, the price of wheat rose dramatically, by about 10x, until Diocletian's reform of the Alexandrian coinage; Rathbone attributed this price

[74] Dominic Rathbone and Sitta von Reden, "Mediterranean grain prices in classical antiquity," in *A History of Market Performance: From Ancient Babylonia to the modern world*, ed. by R. J. van der Spek, Bas van Leeuwen, and Jan Luiten van Zanden (London: Routledge, 2015), 149-235, esp. 150.
[75] Ibid., 171-190, esp. 172.
[76] Ibid.,177.
[77] Ibid.
[78] Ibid., 178.

increase to the coinage reforms of Aurelian in 274/5 CE.[79] Finally, in the fourth century CE, Egypt experienced "constant and steep monetary inflation evident in the price of a wide range of goods."[80] Rathbone speculated that this inflation may have been rooted in the Roman state's new practice of only accepting tax payments in bullion, that is, refusing to accept its own coinage at face value.[81]

After presenting these results regarding the periods of price changes, Rathbone analyzed the Roman prices through the lens of variability: a topic quite pertinent to the findings of the present dissertation. He reasoned that "a major factor in the variability of wheat prices in the Roman world must have been the quality of the harvest," in addition to "exceptional" factors such as "cities under siege and armies in dire straits."[82] Rathbone's thoughts on variability centered on times of real, absolute increases or decreases in the grain supply. However, some of his evidence actually highlights, in my view, the importance of *perceived* changes in supply, especially predictions of future supply. For example, he noted that wheat prices doubled in one Arsinoite village over the course of a few days in 45 CE and explained that this increase "must reflect market reaction to a bad inundation *in anticipation of* a poor harvest in May AD 46."[83] Only a few sentences later, he wrote, "*Expectation of* a poor harvest is again implied in a governor's edict of 18 December AD 191 that all private surpluses of wheat throughout Egypt should be registered and put on the market on pain of confiscation, and that 'nobody is to hide it away *banking on opportunist prices*.'"[84] A poor inundation very well may have been a strong indicator of a poor harvest (and therefore low supply) to come. Nonetheless, I think it is important to pay attention to

[79] Ibid.
[80] Ibid.
[81] Ibid., 178-179.
[82] Ibid., 182.
[83] Ibid., 183-84, emphasis mine. On p. 184, he also noted more episodes of "anticipatory" price increases.
[84] Ibid., 184, emphasis mine.

the fact that prices increased before the supply shock actually occurred, and that speculative price-gouging may have been the result in some cases, as in the edict of 191 CE. Rathbone went on to list other factors contributing to price variability, namely seasonal rhythms in supply, the type of sale, and state intervention.[85]

This focus on variability, including simultaneous variability in addition to change over time, represents an important step forward in the study of ancient prices. The price-influencing factors Rathbone identified did almost certainly play a role contributing to price variability. However, I disagree with Rathbone's continued use of the concept of 'normal price' in the face of this variability. Likewise, as my data suggest for the Ptolemaic period and as some of Rathbone's own evidence indicates, changes in absolute supply and demand may have mattered less than simply *perceived* supply and demand. My study thus builds upon Rathbone's work but adds a greater emphasis on ancient individuals' perception of these factors in the face of incomplete and/or imbalanced information.

3.3.2 Review of Literature on Ptolemaic Prices

Price data from the Ptolemaic period have also been previously tabulated and analyzed. Thus far, though, price data have only been published for select staple commodity crops, so my dissertation represents the largest, most comprehensive collection of early Ptolemaic prices to date. Likewise, for the past six decades or so, research on Ptolemaic prices has focused on the question of how to explain the periods of dramatic price increases, typically referenced as the Ptolemaic 'inflation.' I explore these popular questions in Chapter 6 of this dissertation but also move forward to discuss price variability and volatility in Chapter 7.

[85] Ibid., 184-88.

The earliest collection of Ptolemaic prices dates to 1930, when Fr. Heichelheim published an analysis of the economic changes of the Hellenistic period, of which Ptolemaic Egypt formed a part.[86] This work includes tables of prices for wine, slaves, houses, land, rents, grain, wages, and other goods from Ptolemaic Egypt, as well as Hellenistic Uruk and parts of Greece. Heichelheim's data represent a useful collection, but he included only prices from Greek texts. While Greek was more widely used in the broader Hellenistic world and thus useful for his purposes of comparison, any study of Ptolemaic prices that does not take into account the Demotic evidence is clearly incomplete.

T. Reekmans was not interested in tabulating a comprehensive catalogue of prices when he published "Monetary History and the Dating of Ptolemaic Papyri" in 1948 and "The Ptolemaic Copper Inflation" in 1951; rather, his work represents an attempt to make sense of these prices and to determine how price changes may be useful in dating papyri.[87] Reekmans's emphasis on potential changes in accounting practices rather than real price fluctuations has dominated the scholarship relating to Ptolemaic prices until relatively recently. Working with Greek papyri, he noted the seemingly dramatic rise in prices at various points during the Ptolemaic period, as Heichelheim had noted before him. Between 221-216, Reekmans observed that prices seemed to double, and he attributed the change to a nominal doubling of the value of all bronze coins.[88] In so doing, Ptolemy IV was able to effectively lower his expense for paying those state employees whose wages he paid in bronze, giving them the same official 'value'

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[86] Fr. Heichelheim, *Wirtschaftliche Schwankungen der Zeit von Alexander bis Augustus* (Jena: Verlag von Gustav Fischer, 1930).
[87] T. Reekmans, "Monetary History and the Dating of Ptolemaic Papyri," in *Studia Hellenistica* 5, eds. L. Cerfaux and W. Peremans, (Louvain: Bibliotheca Universitatis Lovanii, 1948), 15-43; T. Reekmans, "The Ptolemaic Copper Inflation," in *Ptolemaica* (*Studia Hellenistica* 7), eds. E. Van't Dack and T. Reekmans (Louvain: Publications Universitaires de Louvain, 1951), 61-118.
[88] Reekmans, "Ptolemaic Copper Inflation," 67.

although fewer coins. Higher-status employees were paid in silver, so their wages were unaffected.[89] Reekmans believed that another rise in prices had nothing to do with the value of the coins, but was rather caused by a shift from recording values in terms of a silver standard to a bronze standard, ca. 211-210 BCE.[90] He wrote, "wages and prices of the period of transition from the 3rd to the 2nd century BCE were calculated in terms of *drachms of copper*, i.e. on the copper standard, instead of in terms of *copper drachms*, i.e. on the silver standard."[91] This was a change in standards of accounting only and was not a real change in the value of the coins themselves, as had occurred in 221-216.[92] Reekmans saw another shift in the units of value in 183-182, under Ptolemy V, based on the doubling of the value of all bronze coinage (i.e., a repeat of 221-216), again presumably so that the king could pay out 'fixed' wages at the same official rate without having to actually hand over the same amount of coins.[93] At this time, the value of silver with respect to bronze changed from 1:60 to 1:120.[94] The value of the bronze coinage was doubled once again in 173 BCE, also "to make economies of the wages of some state employees and soldiers."[95] At this time, which Reekmans dubs "the great inflation," the official ratio of silver to bronze was 1:480.[96] Then between 130-128 BCE a fourth doubling occurred, with the effect that a drachm of copper after 128 BCE weighed only one-sixteenth of the original Ptolemaic coin, which was based on the Phoenician drachm.[97] After 128 BCE, the coins retained their values until the end of the Ptolemaic period. While it may seem that prices and wages were rising throughout

[89] Ibid., 68.
[90] Reekmans, "Monetary History," 17-23.
[91] Reekmans, "Ptolemaic Copper Inflation," 71 (emphasis his). His distinction here is based on his interpretation of the material rather than any change in the way coins were referred to in the Greek.
[92] Ibid., 78.
[93] Ibid., 83-85.
[94] Reekmans, "Monetary History," 23.
[95] Reekmans, "Ptolemaic Copper Inflation," 94.
[96] Reekmans, "Monetary History," 26.
[97] Reekmans, "Ptolemaic Copper Inflation," 104.

the Ptolemaic period, the changes were really devaluations of the bronze coinage rather than real rises in the price of goods and services. According to Reekmans, the significant shifts in the value of the coins allowed the state to maintain a given level of wealth, at the expense of lower level state employees, without raising taxes on other elements of the Ptolemaic population or changing the wages of higher-status state workers.[98] He also thought that the rise in value of the silver coinage relative to bronze was connected to the rising scarcity of silver due to Egypt's lack of its own silver mines and the increasing difficulties of importing the metal, primarily because of various wars with the Seleucid kings in Asia.[99]

In 1984, A. Gara likewise attempted to tackle the issue of the seeming changes in Ptolemaic prices with her article, "Limiti strutturali dell'economia nell'Egitto tardo-tolemaico."[100] In contrast to Reekmans, Gara attributed the shifts to changes in the intrinsic value of the silver coins, based on the debasement of the percentages of silver contained within them. She remained strongly opposed to Reekmans's idea of the Ptolemaic kings' periodically changing the nominal value of the bronze coinage, arbitrarily fixing the ratio of silver to bronze. Instead, she noted the rise in the volume of bronze coins and the disappearance in the texts of values less than five drachms. According to Gara, these observations led to an understanding that the Ptolemaic price shifts do not represent a monetary phenomenon but rather experimentation relating to the relationship between the debasement of the silver coinage and the rise of bronze as the preferred unit of account. She agreed with Reekmans on the idea that the changes in accounting did not necessarily reflect economic reality; we must distinguish between the role of money as a unit of account and as a means of exchange.

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[98] Ibid., 106.
[99] Ibid., 67.
[100] A. Gara, "Limiti strutturali dell'economia nell'Egitto tardo-tolemaico," *Studi Ellenistici* 48 (1984): 107-134.

Within his 1995 book cataloguing Ptolemaic coins "for collectors," the numismatist R.A. Hazzard proposed a simple explanation for the shift from the silver to the bronze standard in 210.[101] Before the change, Hazzard explains, sums were recorded in terms of talents, drachmas, and obols, distinguishing between bronze and silver coins. The ratio of drachmas to obols was 1:6. At the end of an account, a scribe needed to add up all the obols in a list and divide by six to find the total number of drachmas and obols (the remainder after division). With Ptolemy IV's change of standard, everything was multiplied by sixty. The old bronze obol was reckoned at 10 drachmas (so the drachma:obol ratio was now 1:10) and one new bronze drachma was worth sixty old bronze drachmas. This shift allowed the scribe "to eliminate all fractions and to allow the adding of entries without need for division," because now all values could be listed in drachmas, without the need for obols in accounting.[102] While it is certainly true that the change to the bronze standard simplified accounting practices, this relative ease was not necessarily the root cause of the change. After all, drachmas and obols were not new, and other Hellenized cultures used them in accounting without a problem. For simplification to be the definite cause, we would need to look for other potential attempts at scribal simplification to demonstrate a larger pattern. Also, Hazzard's explanation does not take history into account. Why was the simplification introduced in 210 instead of 110, or any other year for that matter? Ultimately, Hazzard's description of the ease of accounting under the bronze standard illustrates one effect the change had, but it does not contextualize that change in terms of Ptolemaic economic history writ large, so the explanation is incomplete.

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[101] R. A. Hazzard, *Ptolemaic Coins: An Introduction for Collectors* (Toronto: Kirk & Bentley, 1995), 83-84.
[102] Ibid., 83.

The next year, in 1996, Klaus Maresch published *Bronze und Silber,* influenced by Reekmans's push to comprehend the seeming rise in figures associated with prices over the course of the Ptolemaic period.[103] To explain the changes in these figures, Maresch emphasized the changes in the way the Ptolemaic state used units of measurement of value. Initially, the state used the silver standard, with values expressed in terms of the silver stater, the drachma (worth ¼ stater), and fractions of a drachma. However, the financial crisis of the 3rd century encouraged Ptolemy IV to introduce the bronze standard. From this point on, the bronze coinage no longer had a fixed value with relation to the silver coinage, so there were two independent systems of value. One 'bronze drachma' had two different values in the papyri, based on whether the scribe was using the bronze standard or the silver standard. The 'bronze drachma' of the bronze standard was worth 1/60 the value of the 'bronze drachma' on the silver standard. Maresch calls the new bronze drachma on the bronze standard a 'drachma of account.' Before 183-182, one silver drachma (on the silver standard) was worth 300 drachmas of account, so one drachma of account was equal in value to 1/300 of a silver drachma and 1/1200 of a silver stater. But we must not forget the 'bronze drachma' of the silver standard, which Maresch now calls a 'nominal silver drachma.' This 'nominal silver drachma' was worth 1/5 of a real silver drachma, so 1/20 of a silver stater. To sum up, Maresch noted four units in the texts (here ranked from most valuable to least):

1. silver stater, on the silver standard (= 4 real silver drachmas)
2. real silver drachma, on the silver standard (= 1/4 silver stater)
3. nominal silver drachma, on the silver standard (= 1/5 real silver drachm)

[103] Klaus Maresch, *Bronze und Silber: Papyrologische Beiträge zur Geschichte des Währung im ptolemäischen und römischen Ägypten bis zum 2. Jahrhundert n. Chr.* (Cologne: Westdeutscher Verlag, 1996), 1-18.

4. drachma of account, on the bronze standard (= 1/60 nominal silver drachm)

These four values remained in use until the Roman period. The ratios within the silver standard remained fixed, but the value of the 'drachma of account' of the bronze standard relative to the values based on the silver standard fluctuated considerably. Maresch explained the introduction of the bronze standard as a result of the rising value of silver as a metal within Egypt, itself due to the shifting political situation of the Ptolemaic period. Ultimately, then, the multiplication of the figures by 60 that we see in the papyri is a result of the new calculation of prices based on the bronze standard (i.e., the introduction of the drachma of account).

Maresch's study of the Ptolemaic prices thus includes a strong, persuasive argument for how the price increases were a result of the change in accounting standards. Moreover, Maresch is the only scholar, until now, to have included Demotic evidence in addition to that from Greek texts. Furthermore, his tables listed prices for multiple commodities in addition to just grains; he included data on the prices of wheat, barley, emmer, wine, castor oil, safflower oil, and sesame oil, in addition to wages and land prices, from throughout the Ptolemaic and Roman periods.[104] Clearly, then, Maresch's price lists are the most comprehensive to date, and encompass a longer temporal range than that of the present dissertation. His text is quite useful and influential, but this dissertation includes the prices of an even wider range, including all commodities for which prices survive. Likewise, Maresch, along with essentially all previous scholars of the Ptolemaic prices, focused his analysis on the price increases and the question of inflation. My study, however, represents a new analysis of contemporaneous variability and volatility in addition to change over time.

[104] Ibid., 181-216.

In 1997, Hélène Cadell and Georges Le Rider published their investigation of increases in the price of grains in the Ptolemaic period, entitled *Prix du blé et numéraire dans l'Égypte Lagide de 305 à 173.*[105] Like most scholars of Ptolemaic prices before them, Cadell and Le Rider only worked with the Greek evidence. Their monograph represents a reaction to the work of these previous scholars, who all agreed that in the late 3rd century the Ptolemies created some sort of new drachma to make accounting practices simpler.[106] The rise in values was not rooted in a change on the ground in the real world, but existed almost entirely in terms of accounting. Reekmans saw this as first a doubling of the nominal value of the drachma of bronze, followed by a multiplication by 30 of the prices expressed in this metal. Hazzard and Maresch rather based their analyses on the idea of one change, straight to multiplying by 60. Gara did not present an opinion on the exact multiplications and their dates, but she did express the idea of an accounting terminology distinct from any actual economic change. For all four, then, the figures given in drachmas of bronze present a somewhat misleading image of price changes in the real world.

Through their tabulation of grain prices, Cadell and Le Rider noticed that the multiplication of prices was not clearly by two, then by 30, as Reekmans had explained, or by sixty, as Maresch and Hazzard had proposed. The shift was actually much more nuanced and complex. When one looks solely at the figures expressed in bronze, without worrying about the difference between bronze and silver values, the changes in price are much less extreme.

The other main disagreement Cadell and Le Rider expressed with the previous scholarship, especially that of Reekmans and Maresch, related to the assumed increase in value of silver metal. Clearly, the value of silver coinage with respect to bronze coinage rose. However, the

[105] Hélène Cadell and Georges Le Rider, *Prix du blé et numéraire dans l'Égypte Lagide de 305 à 173* in *Papyrologica Bruxellensia* 30 (Brussels: Fondation Égyptologique Reine Élisabeth, 1997).
[106] The following explanation reflects Cadell and Le Rider's summary of their reading of and reaction to the work of previous scholars. See Cadell and Le Rider, *Prix du blé*, 70-73.

value of silver coinage with respect to gold coinage did not change. The value of the gold mina coin and that of the silver stater did not vary under Ptolemy IV nor under his immediate successors. Instead of explaining the changing ratio of silver coinage to bronze as a *rise* in the value of silver coinage with respect to the bronze, we should instead express a *devaluation* of the bronze coinage with respect to the silver. This idea of a bronze devaluation was also expressed by Hazzard, although not in the context of explaining the change in price figures under Ptolemy IV.[107]

Cadell and Le Rider went on to propose a new explanation for the ostensibly rising prices expressed in bronze beginning during the reign of Ptolemy IV. To them, the change was not merely a shift in accounting practices, but rather a real rise in prices as a result of many successive periods of inflation.[108] While the gaps in the data did not permit them to determine the exact dates and causes of the inflation, they were able to make some general observations about the most significant inflationary periods. The first period came between 222-216, during which time they calculate annual inflation at 15%. The second was in the years leading up to 199, during which inflation may have been roughly 30% annually. The third inflationary period occurred in the years immediately preceding 173, with an even more serious inflation (Cadell and Le Rider could not give a specific figure because of the decreased volume of extant textual material). While these inflation rates may be high, they are not inconceivable. Modern examples of hyperinflation exist, with prices rising dramatically by the day or even by the hour, so an annual rate of 30% is certainly possible, and much easier to justify than an inflation rate of 6000% annually (a multiplication by 60). Cadell and Le Rider go on to propose possible causes for the three main

[107] Hazzard, *Ptolemaic Coins*, 45.
[108] Cadell and Le Rider, *Prix du blé*, 74-76.

periods of inflation, as well as the intermediary periods of stability, based on historical developments and monetary mechanisms.

The novel explanation of Cadell and Le Rider is potentially very interesting. Reekmans, Maresch, Hazzard, and Gara were all more interested in explaining changes in accounting systems and calculating when these changes occurred than in analyzing any potential price formation or fluctuation within those periods. Cadell and Le Rider began a more serious analysis of such fluctuation based on their openness to the idea that actual economic change could have occurred in the Ptolemaic period. However, especially since they based their analysis on the price of only one commodity (grain), and only the evidence written in one of the two languages of the Ptolemaic society (Greek), from texts dated within the period 305-173, ignoring the later Ptolemaic period, the gaps in their data were not negligible.

While my work on this dissertation was in progress, Sitta von Reden also turned her attention to the Ptolemaic prices. In 2015, she worked with Dominic Rathbone to publish an ambitious article on all grain prices from classical antiquity, with her particular focus being on the eastern Mediterranean before the Roman conquest.[109] Rathbone's contribution was discussed earlier in this chapter, since it addressed the Roman evidence, but von Reden's part of the article is more pertinent to the present analysis of the Ptolemaic prices. Crucially, she distinguished between prices of different types: market prices, conversion rates (i.e., prices in terms of wheat), and penalty prices to be paid in cash instead of unfulfilled rent obligations in kind.[110] As my price data

[109] Sitta von Reden, "Grain prices in the eastern Mediterranean (c. 420-30 BC)," in Dominic Rathbone and Sitta von Reden, "Mediterranean grain prices in classical antiquity," in *A History of Market Performance: From Ancient Babylonia to the modern world*, eds. R. J. van der Spek, Bas van Leeuwen, and Jan Luiten van Zanden (London: Routledge, 2015), 156-170.
[110] Ibid., 163ff.

corroborate, prices of these different types moved according to different dynamics, and I follow her separation in my own analysis.

She argued against Cadell and Le Rider's view of Ptolemaic inflation.[111] Von Reden pointed out that there were steps in the increase of Ptolemaic prices (i.e., it is unlikely that inflation would occur in such regular patterns). [112] Likewise, only the prices quantified in bronze were affected by the increase post-Raphia; those counted in terms of silver did not increase in the same way.[113] Furthermore, since grain remained a key medium of exchange in much of the Ptolemaic economy, von Reden argued that "It can also be asked whether coined money had the same effects on prices as in fully monetized economies," as Cadell and Le Rider had assumed.[114] In the end, von Reden did not take her reasoning so far as to say that inflation definitely did not occur, but merely concluded that "while we cannot exclude the possibility that changes of volumes of money in circulation were major factors for changes in price levels, both temporarily and in the long term, we are lacking the data to prove that link empirically."[115]

While the inflation question cannot be resolved with certainty, as I will also show in Chapter 6 of this dissertation, von Reden did move on to draw other observations based on the price data, especially with regard to price variability. In her portion of the article, she noted three major conclusions. First, based on her analysis of conversion rates and penalty prices, she noted that "there were strong notions of 'normal price' for grain in different economic zones and under different economic circumstances."[116] She thought that these so-called 'normal prices' "enjoyed

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[111] See also Sitta von Reden, *Money in Ptolemaic Egypt: From the Macedonian Conquest to the End of the Third Century BC* (Cambridge: Cambridge University Press, 2007), 76-78.
[112] von Reden, "Grain prices in the eastern Mediterranean (c. 420-30 BC)," 169.
[113] Ibid.
[114] Ibid.
[115] Ibid.
[116] Ibid.

some official backing" and emphasized that "Such regional stability of price expectation over several generations, and even centuries, suggests a large degree of institutional pressure and little impact of changing economic trends and market forces."[117] Thus von Reden's argument emphasized the importance of official conversion rates and penalty prices; she believed that these "standardized prices stabilized market prices and created a limit to arbitrary fluctuations of price according to supply and demand."[118] In her view, market prices were derived from official rates and therefore stayed largely stable.

However, her second key observation seems to indicate a lack of stability. She noted that "massive deviations from normal price levels were frequent, both within and between regional economies."[119] Von Reden did not explain this observation further, but it seems to me if such large deviations from the 'normal price' were so frequent, then the very existence of a normal price outside the context of official rates should be called into question. As will become clearer later in this dissertation, in Chapter 7, I likewise observed large, frequent deviations from official prices in the records of market prices. I will argue for the historical and theoretical importance of this variation as the dissertation progresses.

Third, von Reden argued that "the formation of regional notions of 'normal price' and the formation of interdependent economic regions" were highly influenced by "Monetization and coin circulation."[120] Noting that she could not prove this idea, she speculated that the process of monetization across all of Egyptian territory may have led to the development of standardized, stable prices across Egypt.[121] Von Reden's own previous work on Ptolemaic monetization

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[117] Ibid., 170.
[118] Ibid., 166.
[119] von Reden, "Grain prices in the eastern Mediterranean (c. 420-30 BC)," 170.
[120] Ibid.
[121] Ibid.

emphasized that this was "a monetary economy that operated on a limited and uneven supply of cash," so her reasoning here that "coined money [had become] the main unit of account and means of payment in public and private transactions" is striking.[122] The seeming contradiction might be resolved if we broaden the definition of "coined money" to include money was not in the form of physical coins: for example, money that existed only in ledger form in banking institutions. Given the relatively low value and resultant restricted spread of Ptolemaic coinage outside Ptolemaic territory, it does seem plausible that prices calculated in terms of Ptolemaic coins and perhaps accounting units might have been more similar to each other than to prices from different "economic zones," in different "monetary networks."[123]

Ultimately von Reden concluded her work on a "pessimistic" note.[124] After listing a number of socio-historical questions about which parties benefitted from price regulation, why, and how, she wrote, "These questions, though crucial for understanding of the role of markets in the ancient economy, cannot be analysed on the basis of price data."[125] Further, she concluded that "Extant prices cannot tell us much about the nature of markets and price formation in the Classical or Hellenistic world."[126] It is of course true that the prices mean little out of context, and a purely quantitative study of prices alone would not be able to explain the social and economic developments of the period. Nonetheless, I still affirm that the price data can serve as one form of evidence, which, coupled with other sources, can generate a great deal of insight into Ptolemaic economic history.

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[122] von Reden, *Money in Ptolemaic Egypt*, 278; von Reden, "Grain prices in the eastern Mediterranean (c. 420-30 BC)," 170.
[123] von Reden, "Grain prices in the eastern Mediterranean (c. 420-30 BC)," 170. For more on Ptolemaic coins and monetization, see Chapter 4, section 4.4.9, "Monetization and the Money Supply." For more information on Ptolemaic accounting units, see Chapter 5, *passim.*
[124] von Reden, "Grain prices in the eastern Mediterranean (c. 420-30 BC)," 169.
[125] Ibid., 170.
[126] Ibid.

Until recently, studies of Ptolemaic prices focused almost entirely on the question of the price increases and the extent to which they were caused by accounting changes or real inflation.. In general, the consensus seems to be that the price increases cannot be explained as a result of inflation alone, as Cadell and Le Rider argued, but rather some combination of changes in accounting and actual inflation.[127] The issue of the price increases cannot be fully resolved with certainty, as von Reden has noted.[128] Nonetheless, the 'inflation question' still critical to understanding Ptolemaic monetary history, so I tackle it in Chapter 6 of this dissertation.

It is also worthwhile to compare contemporaneous prices and to analyze their variability and volatility, as the recent study of Rathbone and von Reden began to do.[129] The price data are revealing in their very variability, as I show in Chapter 7 of this work. In approaching the question of variability, I was clearly influenced by Rathbone and von Reden's recent article, but their emphasis on the stability of 'normal prices' masked the great volatility visible in prices outside the official rates. The end of this dissertation, therefore, serves to unmask this variability and question the effectiveness of those Ptolemaic institutions that held regulatory power.

My study also moves beyond previous work in its comprehensiveness; like Maresch, I include prices in both Greek and Demotic, but I do not restrict my data to the prices of certain commodities: all commodities with surviving prices are included. A broader study, incorporating both languages and as many commodities as possible, coupled with comparisons of prices both across and within sectors of the economy, allows for an even more nuanced approach to the history of prices.

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[127] Cf. von Reden, "Grain prices in the eastern Mediterranean (c. 420-30 BC)," 169-70.
[128] von Reden, "Grain prices in the eastern Mediterranean (c. 420-30 BC)," 169.
[129] Dominic Rathbone and Sitta von Reden, "Mediterranean grain prices in classical antiquity," in *A History of Market Performance: From Ancient Babylonia to the modern world*, eds. R. J. van der Spek, Bas van Leeuwen, and Jan Luiten van Zanden (London: Routledge, 2015), 149-235.

3.4 Sources for Ptolemaic Egyptian Prices

The relative abundance of economic texts preserved from the Ptolemaic period of ancient Egypt allows us the unique opportunity to gain detailed, quantitative information about prices. The current study is based on a database of as many prices as possible from early Ptolemaic texts, dating to between 332 and 186 BCE, written in Demotic and/or Greek. The textual corpus is necessarily large; it is as comprehensive a data set as possible for the period. As Sir William Beveridge declared in the introduction to his massive study of *Prices and Wages in England*, "the whole value of price records for social and economic history lies in comparison."[130]

This comprehensive collection of Ptolemaic prices may seem clearly defined on the surface, but within the Ptolemaic textual tradition, the monetary values reported in texts do not always refer to actual prices individuals physically paid to gain property rights over things. In many cases, it is difficult to determine if prices extant in the texts represent an actual sale using conventional forms (i.e., someone gave X good to another party, who gave Y coins in exchange), a simple inventory of values with no physical exchange, or an entirely different situation not yet understood. For example, there exists a great amount of available quantitative information on the value of commodities within annuity contracts between a man and a woman (Demotic *sẖ n sʿnḫ*, literally "documents of support," often referred to as "marriage documents"). These papyri include a list of the items a woman brought with her when she began to cohabit with a man. When she formalized her domestic relationship with him (which could have occurred at the same time as the initial cohabitation or at some point later), the belongings she brought into the

[130] Sir William Beveridge, *Prices and Wages in England From the Twelfth to the Nineteenth Century* (London: Longmans, Green and Co., 1939), xxv.

relationship were inventoried, along with the value of each. The documents do not record sales or exchanges, but inventories. In the case of divorce, the woman would be able to leave the man's household with her property, or if the original property were unavailable for whatever reason, she could claim its equivalent value. Since these inventories may or may not have been called upon, it is impossible to say whether the valuation of these items was ever actually used. However, it would be an exaggeration of this complexity to claim that the values are inaccurate because they do not represent actual sales receipts. On the contrary, the values were more likely determined with as much fairness and accuracy as possible, since they could in fact be called upon and used in cases of broken relationships. Although an actual exchange may not have taken place, the values recorded refer to the items' exchange-values, their equivalents in terms of other items, so these values are included as prices for the purposes of this study.

Some prices do not refer to actual goods at all, but rather a price to be paid as a penalty in the case of the breaking of a contract or an oath. For example, at the end of some documents of sale, after all parties have agreed to the sale and the price has been agreed upon and paid in full, the contract could include a penalty clause, in which the seller would have to pay a penalty to the buyer if the seller were to renege on the deal and fail to live up to any of the previous clauses. Likewise, the buyer might also agree to his own penalty clause, in which he would also agree to pay a fine to the seller if the buyer did not act in accordance with all of the points stipulated earlier in the contract. Similar penalty clauses can be found in Ptolemaic temple oaths, documents which were designed to resolve conflicts. If someone felt wronged by another party in some way (for example, he claimed to be the victim of a theft or an act of adultery), he could propose that the one who wronged him come to the temple and swear an oath of innocence before the god. If the accused party refused to make the oath, then he or she was presumed guilty of the offense and

would be required, by the terms of the oath, to repay whatever might have been stolen and/or to pay a penalty to the victimized party. The fines represented in penalty clauses, whether those clauses are found in contracts or oaths, do not represent the value of any particular good, so they cannot really be called "prices." It is also impossible to know whether they were ever actually paid. However, it is possible that they were estimated in proportion to the current pricing levels or standard of living in the time and place in which they were imposed. Granted, is also possible that the level of these penalties was closely related to the wealth level of the party who would potentially be liable to pay the penalty, as is the case with liquidated damages in the modern American legal system, in order to deter that party from breaking the contract (at least for penalty clauses at the end of contracts, if not oaths, in which the penalty-worthy action may have already taken place). Still, as the cost of living and wealth levels may have risen and fallen together, valuable information regarding these general levels may come from tracing them over time and space. Penalty prices are included in this dissertation, and they serve as one possible indicator of inflation in my analysis of the Ptolemaic inflation in Chapter 6. Moreover, those penalty clauses that include rates of conversion between other grains and wheat (and between wheat and cash) in case of non-payment of rents that were due in kind, are included in my analysis of grain price variability in Chapter 7. Thus the penalties recorded in penalty clauses will be included in the current study, just as the values given in the inventories of annuity contracts, since they may relate to actual shifts in prices over the course of Ptolemaic Egyptian history, even though they themselves do not necessarily represent tangible exchanges of goods.

Not all prices were negotiated by two equal parties. For example, it is unclear whether the man and the woman in the above annuity contracts held the same level of social power. But the role of power dynamics in 'price formation' is even more prominent in cases in which an

individual engaged with the state. In a sense, the values listed in tax receipts could be considered prices, in that they record payments, despite the fact that the amounts owed and paid for taxes were not negotiated and agreed upon by both the state and the taxpayer. If we consider the broader threat of the taxpayers' revolting against the state or fleeing the land (*anachoresis*) alongside the opposing threat of state violence, then there is always a certain level of negotiation, even in the Ptolemaic subjects' economic interactions with the state. But negotiation is not the only pricing mechanism worth analyzing, and the setting of fixed prices by the state was certainly a prominent feature of the Ptolemaic economy. The state held monopolies on the many seed oils, and the prices of those commodities were fixed. These flat prices set by the state are worthy of analysis in this study of pricing dynamics, especially as they compare to the prices of commodities over which the state did not exercise as much control. For that reason, prices of these monopolized commodities are included in this study. In Chapter 7, I compare variability in the price of commodities whose prices were ostensibly fixed with variability in the price of less regulated commodities. Likewise, tax documents will be included when they relate to non-proportional taxes, like the demonstrably flat salt tax, which can serve as a standard against which to measure the price increases in Chapter 6.

Several genres still remain. Unfortunately, Demotic sales contracts (the Demotic term for the genre is *sẖ r-ḏbȝ ḥḏ* "document concerning money") generally do not specify a price but merely say that the price has been agreed upon and paid in full. Occasionally documents recording smaller sales, written in an epistolary style, do mention the price, so they will be included. Likewise, sometimes the payment for a large sale (of land, etc.) was not paid in a lump sum, so the sales contract includes the price to be paid in future installments, because of which the

contract was drawn up.[131] Also, some accounts do list prices paid by a given project over a period of time.[132] All such prices are included in the database, although the studies included in this dissertation focus on commodity prices only.

Unlike the majority of Demotic sales contracts, those written in Greek are more likely to include prices. Prices are also mentioned in accounts and in letters which refer to business affairs, particularly those on large estates. These letters and accounts include both private and official documents. For example, official accounts from the Menches papyri include information about expenses that arose during the state's survey of agricultural production, such as purchases of goods like food and papyrus and payments made to individual officials for their services.[133] Likewise, the archive of Zenon, the manager of the estate of the dioiketes Apollonios in the third century BCE, contains letters written to Zenon regarding purchases for the estate that record prices, and Zenon's accounts of supplies sometimes include prices as well. All the commodity prices recorded in Greek contracts, accounts, and letters will be included in the price database of this study.

As Rathbone has pointed out in his study of prices from Roman Egypt, "the social representativeness of the written evidence for prices" is a definite problem.[134] Recording financial information in a text of any of these genres was certainly an anomaly rather than the rule in terms of Ptolemaic society overall. The majority of people would likely not have had assets significant enough to be worth protecting with a legal contract. Most sales would have been informal, and there was no need for a contract. The corpus also remains incredibly small relative to the total number of documents that were written in Egypt in the period, due to the vicissitudes of

[131] For an example, see P. Berlin 11338.
[132] For example, P. Phila. 30 is an account of repairs to a tomb and references the cost of all the goods and labor purchased for those repairs.
[133] Arthur Verhoogt, *Regaling Officials in Ptolemaic Egypt: A Dramatic Reading of the Official Accounts from the Menches Papers* (Leiden: Brill, 2005).
[134] Rathbone, "Prices and price formation," 185.

preservation over the millennia gone by. Likewise, the information gleaned about the Ptolemaic economy refers only to the economy of Ptolemaic Egypt specifically; my conclusions cannot be generalized to the ancient economy writ large, nor to other periods of the ancient Egyptian economy. This time and place was unique in its social and economic organization; the information obtained is specific to this period, and it necessarily represents data recording the activities of a very small percentage of all the people around and financial transactions which occurred within that period.

3.5 Conclusions

The nature of the source material and our chronological distance from the events the material describes necessarily limit the possibilities for research into the price history of Ptolemaic Egypt. The data represent a very small sample of all the prices that probably existed within that time period. The prices found in these sources do not include much discussion; we know only the final price, with little information on how that price was negotiated or set. Furthermore, because all of the parties involved have been gone for millennia, it is much more difficult to determine the social and cultural background of the formation of individual prices than it would be for an investigation of modern prices.

However, these limitations are not absolute and do not prevent a study of Ptolemaic prices from being possible. Rather, it is possible to take what has been gleaned from modern economic sociology and use this background to make the best possible use of the source data. Many of the modern studies of price formation relate to the effects of social institutions and culture on preference formation. These studies have been yielding interesting results, so similar research into ancient prices might likewise prove interesting. While of course we cannot interview participants in

price formation to determine their exact psychological background, we can use what we know of Ptolemaic society and culture to make deductions about how prices fluctuate across time, space, and class. The next chapter will examine the economic and social structures of Ptolemaic Egypt, providing the historical background on those developments in demographics, technology, and institutions which are most likely to have influenced the pricing dynamics of the period.

CHAPTER FOUR

Pricing in the Ptolemaic Economy: Potential Price-Shaping Factors in Context

4.1 Introduction

The prices investigated in this study are situated in a specific historical context, the Egyptian Ptolemaic period. The period had its origins in 332 BCE, when the Greek-speaking Macedonian king known as Alexander the Great (Alexander III of Macedon) wrested Egypt from Persian control and made it a part of his vast empire. In 323 BCE, Alexander died in Babylon, his empire stretching from Europe all the way to India and Afghanistan. At that time, he did have an infant son and heir, who now became Alexander IV. The deceased Alexander's generals chose to divide the empire to each govern a region in the name of the heir, and Ptolemy took Egypt. However, Alexander IV was killed in 311 BCE, and six chaotic years later, Ptolemy declared himself king of Egypt and was accepted as such by his army, ushering in three centuries of Ptolemaic rule. This dissertation investigates prices during the reigns of the early Ptolemies, from Alexander's conquest in 332 BCE until 186 BCE, when the Great Revolt of Upper Egypt ended, which was a rebellion against Ptolemaic rule that threatened the very integrity of the kingdom. While the Greeks and Egyptians had maintained trade relations since Minoan times, the Ptolemaic period was the first time Greek-speakers had actually ruled Egypt, and they ushered in a period replete with economic change. This chapter discusses some of the key historical developments of the Ptolemaic period that might have influenced prices so that those factors can be investigated in relation to the data in Part II of the dissertation.

Prices are a key indicator of economic change, but they cannot be analyzed without a broader understanding of social change at the time. Douglass North begins his book on economic

change with the statement that "understanding economic change … requires that we cast a net much broader than purely economic change because it is a result of changes (1) in the quantity and quality of human beings; (2) in the stock of human knowledge particularly as applied to the human command over nature; and (3) in the institutional framework that defines the deliberate incentive structure of a society."[1] North's work thus represents an attempt to understand economic change as a general process present throughout the history of human civilization, based on changes in demographics, technology (incorporating advancements in the broader stock of human knowledge), and institutions. Those three categories of social change, when applied to the specific context of Ptolemaic Egypt, may be useful in identifying factors that could have influenced prices in this period. Essentially, North reasons, if we examine economics as competition for scarce resources, then it is crucial to understand who was playing the game, what knowledge and tools the players had at their disposal, and how the rules of the game structured the way it could be played.

In this chapter, I apply North's tripartite framework to a Ptolemaic context. I demonstrate the existence of demographic change in Egypt during these centuries and evaluate the relationship between the rise in immigration and incentives instituted by the Ptolemaic state that could have impacted prices. I also consider technological developments in this period, especially in the realm of irrigation. In the end, though, I argue for the central importance of the development of Ptolemaic institutions, particularly in their role as vehicles to manage uncertainty, to any understanding of Ptolemaic prices.

[1] Douglass C. North, *Understanding the Process of Economic Change* (Princeton: Princeton University Press, 2005), 1.

4.2 The People: Demographics, Immigration, and Cities

4.2.1 Introduction

Shifts in the demographic structure of a population can influence that population's economic activity. Rises and drops in population numbers affect the labor supply and demand for food and other goods. Likewise, shifts in a society's ethnic makeup can influence demand, since individuals from different backgrounds might have different preferences and purchasing power. Much of Ptolemaic demography is unknown or difficult to work out, but a few key trends are visible in the evidence. The population seems to have initially risen, in part due to immigration. Over time, population levels seem to have plateaued and possibly declined slightly. Early in the period, Ptolemaic control of territories outside Egypt grew even more dramatically, but the area of those holdings fell sharply after the third century BCE. In the third century, we witness Egypt as a land of opportunity, growth, and investment in new cities and infrastructure. The latter two centuries of the period have not been studied as extensively, but it seems that the initial gains subsided. The loss of territories abroad may have been a factor that slowed imports and opened Egypt up to be more susceptible to market shocks, since its access to natural resources was less diversified.

4.2.2 The Size of the Labor Pool

The exact numbers for the overall population of Ptolemaic Egypt are a subject of contention, with estimates ranging from 1.2-10 million people in the third century BCE, with the actual number likely being around 3-5 million.[2] While population shifts can affect price

[2] D. W. Rathbone, "Villages, Land and Population in Graeco-Roman Egypt," *Proceedings of the Cambridge Philological Society, New Series* 216 (1990): 122-123; J. G. Manning, *Land and Power in Ptolemaic Egypt: The Structure of Land Tenure* (Cambridge: Cambridge University Press, 2003), 47-49;

fluctuations over time, in a Ptolemaic context, such population shifts remain murky. Rathbone has referenced an increase in the population in the third century, followed by prolonged decline.[3] The third century did see a population increase, due in part to immigration. The Ptolemies' investment in infrastructure and agricultural intensification likewise created a scenario in which Egypt could support more people. Nonetheless, there is so much debate over the accuracy of specific population estimates that it seems untenable at present to connect purported population shifts to pricing dynamics.

Overall population numbers alone do not accurately describe the makeup of the labor force. The youngest children and the oldest adults likely did not labor, and women and men did not play the same role in terms of their labor in antiquity. Precise age ratios of the population would be very difficult to reconstruct, but some previous research has shed light on sex ratios. Clarysse and Thompson used salt tax records to note that in the Fayyum, there was a shortage of women among Greek families, although not in Egyptian families, and that unwed brothers and adult sons "formed a regular feature of many Greek households."[4] In the villages of the Fayyum, Clarysse and Thompson report an overall sex ratio of 102, meaning there were 102 men for every 100 women – a relative shortage of females, either due to higher mortality among females or higher immigration rates among males.[5] Still, the sex ratios differ dramatically from district to district (Clarysse and Thompson report a range of 67.0 to 176.7 males per 100 females), so any

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Walter Scheidel, *Death on the Nile: Disease and the Demography of Roman Egypt* (Leiden: Brill, 2001), 220-223; Walter Scheidel, "Creating a Metropolis: A Comparative Demographic Perspective," in *Ancient Alexandria between Greece and Egypt*, eds. William V. Harris and Giovanni Ruffini (Leiden: Brill, 2004), 1-31, esp. 9; Willy Clarysse and Dorothy J. Thompson, *Counting the People in Hellenistic Egypt* (Cambridge: Cambridge University Press, 2006), 2: 101.

[3] Rathbone, "Villages, Land, and Population."

[4] Clarysse and Thompson, *Counting the People*, 2: 317.

[5] Ibid., 106.

broad generalizations relating to causality are likely to be faulty.[6] Ultimately, it is possible that because of the slightly higher proportion of men in the Fayyum, the overall labor pool may have been slightly larger than would be expected based on population numbers alone. Still, the higher proportion of men in the area was too minor to have a significant impact on wages.

The immigration of new actors from around the Mediterranean world certainly influenced the Ptolemaic labor pool. While the Late Period king Amasis (570-526 BCE) had attempted to limit trading activities with the Greek-speaking world to the city of Naukratis (effectively constricting immigration), the Ptolemies had different priorities: they welcomed an influx of Greek-speakers to Egypt, since such immigrants presumably would have been more likely to support Ptolemaic rule.[7] Many of these settlers were Greek-speaking soldiers. The early Ptolemies established a loyal reserve army by granting these soldiers, who came to be known as kleruchs, plots of land in Egypt, with their size based on the soldier's rank. The idea behind the practice was likely that these soldiers would remain loyal to the Ptolemaic state, be ready for military service whenever necessary, bring new land into cultivation, and be in place in areas of potential political trouble to serve the interests of the king.[8] Originally, this land was still considered royal property, with the solider only having the right to use it while he was still on military reserve, but over time, the land became essentially inheritable, and could even be transferred by cession.[9] The kleruchs thus had an incentive to maintain ownership of their land grants, even if they rented them out. The Greek-speaking soldiers in Ptolemaic Egypt became spread throughout the country, not

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[6] Ibid., 309, Table 7:27.
[7] Katja Mueller, *Settlements of the Ptolemies: City Foundations and New Settlement in the Hellenistic World*. Studia Hellenistica 43 (Leuven: Peeters, 2006), 174.
[8] J. G. Manning, *The Last Pharaohs: Egypt Under the Ptolemies, 305-30 BC* (Princeton: Princeton University Press, 2010), 161; Christelle Fischer-Bovet, *Army and Society in Ptolemaic Egypt* (Cambridge: Cambridge University Press, 2014), 197-299
[9] Manning, *Land and Power*, 178-79.

isolated in purely military communities; and their land ownership put them in a position of relative privilege.

The descendants of Ptolemy I continued the practice of importing mercenaries from the Greek-speaking world when they needed to add to their military forces. It should be acknowledged, though, that this was hiring on an emergency basis, and the Ptolemies likely did not bring in Greek mercenaries steadily or regularly. Christelle Fischer-Bovet has also persuasively argued that mass immigration of Greek-speaking soldiers ended by the mid-third century, with the exception of emergency hiring, such as by Ptolemy IV for the Battle of Raphia in 217 BCE.[10] Thus while Alexander and Ptolemy I did bring armies with them from the Greek-speaking world and the Ptolemies did grant them land, it would be faulty to imagine a constant stream of Aegean military personnel into Egypt throughout the Ptolemaic period. Fischer-Bovet has further demonstrated that the military settlers coming to Egypt represented slightly more than half of all immigrants.[11] Immigration to Egypt would have been an incredibly expensive undertaking in the ancient world, and there is no evidence that the Ptolemies or the rulers of any other states provided any official financial backing for civilian immigration.[12]

While the Ptolemies might not have paid for an immigrant's journey to Egypt, they did establish economic incentives to immigrate through their tax policies. Those whose work actively promoted Greek culture, i.e., teachers, athletic coaches, athletes victorious in the Alexandrian games, and artists involved in serving Dionysus, were exempt from the salt tax, a tax otherwise

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[10] Christelle Fischer-Bovet, "Counting the Greeks in Egypt: Immigration in the first century of Ptolemaic Rule," in *Demography and the Graeco-Roman World: New Insights and Approaches*, eds. Claire Holleran and April Pudsey (Cambridge: Cambridge University Press, 2011), 152.
[11] Ibid., 153.
[12] Mueller, *Settlements of the Ptolemies*, 175-76.

levied against every individual in Egypt.[13] Others were still liable for the salt tax but avoided the obol tax, which was otherwise applied to all adult males. These groups included 'Hellenes' (*Wynn)*, Persians (*Mdy*), and Arabs (*Hgr*).[14] Hellenes were also able to avoid the otherwise required labor service to the state (corvée). Hellenic status was conferred upon those of Greek origin, but more generally, in a legal sense, a Hellene was simply a non-Egyptian, so Jews and Thracians could be considered legally Hellenic.[15] The status was so beneficial, however, that some Egyptians attempted to achieve it and seem to have succeeded, perhaps through their work for the state administration.[16] A civilian Greek might be encouraged to move to Ptolemaic Egypt in part because of the higher social and economic status his ethnic background would grant him in this new place.

As a result, relatively large numbers of immigrants were coming to Egypt between 323 and 31 BCE. Still, the numbers are large only relative to earlier periods of Egyptian history; the overall percentage of Greeks within the population remained quite low. Fischer-Bovet estimates the number of soldiers who settled in Egypt at around 40,000 and multiplies that number by 2.9 to account for their wives and children (regardless of whether those wives immigrated or were already resident in Egypt), arriving at a figure of 116,000 for the population of Egypt with a military immigrant as its head of household.[17] Based on her reasoning that military settlers represented slightly more than half of all Greek-speaking immigrants to Egypt, the total number

[13] Clarysse and Thompson, *Counting the People*, 2: 124.
[14] Ibid., 125.
[15] Ibid., 142, 145.
[16] Ibid., 142-43.
[17] Fischer-Bovet, "Counting the Greeks," 140-141.

of immigrants is only about 200,000, or 5% of the population of Egypt (based on an estimated total population of 4 million).[18]

The fact that Greeks made up only a small minority of the population does not negate their potential impact on Ptolemaic prices. The Greek-speaking settlers likely did not change the overall population in large enough numbers to significantly strain the country's resources or drive down wages. In fact, despite the influx of immigrants in the early third century BCE, many texts from throughout the period actually hint at shortages of labor. For example, the Revenue Laws Papyrus specifies that oil-makers should not be allowed to move from nome to nome, likely since such movement would have led to a scarcity of oil-makers in certain nomes, and that state officials and contractors should ensure that these workers actually engaged in work every day.[19] Therefore it is unlikely that immigration in the early Ptolemaic period increased the labor supply enough to have driven down wages and the associated cost of goods.

Nonetheless, the relative privilege of Greek-speakers as a newly significant sector of the Egyptian population may have impacted prices. As discussed above, Greek speakers had clear tax advantages over others, but those tax advantages likely did not make a major impact on their economic activity, since the taxes they were exempt from paying were not particularly hefty ones.[20] The privilege of Greek-speakers was probably more apparent in their social networks, both formal and informal. For example, employment within the state administration was more available to Greek-speakers than Egyptians. Such positions could bring with them financial advantages that were at times significant. Immigrants and their close descendants did form social

[18] Ibid., 152.
[19] P. Rev., 44-46. The extent to which this shortage was due to demographics is uncertain, since other evidence strongly suggests shortages were closely related to mistreatment of workers. Likewise, it is possible that during times of war when many men were mobilized to fight away from home, the labor force within Egypt waned. For further discussion, see 4.4.11, "Labor," below.
[20] For further discussion of taxes, see 4.4.9 "Taxes," below.

networks that bonded them together more closely, especially in areas where they were more concentrated together, like the major cities and the Fayyum. Those who worked as state officials or who were personally acquainted with state officials had greater access to credit mechanisms, for example, that could have enabled them to engage in riskier and more lucrative financial transactions. This Greek-speaking privilege may have impacted prices because Greek-speakers had different preferences from those of the local Egyptian-speaking population; producers' incentives to cater to the desire of Greek-speakers certainly affected the production of goods. For example, the arrival of this culturally Greek population increased wine production on a scale never before seen in Egypt. Likewise, the immigrants' preference of wheat to the traditional Egyptian staples of barley and emmer caused wheat to overtake these others as the most actively farmed grain in Egypt.[21] I expect, then, that the price of these goods preferred by Greeks would be driven down over the course of the early Ptolemaic period in line with the increases in their production.

4.2.3 The Rise of New Settlements

The Ptolemaic dynasty did not simply take up residence in existing Egyptian settlements; they actively founded new cities to serve as centers for their own power. The development of these new settlements through both private and state investment could have impacted both spatial and temporal changes in prices. Greek-speakers resided in higher proportions in these new settlements, and therefore their preferences may have had an impact on the formation of differences in the prices of certain goods between the new settlements and the older, more traditionally Egyptian areas of Egypt. Likewise, the settlers who built their homes in these new cities spent money in the

[21] This shift in grain preferences will be discussed in more detail in 4.3.3 "Agriculture," below.

process, and these investments cannot be discounted as potential price-shaping factors. The development of major cities like Alexandria further stimulated demand and trade.

During his campaign in Egypt in 331 BCE, Alexander founded the city of Alexandria on the Mediterranean coast, where previously only a small settlement known as Rhakotis (*Rꜥ-qd.t*) had existed. This new city constituted Egypt's gateway to the wider Mediterranean world commercially, politically, and culturally and became what Bowman has called "the greatest trading city of the ancient Mediterranean."[22] The city's location at the mouth of the Nile, on the coast, made it a hub for commerce, which was further facilitated by the construction of two new deep water ports in the city.[23] In 311 BCE, Ptolemy I officially moved the royal residence and the heart of the state from Memphis to Alexandria, as recorded in the Satrap Stele, but the state apparatus had largely relocated as early as 319.[24] This move was naturally associated with a concomitant shift of resources, some of which were spent towards investment in cultural institutions. Ptolemy I and his son, Ptolemy II, founded the Alexandrian Museion, a scholarly institution dedicated to the furthering of philosophical, scientific, historical, and other academic pursuits, and Ptolemy III established the great library at Alexandria.[25] While Alexandria was thus the heart of Greek culture in Egypt and the city naturally attracted many Greeks and Macedonians, the majority of its population was still Egyptian, mainly farmers, priests, and those working for the state administration.[26]

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[22] Alan Bowman, "Trade and the Flag: Alexandria, Egypt and the Imperial House," in *Alexandria and the North-Western Delta: Joint Conference Proceedings of Alexandria: City and Harbour (Oxford 2004) and The Trade and Topography of Egypt's North-West Delta, 8th Century BC to 8th Century AD (Berlin 2006)*, eds. Damian Robinson and Andrew Wilson (Oxford: Oxford Centre for Maritime Archaeology, 2010), 103-109, esp. 103.
[23] Manning, "Hellenistic Trade(rs)," 114.
[24] Werner Huss, *Ägypten in hellenistischer Zeit 332-30 v. Chr.* (München: Beck, 2001), 65.
[25] Günther Hölbl, *A History of the Ptolemaic Empire* (London: Routledge, 2001), 26, 64.
[26] Hölbl, *History of the Ptolemaic Empire*, 27; Scheidel, "Creating a Metropolis," 25.

Scheidel estimates that Alexandria's population peaked during the Ptolemaic period at around 300,000 circa 200 BCE, and in the Roman period this figure may have risen as high as 400,000.[27] For comparison, Scheidel has also argued that "prior to the third century BCE, no city in the coastal regions of the Mediterranean is reliably known to or even likely to have comprised at least 100,000 residents," although perhaps inland cities like Memphis might have reached that size.[28] The development of Alexandria as a mega-city in the Ptolemaic period changed trading patterns in the Mediterranean because of the demand generated by its residents and its role as a gateway to the rest of Egypt.

Greek-speakers played a significant role in developing new settlements in the area of the Fayyum.[29] Ptolemy II actively promoted Greek settlement in the region and had these settlers reclaim land at the edges of the desert with a series of irrigation projects, projects which also extended to building a new artificial lake in the southern Fayyum.[30] This massive undertaking opened up a great deal of previously uninhabitable land to human settlement, perhaps tripling the amount of arable land in the Fayyum, and 30-40 new settlements sprang up in the region.[31] By the mid-third century, the Fayyum's population stood at around 80-100,000 people.[32] A larger proportion of kleruchs lived here than anywhere else in Egypt, and the area was attractive to Greek-speaking immigrants, resulting in a quite high proportion of Greeks in the population (Clarysse and Thompson estimate 32.2%, more than six times as high as Fischer-Bovet's estimate

[27] Scheidel, "Creating a Metropolis: A Comparative Demographic Perspective," 31.
[28] Scheidel, "Creating a Metropolis," 1.
[29] For more on the demographic and political distinctions between the populations of the Fayyum and the Nile Valley, see Manning, *Last Pharaohs,* 68 & 139.
[30] Hölbl, *History of the Ptolemaic Empire*, 62-63.
[31] Manning, *Last Pharaohs*, 139; Hölbl, *History of the Ptolemaic Empire*, 62-63.
[32] Clarysse and Thompson, *Counting the People*, 2:94-95; Manning, *Last Pharaohs*, 139.

for Egypt as a whole).[33] Thus while the majority of the population was still non-Greek, the Fayyum had a more Greek character than the rest of Egypt, and data relating to this region should be treated as exceptional.

New cities were also built in Upper Egypt. Upper Egypt had been dominated by the city of Thebes for millennia, to the extent that in Egyptian, the city's name, *Nỉw.t*, literally means simply "the city." Ptolemy I founded the new city of Ptolemais Hermaiou to be the region's new administrative center and as the heart of support for the state in the south, perhaps as a counterbalance to Thebes.[34]

The newly founded Ptolemaic cities and the agricultural reclamation of the Fayyum represented influxes of money and resources into new areas. As the Ptolemaic state developed incentives for private individuals to build and settle in these new areas, these individuals in turn drew more people and money to the new settlements. While specific estimates of the initial construction costs have not yet been calculated, it is reasonable to presume that, for example, following the move of the Ptolemaic capital to Alexandria in 311 and the founding of Ptolemais Hermaiou around the same time, money and people were flowing into those cities for at least several years. That investment could certainly have impacted prices, as could the higher proportion of Greek-speaking peoples in these Ptolemaic foundations relative to the rest of Egypt. Moreover, the volume of consumer demand and resultant trade generated in major cities, especially port cities, as compared to the more agriculturally productive countryside, led to different sorts of economic activity being carried out in urban and provincial areas.

[33] Clarysse and Thompson, *Counting the People*, 156.
[34] Hölbl, *History of the Ptolemaic Empire*, 92.

4.2.4 Boundaries of the 'Egyptian' Economy

The people affecting prices in the Ptolemaic economy were not only subjects of the Ptolemaic dynasty living in Egypt; trading partners outside Egypt must also be considered. Ptolemaic Egypt was not a closed system, but rather a part of larger integrated economic networks. Moreover, the boundaries of the Ptolemaic kingdom of Egypt itself were not restricted to the Nile Valley, so it must always be kept in mind that what constituted 'Egypt' was somewhat flexible and included many other portions of the Mediterranean region.

As early as 322/21 BCE, Ptolemy I was already campaigning in Cyrenaica to the west of Egypt, and in 319, he moved to the east to invade Syria-Phoenicia, which was replete with coastal harbors and timber resources.[35] Ptolemy I also looked north to the Mediterranean, building diplomatic contacts with Cyprus, and through those treaties, expanding his navy by nearly 200 ships.[36] By the end of his reign, Ptolemy I had gained control of Cyrenaica, Cyprus, Coele Syria, and other harbor cities along the Phoenician coast.[37] By around 289 BCE, his son and successor, Ptolemy II, had also gained control over the League of Islanders, an ostensibly independent league of Aegean poleis, but one whose chief official was appointed by Ptolemy.[38] The exact degree of official Ptolemaic power in these territories varied over time and space, but it is clear that the early Ptolemies were establishing their Egypt as a Mediterranean power rather than isolating themselves from the surrounding world. The territories outside Egypt could be useful in generating revenue and in supplementing Egypt's natural resources. For example, Ptolemy III was able to lessen the hunger caused by the low inundation of 245 BCE by importing grain from Syria, Phoenicia,

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[35] Thompson and Buraselis, "Introduction," 4; Hölbl, *History of the Ptolemaic Empire*, 14-20.
[36] Thompson and Buraselis, "Introduction," 4.
[37] Hölbl, *History of the Ptolemaic Empire*, 28.
[38] Andrew Meadows, "The Ptolemaic League of Islanders," in *The Ptolemies, the Sea, and the Nile*, eds. Kostas Buraselis, Mary Stefanou, and Dorothy J. Thompson (Cambridge: Cambridge University Press, 2013), 33-34.

Cyprus, and elsewhere, as recorded in the Kanopus decree.[39] The timbers of Lebanon were also a fruitful resource to call on, especially when the Ptolemies were building massive ships to increase their naval power.

The Ptolemies also expanded their kingdom south into portions of Lower Nubia known as the Dodekaschoinos or the Triakontaschoinos.[40] There, they established several new temples and garrisons, around which settlements likely grew.[41] Textual evidence mentions that the provincial governor Boethos founded two new settlements, Philometoris and Kleopatra, somewhere in Lower Nubia in the reign of Ptolemy VI.[42] The Ptolemies lost control of most of this region during the Great Revolt of 205-186 BCE and again towards the end of the reign of the Ptolemaic dynasty – outside the scope of the present study.[43]

Ptolemaic territorial expansion was concentrated only in the first hundred years of Ptolemaic reign. As Scheidel has rightly underscored, Cyrenaica came under Ptolemaic control in 321/20 BCE, before Ptolemy I had even been declared king; Cyprus was acquired in 312 and again in 295/94, and Palestine, Phoenicia, and southern Syria in 301.[44] Another round of expansion was attempted in 246 BCE in Syria and Mesopotamia but was ultimately unsuccessful.[45] The Seleucids took over southern Syria and the coastal regions of southern Asia Minor in 198-197 BCE.[46] Thus the territories of Ptolemaic Egypt initially grew, slowing down after 300 BCE and stopping entirely after the mid-third century: the early expansion was reversed

[39] Hölbl, *History of the Ptolemaic Empire*, 49.
[40] Muhs, *Ancient Egyptian Economy*, 263-64 and references there.
[41] Ibid., 263-64.
[42] Mueller, *Settlements of the Ptolemies*, 161-64.
[43] Ibid., 263-64 and references there.
[44] Scheidel, "Creating a Metropolis," 8.
[45] Ibid.,
[46] Ibid.

in the second and first centuries BCE.[47] Trade volumes presumably declined as the boundaries of the Ptolemaic kingdom drew closer to Egypt, especially since the kingdom's high customs duties and the closed currency zone made imports cumbersome. The constriction of Ptolemaic territories also meant that markets would have had a more difficult time responding to shocks, since imports (for example, of grain from abroad if Egypt were suffering from a poor harvest) could not be expected to arrive in Egypt with any certainty.

Of course, the people of Ptolemaic Egypt always traded with others outside Ptolemaic control. With their movement of the capital from Memphis to Alexandria, the Ptolemies made clear their desire for Egypt to be a part of wider Mediterranean trade networks. They were able to do so primarily because of Egypt's greatest resource—grain—which was exported all over the Mediterranean.[48] In exchange, those in Egypt obtained from the regions surrounding the Mediterranean a plethora of goods, including wine, various metals unavailable in Egypt (especially tin), and timber, which was relatively lacking in Egypt itself. The vast numbers of Rhodian amphora handles uncovered archaeologically can attest to the significance of imported wine and oil from the island. Kos, Cyprus, and Crete were also key trading partners with Egypt.[49] Ptolemaic Egyptians also traded with the western Mediterranean, including Italy, Sicily, and Carthage.[50]

These trade relationships extended even beyond the Mediterranean, stretching north to the Black Sea, south to the eastern coast of sub-Saharan Africa, east as far as India, and west along the north African coast and to Sicily. Perhaps exceptionally, an Egyptian trireme with the name Isis

[47] Ibid., 8-9.
[48] Manning, "Hellenistic Trade(rs)," 113.
[49] Ibid., 116.
[50] Ibid.

was drawn in a shrine to Aphrodite and Apollo as far away as Nymphaeum in the Crimea sometime in the mid-third century BCE.[51]

Ptolemy II made trade via the Red Sea more efficient by constructing a network of roads through the Eastern desert to connect the Nile valley with the Red Sea coast.[52] The state administration employed tribal peoples such as the Blemmyes to maintain security on the desert these roads passed through, and hydraulic installations and forts were also in place at regular intervals.[53] Roads linked Edfu and Koptos, on the Nile, with the port of Berenike, founded by Ptolemy II, on the Red Sea coast.[54] In addition to the roads, he built a canal linking the Nile to the Red Sea and founded a series of new port cities on its coast.[55] The sites of these cities had been exploited for trade in the past, but the cities represent the first permanent foundations there.[56] These ports facilitated trade with peoples along the eastern coast of Africa, from whom the Ptolemies wanted ivory, live elephants, and gold.[57] The Red Sea port cities also functioned as a nexus for trade directly with southern Arabia, and through Arabia, with traders from settlements around the Indian Ocean as well. Some of the most common imports from the east that came through the Red Sea ports included textiles, incense, frankincense, myrrh, cinnamon, saffron, cassia, and calamus.[58]

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[51] Dorothy J. Thompson and Kostas Buraselis, "Introduction," in *The Ptolemies, the Sea, and the Nile: Studies in Waterborne Power*, eds. Kostas Buraselis, Mary Stefanou, and Dorothy J. Thompson (Cambridge: Cambridge University Press, 2013), 3.
[52] S. E. Sidebotham, "From Berenike to Koptos: Recent Results of the Desert Route Survey," *Topoi* Supplement 3 (2000): 415-38.
[53] Manning, *Last Pharaohs*, 107; Mueller, *Settlements of the Ptolemies*, 152.
[54] S. E. Sidebotham and W. Z. Wendrich, *Berenike 1995: Preliminary Report of the Excavations at Berenike (Egyptian Red Sea Coast) and the Survey of the Eastern Desert* (Leiden: Research School, CNWS, 1996).
[55] Mueller, *Settlements of the Ptolemies*, 152.
[56] Ibid., 155.
[57] Ibid., 154.
[58] S. E. Sidebotham, *Berenike and the Ancient Maritime Spice Route* (Berkeley: University of California Press, 2011), 34.

Over time, as the Seleucid rulers gained control of much of the traditional land route from Egypt to Arabia through Gaza, the Red Sea ports became more crucial for trade with eastern partners. Sidebotham has suggested that the land routes through Gaza may have been more commonly used until the reign of Ptolemy V (210/204-180 BCE), when Antiochus III (r. 223-187 BCE) wrested Coele-Syria from the Ptolemies.[59] If Ptolemaic traders had to pass through Seleucid lands to conduct trade, the costs of such trade would have risen due to the involvement of middlemen and potential taxes due along the way. This rise in costs, perhaps coupled with the physical risks involved, seems to have made the Red Sea route more efficient after the mid-third century.

While trade via the Red Sea port cities may have become more efficient than overland trade through Gaza, it was still a risky, expensive undertaking. Transporting cargoes in the Red Sea was dangerous, as attacks at the hands of Nabataean pirates were not uncommon.[60] Prices of these imported goods within Egypt would have had to be high enough to offset the risk of stolen cargoes along the way. Even if the trip went smoothly, the Ptolemaic central administration taxed imports at a very high rate, ranging from roughly 25-50% of their value.[61] Trade with southern Arabia, and the east African coast thus seems to have consisted mainly in exotic luxury goods rather than staples, since these heavy import taxes would have made it impractical to obtain abroad anything that could reasonably be found or produced within Egypt, and imports would necessarily have to have a high retail price to offset the cost of the taxes. The state even attempted (unsuccessfully) to cultivate frankincense and myrrh domestically, and had these attempts been

[59] Ibid., 33-34.
[60] Ibid., 35.
[61] P. M. Fraser, *Ptolemaic Alexandria* (Oxford: Clarendon Press, 1972), vol. 1: 150.

successful, the Ptolemies could have earned an even higher income than what they were bringing in from import taxes.[62]

4.2.5 Conclusion: The People

Ptolemaic Egypt swelled in the third century BCE, then waned in terms of both its population and its territorial reach. The people whose actions shaped the Ptolemaic economy were diverse, especially because of the arrival of immigrants from Greece, Macedonia, Arabia, Syria, and elsewhere. Egypt was also involved in much larger integrated trade networks. The Ptolemaic state invested Egypt's infrastructure in ways that lowered the transaction costs associated with long-distance trade, such as through ports and roads. The foundation of new settlements, in particular the massive city of Alexandria, stimulated demand for commodities from home and abroad, which, in turn, stimulated exchange.

What might all this mean for prices? Most of the growth in Egypt's population and holdings abroad occurred in the third century BCE, which might have led prices in this time to differ from those in the later periods of shrinking. There were also likely price differences between cities and the countryside, since the cities (especially those with ports) had easier access to imports but were further from agricultural production. Differences are likewise possible between areas like the Fayyum, with its relatively high population of Greek-speakers, and more traditionally Egyptian areas like Thebes. The diversity of Ptolemaic Egypt's population must be kept in mind in the course of analysis of the prices these people established and paid for goods and services.

In particular, the networks through which individuals in certain social categories associated with each other affected the access those individuals had to information, including information

[62] Sidebotham, *Berenike and the Ancient Maritime Spice Route*, 34.

about prices. Essentially, an individual's demographic profile may have impacted his position within social networks and therefore the extent and quality of information at his disposal. This question of information is the subject of the following section of North's framework of economic change.

4.3 The Scope of Human Knowledge: Science, Technology, and Information

4.3.1 Introduction

The individual players active within a given society are constrained by the scope of their knowledge and the technological tools at their disposal. It is to be expected, then, that changes in that knowledge and technology would result in changes in the peoples' economic behavior and thus in the larger economy. New technology can decrease the time and labor required to produce goods, thereby increasing their supply and decreasing their price. As new technology develops, older tools become outmoded and less desirable, and their price can drop as a result.

Ptolemaic Egypt witnessed a great deal of work and discoveries in the sciences, especially at the great Museion of Alexandria. However, most of this science was not closely related to the technology of production. Advances were made in technology related to agriculture, particularly in irrigation methods and the promotion of new crops. The development of larger ships in this period may have technically made the transportation of large cargoes by sea became more possible; however, such ships were used for military purposes and there is little evidence for their use in sea trade.. While technology did progress in the three centuries of the Ptolemies' rule, it is crucial to note that no ancient civilization experienced technological growth on anywhere near the scale of the modern developments of the industrial and information revolutions. Prices in Ptolemaic Egypt thus may have shifted as a result of new technologies, but relative differences in

individuals' access to information are likely to have been even more influential in pricing dynamics.

4.3.2 Science in Ptolemaic Alexandria

The Ptolemaic rulers were interested in promoting scientific development, and the Museion at Alexandria served as perhaps the world's first state-sponsored institution devoted to the academic pursuit of the sciences. Ptolemy II actively collected texts for the Museion's venerable Library, requiring that every book that arrived on every ship in Alexandria be donated to the library, in exchange for a copy.[63] Many texts written in other languages were translated into Greek at the Library. Among the scholars resident in Alexandria were Euclid, Ctesibius, Eratosthenes, and Apollonius of Perga, and the city grew to become the heart of the scientific community of the Hellenistic world.[64]

While academically extraordinary, the scientific advancements of the Museion scholars had little economic significance and no direct impact on prices. However, what is clear from the scholarship at the Alexandrian Museion is that the Ptolemaic rulers had a strong interest in innovation, and a ruler's status in the Hellenistic period could be linked to the achievements of the scientists he supported.[65] The rulers of the Hellenistic world were almost always in competition with each other, and they raised their status in part through academic innovation.

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[63] Lucio Russo, *The Forgotten Revolution: How Science Was Born in 300 BC and Why It Had to Be Reborn*, trans. Silvio Levy (Berlin: Springer, 2000), 246 & references throughout.
[64] Ibid., 246-247.
[65] Ibid., 248.

4.3.3 Agriculture

Since agriculture remained at the foundation of ancient economic activity, the technology associated with this sector is the most crucial to investigate. Roman writers mention that there were a number of Hellenistic works (Varro mentions fifty) applying scientific theory to agricultural practice (unfortunately, none survive).[66] For example, Theophrastus investigated botany and worked towards a classification system for plants.[67] Still, while he may have understood aspects of agriculture like the importance of selecting strong seeds or of manuring, it is unlikely that his works were widely used as practical manuals for farmers. Varro later recorded Stolo's opinion of Theophrastus, namely that his works were less useful to those actually tilling the soil than to those studying philosophy.[68] While the applicability of Alexandrian botany to real farming of Egyptian lands is debatable, the Ptolemies and their farming subjects did have a strong interest in improving agricultural yields, investigating new farming methods, and growing new crops.

In the development of the Fayyum, the Ptolemaic rulers increased the area of land possible to cultivate by improving on irrigation methods in previously farmed areas, draining marshes, and irrigating new areas on the edge of the desert.[69] The written correspondence of the irrigation engineers in the reigns of Ptolemy II and Ptolemy III, Kleon and Theodoros, survives, as does documentation on the irrigation of the estate of Apollonios, also in the Fayyum. Scholars of the economic history of the period have largely shied away from writing about these improvements, claiming a lack of expertise; for example, Rostovtzeff writes that "the technical side must be

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[66] Varro, *De re rustica* I.1.8.
[67] Dorothy J. Thompson, "Agriculture," in *The Cambridge Ancient History, Volume VII, Part 1: The Hellenistic World*, ed. by F. W. Walbank et al. (Cambridge: Cambridge University Press, 1984), 364.
[68] Varro, *De re rustica* I.5.1-2.
[69] Rostovtzeff, *Social and Economic History of the Hellenistic World* I, 360.

investigated by a specialist familiar both with modern practice and with the history of the science and technique of ancient times."[70] He argues that the only fact about the project worthy of note to an economic historian is that the work on the project was done almost entirely by free labor, neglecting that improvements in the technology of irrigation would have increased agricultural supply and potentially affected the prices of agricultural produce. Rostovtzeff does note that new technology was used, but further notes the absence of a comprehensive technical history of the period or the project, incorporating both papyrological references and actual tools uncovered archaeologically.[71] Unfortunately, since he wrote those words in 1941, this situation has not significantly changed, and much more work remains to be done on the technology of irrigation in the Ptolemaic period.

What is known is that water-lifting technology was advancing in this period. New devices allowed for fields to be watered past the level reached by the Nile, its tributaries, or canals during their annual inundation. From the earliest times in Egyptian history, water could be lifted using a basic scoop, but such a method was not incredibly effective on a large scale.[72] The *shaduf*, a scoop with a counterweight mounted on a balance that came into use as early as the New Kingdom and is still in use in Egypt today, makes the labor of lifting water easier, but still not significantly faster, and there is no evidence of its use on a large, industrial scale.[73] Hellenistic water-lifting technologies, however, were much more efficient and capable of lifting more water than these earlier methods. The compartmented water-wheel known in Greek as the τυμπάνον was developed in this period, and there is textual evidence of its having been used in Egypt by at least

[70] Ibid., 360-61.
[71] Ibid., 362.
[72] John Peter Oleson, "Water-Lifting," in *Handbook of Ancient Water Technology*, ed. Örjan Wikander (Leiden: Brill, 2000), 219.
[73] Ibid., 225-228.

the third century BCE.[74] The τυμπάνον greatly increased the amount of water that could be moved, although that water was not moved very far away from its source.[75] Sometime between 241 and 220 BCE, Archimedes improved upon the capabilities of the water wheel with his invention of the water screw, which was less susceptible to clogging with silt and required less energy to turn.[76] Still, both the water wheel and the water screw were limited in the height to which they raised the water, a problem which Philo of Byzantium helped to alleviate with his bucket chain, the invention of which can be traced to the late third century BCE.[77] As ambitious and innovative as this design was, it was also rather impractical and inefficient, since the device is powered by the force of the river's flow. In reality, it was so complex and expensive to use that, Oleson argues, the bucket chain could be used "only where the need was great and the water too deep for lifting with other types of pumping machinery."[78]

In theory, the water wheel, water screw, and bucket chain could have increased the efficiency of irrigation in Ptolemaic Egypt.[79] However, as Monson notes, citing North, "it is important to distinguish between technological invention and its diffusion because inventions often require innovations that make them widely available as well as the right economic and social conditions before they make an impact on productivity."[80] Monson emphasizes the increasing use of irrigation technologies in the early Roman period (the first and second centuries CE) rather

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[74] Ibid., 229, 233, 246.
[75] Ibid., 230.
[76] Ibid., 242, 246.
[77] Ibid., 251-252. Philo describes, "With it water can be lifted from rivers or other places in order to deliver it to elevated places to water gardens and farms. This water can also be lifted to flow into fortresses and elevated hidden places." Philo of Byzantium, *Pneumatica* 65, translated in Oleson, "Water-Lifting," 252-253.
[78] Ibid., 258.
[79] Andrew Wilson, "Machines, Power and the Ancient Economy," *Journal of Roman Studies* 92 (2002): 1-32.
[80] Andrew Monson, *From the Ptolemies to the Romans: Political and Economic Change in Egypt* (Cambridge: Cambridge University Press, 2012), 192, citing Douglass C. North, *Structure and Change in Economic History* (New York: Norton, 1981), 163.

than during the Ptolemaic period – he links the adoption of these technologies to new economic incentives in the Roman period.[81] While new irrigation technologies existed in Ptolemaic Egypt, there is no evidence for them being used on a significant enough scale to have influenced the prices of agricultural produce.[82] Certainly, the agricultural productivity of the Fayyum region increased through the Fayyum reclamation project, but the extent to which it was aided by new water-lifting technologies remains murky. The geographic reach of such irrigation devices is also uncertain; the Fayyum reclamation project was exceptional in Egypt, so it would be faulty to project use of such devices in the Fayyum to the rest of the kingdom. Moreover, outside the Fayyum, irrigation aside from the annual Nile inundation was only required for orchard and vineyard land, not grain land, so any increase in agricultural productivity that such technologies could have brought about would not have impacted grain yields, even if such technologies were in use. Therefore it is unlikely that new developments in Hellenistic irrigation technology would have impacted Ptolemaic prices.

The people of Ptolemaic Egypt also made efforts to improve the crops themselves and to introduce new types of crops. Apparently Greek immigrants found Egyptian cabbage to be too bitter for their taste, and there are reports of (ultimately unsuccessful) attempts made to import seeds from Alexandria to improve the crop.[83] The mid-third century Zenon archive from the Fayyum records Apollonios' attempts to experiment with oils, poppy, and lettuce to make those crops tastier for Greeks, as well as to introduce new varieties of certain crops, such as garlic from Lycia and chickpeas from Byzantium, and to experiment with planting two crops of wheat in one

[81] Monson, *From the Ptolemies to the Romans*, 192.
[82] For example, the references Oleson cites for the use of these technologies are from Roman sources, despite their invention dates in the Hellenistic period.
[83] Dorothy J. (Crawford) Thompson, "Food: Tradition and Change in Hellenistic Egypt," *World Archaeology* 11.2 (1979): 139.

year.[84] Other early attempts at satisfying Greek demand included expansion of wine production in the Fayyum, as well as the development of new orchards and plantations for the production of figs, walnuts, peaches, apricots, plums, and olives.[85]

Perhaps the most salient difference between Greek and Egyptian palates lay in grain. In the years leading up to the Ptolemaic period, the staple grains of Egypt were barley and emmer wheat, but under Ptolemaic rule, wheat also became extremely popular, especially among the Greek immigrant population. In discussing the introduction of wheat, Dorothy Thompson goes so far as to say that wheat "soon completely supplanted the earlier emmer wheat" and that "the new wheat caught on very quickly, and within one hundred and fifty years the switch … was almost total."[86] Crop reports from the Fayyum do indicate that the farming of wheat became extremely common; one reports on almost half of the Fayyum's farmland notes that wheat represented 74.6% of the land sown, whereas barley represented 14.5% and emmer wheat a mere 1.7%.[87] This shift to wheat production may have been partially a result of the demand resulting from the preferences of Greeks, but it was likely also related to the fact that harvest taxes were calculated in wheat. Because tax payments in barley were converted to wheat at a rate of 2:3 (requiring a 50% higher payment in barley than in wheat) and payments in emmer were converted at 4:9 (requiring over double the amount in emmer than in wheat), farmers were effectively incentivized to farm wheat over other grains.[88] As Muhs writes, "official penalization of harvest tax payments in barley

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[84] Ibid., 140.
[85] Claire Préaux, *Les Grecs en Égypte d'après les archives de Zénon* (Brussels: J. Lebègue, 1947), 22-27.
[86] (Crawford) Thompson, "Food: Tradition and Change in Hellenistic Egypt," 140.
[87] Dorothy J. Thompson, "New and Old in the Ptolemaic Fayyum," in *Agricultre in Egypt: From Pharaonic to Modern Times*, ed. Alan K. Bowman and Eugene Rogan (Oxford: Oxford University Press, 1999), 129.
[88] Brian Muhs, *Tax Receipts, Taxpayers, and Taxes in Early Ptolemaic Thebes*. OIP 126 (Chicago, Oriental Institute, 2005), 25-26.

and emmer may thus have encouraged the switch to hard wheat as much as taste."[89] The Fayyum was exceptional in its higher proportion of Greeks than elsewhere in Egypt, so the evidence for the proliferation of wheat farming in the Fayyum can by no means be generalized to the rest of Egypt. Manning's claim that wheat only came gradually to the Thebaid seems more likely than a quick change of the main food staple over the entire kingdom.[90] Greek preferences may have made a rise in wheat production far more feasible and desirable in the Fayyum than elsewhere.

The developments in crops, when coupled with the evolution of water-lifting technology that could have made Ptolemaic irrigation slightly more efficient, lead to the expectation that the prices of grains other than wheat would drop over the course of the period, as demand for them dropped and supply could theoretically rise. In addition, the increase in the variety of crops available, given imports based on new tastes, may have generated greater disparities in food prices, with newer, fancier foods fetching higher prices than did basic staples.

4.3.4 Shipping: Technology and Infrastructure

Changes in the costs and risks associated with shipping could have affected prices. There are textual examples of fees paid for shipping or transportation, but the cost of shipping in these precise examples could have differed based on a number of factors, such as the volume of goods shipped, the distance traveled, the type of transportation, etc. This variety of factors impacting the cost of shipping in particular situations implies that transportation might not have been commoditized, and the extent to which the extant fees reflect shipping costs generally is unclear. While it is thus difficult (and beyond the scope of this dissertation) to precisely quantify the cost of shipping in Ptolemaic Egypt, for the purposes of this study, some speculation is possible. Shipping

[89] Muhs, *Tax Receipts*, 25.
[90] Manning, *Land and Power in Ptolemaic Egypt*, 73.

could become cheaper if it were faster; with less time in transit, less would have to be spent on the maintenance of the shipping crew and more goods would be able to reach their markets, increasing possible supply. Less time in transit could also imply less risk, for the simple fact that goods and people would not be in the risky limbo of travel for as long. However, if quicker shipping times were achieved via more expensive infrastructure (better ships, for example), then those costs also need to be factored in. Thus it is necessary to explore changes in the technology and knowledge associated with shipping that might have trimmed shipping times and transaction costs.

Throughout the millennia of Egyptian history, the main avenue for transport was the Nile River, and shipping by water rather than overland was the norm. Alexandria was founded at the nexus of the Nile and the Mediterranean Sea, more effectively linking the two for shipping purposes with its double water frontage. In the Ptolemaic period, then, transport by water was still standard practice. Transport by land did still occur, but its improvement occurred much more slowly than by water, and changes in the efficiency of transport by land were more due to political stability and policing (or instability and banditry) at certain times rather than to developments in science and technology. For that reason, this section will focus on waterborne transport.

The Ptolemies made investments into Egypt's infrastructure in an effort to improve transportation to regions outside the Nile Valley. One prominent example of such investment is the Pharos, Alexandria's famous lighthouse, which was built around 280 BCE.[91] Reaching a height of 95 meters, it was topped with a cylindrical room containing a massive lantern and parabolic mirrors to reflect the light as far as 48 km away.[92] This lighthouse was known in its time as one of the seven wonders of the world. Still, it was not a mere wonder; it was considered so

[91] Russo, *Forgotten Revolution*, 116.
[92] Ibid., 116-17.

practical that after its construction, lighthouses came to be built in almost all the significant ports surrounding the Mediterranean. These lighthouses served as beacons to allow sailors to more easily reach shore at the correct point, and they could serve as warning signs in case of dangerous waters near the shore, thus decreasing the risks associated with shipping.

Beyond just improving navigation, the Ptolemies also invested in shaping the geography of Egypt itself in order to improve shipping routes. In 275 BCE, Ptolemy II re-excavated an older canal linking the Nile (and thus also the Mediterranean) to the Red Sea.[93] This canal started in the Pelusiac branch of the Nile near Bubastis and ran along the Wadi Tumaylat, a depression left by a dried-up Nile branch, to the Red Sea.[94] The canal connected trade operations in the Mediterranean, Nile Valley, and Red Sea through one system that did not require any movement by land, thus presumably lowering the cost of shipping over great distances. However, if this canal were anything like the later Roman and Arab canals nearby, it might have been navigable only seasonally, when the Nile was at its height.[95] Because the canal was probably not very deep, it is unlikely that sea vessels could travel on it, so cargoes still would have had to be transferred to low Nile barges when they reached the canal. Another problem relates to its seasonality: the active season of the canal would have been out of sync with the season when it was possible to sail to India, which implies that the trade on the Red Sea may have been more localized, or that goods were stored at the Red Sea coast until they could be transported to the Nile.[96] Access to this canal,

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[93] Russo, *Forgotten Revolution*, 114. Herodotus (II.158-59) also mentions seeing canals, which could indicate that the canal was operational already under Persian rule.
[94] John P. Cooper, "Egypt's Nile-Red Sea Canals: Chronology, Location, Seasonality and Function," in *Connected Hinterlands: Proceedings of the Red Sea Project IV, held at the University of Southhampton, September 2008*, eds. Lucy Blue, John P. Cooper, Ross Thomas, and Julian Whitewright (Oxford: Archaeopress, 2009), 198.
[95] Ibid., 204.
[96] Ibid., 205.

whether for local or long-distance trade, could have lowered transaction costs and thus prices for the goods being transported.

The early Ptolemies also invested greatly in their navy due to competition with the Antigonids for control of the eastern Mediterranean.[97] In the face of this competition, the classical trireme gave way to larger polyreme ships, with more and more rows of rowers both horizontally and vertically. The largest was probably Ptolemy IV's forty vessel, which was likely manned by forty rowers per vertical column.[98] While such investment in shipbuilding would have had economic effects, especially in Alexandria, where most of the ships were actually constructed, these new ships were built for war and not originally intended for economic activity.

However, the development of the large warships may have affected trends regarding merchant vessels. A quote from Moschion recorded by Athenaeus describes that Hieron II of Syracuse (r. 271-216 BCE) built a massive cargo ship, the *Syracusia*, which was similar in size to the warships but was replete with luxurious accommodations, including a library, a gymnasium, hanging gardens, twenty horse stalls, and mosaic floors depicting the entire story of the *Iliad*.[99] It might seem that this Syracusian king's ship was more of a pleasure vessel than a way to make a profit, and yet Athenaeus cites it as an example of Hieron's construction of σιτηγά "grain transport ships."[100] Once the ship was built, Hieron loaded it with 60,000 measures of grain, 10,000 jars of Silician saltfish, 20,000 talents of wool, and 20,000 talents of other goods, *in addition to* the provisions for those aboard.[101] However, in the end, the ship could not be

[97] Dorothy J. Thompson and Kostas Buraselis, "Introduction," *The Ptolemies, the Sea and the Nile: Studies in Waterborne Power*, eds. Kostas Buraselis, Mary Stefanou and Dorothy J. Thompson (Cambridge: Cambridge University Press, 2013), 6.
[98] Athenaeus, *Deipnosophistae* V. 203e-f (quoting Callixeinus, *On Alexandria*).
[99] Ibid., V.206-209.
[100] Ibid., V.206f.
[101] Ibid., V.209a-b.

accommodated by most harbors, so Hieron sent the ship to a king Ptolemy (likely Ptolemy III) in Alexandria as a gift. Athenaeus's description of the beautiful details of this magnificent ship is clearly an extreme example, but it can perhaps indicate a trend toward large luxury ships intended for war. However, it is unlikely that such large prestige ships represent a general trend toward large merchant ships; I know of no explicit evidence of such ships being used for trading purposes.

A more frugal person engaging in long distance trade might still make use of a massive ship, just filling it mainly with necessities and cargo rather than extravagances. The technology required to build very large seafaring ships, capable of hauling massive cargoes, was developed in the Hellenistic period by scholars including many who were active in Alexandria. Even an average merchant ship in the Hellenistic period would hold at least 200-300 tons of cargo, much less than the *Syracusia*'s 1900 tons, but still by no means a small haul.[102] Thus, given the requisite capital, the transportation of large cargoes over long distances was now possible, and this technological development may have affected Ptolemaic prices, perhaps, for example, at times when a large haul arrived in a harbor, flooding the market with certain foreign goods all at once.

In sum, transportation of goods by water became easier in the Ptolemaic period, particularly transportation over long distances. These improvements were due both to the development of science in Alexandria as well as to the investments the Ptolemies devoted to the technology and infrastructure of transportation.

4.3.5 Access to Information

Prices form and fluctuate differently based on the degree and quality of access to information the parties involved have. In the imaginary perfect market, a given commodity being

[102] Lionel Casson, *The Ancient Mariners: Seafarers and Sea Fighters of the Mediterranean in Ancient Times*, 2nd ed. (Princeton: Princeton University Press, 1991), 157.

exchanged would be homogenous, its qualities would be fully understood by all parties, and prices would form and fluctuate based on supply and demand. This model is based on economic forces and math rather than on the decisions and wills of individual agents. However, in reality, these pieces of information that affect prices are generally not known perfectly at the same time by all agents, so pricing depends to a certain extent on the particular people involved and their relative access to these various sorts of information. Greater access to information is an advantage in agreeing on a price.

Actual goods in the real world do not tend to be homogenous; that is, within a certain category of commodity (for example, wine), differences in quality exist. When a seller sets a price, he is estimating the quality of his product relative to those of other producers, and he is also basing that estimation on how much knowledge buyers will have about the relative quality of the various products for sale. In the Hellenistic Mediterranean world, wine was a widely-traded commodity, and those involved in viticulture seem to have had an interest in making their particular wine known to buyers. Amphoras from different places have different shapes, and the handles of many amphoras were stamped with the sign of the wine's producer or trader. These stamps also could attest to the type or quality of the wine contained in that particular amphora. The amphoras and their stamps thus served to signal the status of the wine to potential buyers, perhaps, in theory, minimizing the uncertainty surrounding the wine inside that would otherwise exist. This effort could imply that buyers had a certain level of choice and knowledge about the meaning of different amphora handle stamps; an individual in search of wine would have multiple options to choose from and would be more likely to pay more for (or simply to buy) a wine whose quality he felt more certain of. It may also be possible to infer that the wines that were stamped may have been of higher status than those that were left unmarked, since there would be a greater incentive

to signal this higher quality.[103] Locally-made imitations of imported amphoras and their stamps are known from Classical Naukratis; at least in earlier periods, then, the stamps on imported amphora handles were worth copying.[104] While it cannot be assumed that imitations existed in the Ptolemaic period, their early existence indicates that stamps had been used to signal something good about the contents of the jars.

In an imaginary perfect market, sellers would know what other sellers are charging for their products, and buyers would know what other buyers are paying. Each party could make a rational choice regarding an acceptable price to charge or to pay, and all parties involved could avoid being cheated due to their lack of understanding about a fair price. However, this perfect market has never existed, and even if the quality of the goods is known, knowledge of other prices is rarely clear. The result can be an asymmetry of price information. Members of an in-group can know things outsiders do not, and the social position of the parties involved can therefore affect prices. In Ptolemaic Egypt, various institutions allowed individuals to gather together and share information with each other in a way that allowed members greater access to knowledge about economic activity, knowledge which may have shaped the prices they set or accepted.[105]

The state itself can be seen as such an in-group, since it collected information on individuals and lands through the census, taxation, land surveys, and the placement of state representatives within other institutions. The Ptolemies kept track of the people under their control

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[103] While modern states might also aim to signal their regions' status as wine producers through exclusive appellations or official tests of quality, no such practice seems to be evident in the Hellenistic world; these efforts seem to have been more of a private concern. For a modern example of how such official efforts can affect prices, see Yuna Chiffoleau and Catherine Laporte, "Price Formation: The Case of the Burgundy Wine Market," *Journale française de sociologie* 47 Supplement (2006): 157-182.

[104] Alan Johnston, "Stamped amphorae," in *Naukratis: Greeks in Egypt*, by Alexandra Villing, et al. British Musuem Online Research Catalogues: < http://www.britishmuseum.org/research/>. online_research_catalogues/ng/naukratis_greeks_in_egypt.aspx> (accessed February 11, 2018), 9.

[105] For more detailed discussions of Ptolemaic institutions, see section 4.4 "Ptolemaic Institutions," below.

through the collection of a census, and the knowledge they derived from the census allowed them to maximize the revenues they could obtain from their people. There were two censuses of people, one by household and one by the occupation of the heads of household.[106] It was crucial for the central administration to maintain an awareness of all the men of Egypt so that it could collect the corvée labor requirement (Demotic *ꜥrt*) from each man: he had to move 30 naubia of earth (to maintain the irrigation system) each year or pay a tax of 2 qite (4 drachmas), roughly equivalent to the wages that would commonly be paid for a similar amount of free labor.[107] The census was also useful in keeping track of who had paid his taxes and completed his corvée labor service. In addition to the census of human capital, there was also a census of livestock. They could presumably also be mustered for service to the state in plowing or transporting goods or people.[108]

The central administration also maintained knowledge of its territory through field surveys. Biannually, before planting and before the harvest, village scribes would measure the extent of all the land in their village and would record how it was used and who owned it. Sometimes the scribe would issue the landowner a receipt for his lands' having been surveyed. The second survey would then allow the administration to calculate harvest taxes owed on each plot of land, which were based on the amount of land sowed (rather than the produce of the harvest) to mitigate the risk of low revenues to the state because of a bad harvest.[109] Initially, the central administration surveyed and taxed grain-producing royal land. It also taxed other grain-producing land given to officials and kleruchs, as well as orchards and vineyards on private land.

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[106] Clarysse and Thompson, *Counting the People* vol. 2, 20.
[107] Muhs, *Tax Receipts*, 57-60.
[108] Clarysse and Thompson, *Counting the People* vol. 2, 206.
[109] Muhs, *Ancient Egyptian Economy*, 231; K. Vandorpe, "The Ptolemaic epigraphe or harvest tax (*shemu*)," *Archiv für Papyrusforschung* 46.2 (2000): 169-232.

In 263 BCE, Ptolemy II began surveying and taxing temple lands with orchards and vineyards.[110] In the late third and early second centuries, this trend towards greater state oversight of temple lands continued, as the central administration began to survey grain-producing temple lands.[111]

Temples were responsible for reporting information on their lands and personnel to the state. The 258 BCE Karnak Ostracon, a royal edict to temples, required them to survey their lands and report on information such as tenancy and flood levels. In the very collection of such information, temples may have also served as an in-group more knowledgeable than local farmers within their nomes. Private associations were also a common feature of Hellenistic life. These associations functioned within specific communities as guilds for members of certain professions, as religious associations devoted to serving certain deities, or as clubs for employees of certain large households or royal estates.[112] Especially for individuals working outside the central administration, these private associations could have served as in-groups through which members could share information.

Ptolemaic society was not very literate, so access to information depended more on whom people associated with rather than which texts they could acquire. In the centuries before Alexander's arrival in Egypt, writing was generally limited to elites and those in professions which had need of it, namely scribes and priests.[113] Baines and Eyre estimate the literacy rate of Old Kingdom Egypt at .33-1%, and they seem to maintain that estimate for the rest of pharaonic

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[110] Muhs, *Ancient Egyptian Economy,* 231.
[111] Ibid.
[112] Brian Muhs, "Membership in Private Associations in Ptolemaic Tebtunis," *Journal of the Economic and Social History of the Orient* 44.1 (2001), 2.
[113] Dorothy J. Thompson, "Literacy and power in Ptolemaic Egypt," in *Literacy and power in the ancient world*, eds. Alan K. Bowman and Greg Woolf (Cambridge: Cambridge University Press, 1994), 68.

Egypt, albeit without such quantitative specificity.[114] By the mid fourth century, the proportion of the population able to both read and write fluently in Demotic was roughly .25%, according to Ray, although he also estimates that the proportion able to read but not fluently write in the language was higher, 6.25% of the total population.[115] Thompson has suggested that the increase in extant documentation dating to the Ptolemaic period, coupled with the Ptolemies' new "literate tradition and programme of education," led to an increase in literacy rates at this time.[116] Thompson's point about the increase in investments in bureaucracy is quite valid; the Ptolemies were far more interested in documenting their population than were previous rulers of Egypt, so it is only logical that the corps of literate bureaucrats expanded as well. Still, it would be faulty to assume that rising literacy rates suggest that a greater variety of individuals were reading and writing for new reasons. In any case, the majority of people living their economic lives in Ptolemaic Egypt could not read, so their access to price information would likely have been limited to information they could access through oral communication exchanged within their social network. This information is therefore likely to have had a limited geographic range. While we might expect price levels to be fairly similar within one area, prices may have been more variable from region to region (or even village to village) as a result of the limited range of price information rather than pure supply and demand.

However, those assumptions might find support based on the extant documentation, since the transactions recorded in these documents were prepared by individuals with at least some access to writing. It is impossible to obtain an accurate set of data representing all the pricing

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[114] John Baines and C. J. Eyre, "Four notes on literacy," in *Beiträge zu Fragen der Wissenschaftstheorie und Methode*, Göttinger Miszellen 61 (1983): 67.
[115] John Ray, "Literacy in Egypt in the Late and Persian Periods," in *Literacy and power in the ancient world*, eds. Alan K. Bowman and Greg Woolf (Cambridge: Cambridge University Press, 1994), 64-65, n. 31.
[116] Thompson, "Literacy and power in Ptolemaic Egypt," 79.

activities in a majority illiterate society. The data will be skewed towards the activities of higher-status individuals. For example, if an illiterate individual wanted to document his purchase of a plot of land, he would need to pay a scribe to write up the document in the official style. After 146 BCE, it was required that Demotic documents also be registered in Greek at the official "writing office" (γραφεῖον). This dissertation is focused on the early Ptolemaic period, before the requirement for Greek registration was enacted, perhaps implying a greater division between Greek and Demotic documentary traditions. Because of the nature of the extant documentation, the data in this study represents a small fraction of all the prices that were actually decided upon in this period, since the documents only represent the activities of institutions and of individuals who either were literate themselves or had access to a scribe and the ability and willingness to pay the scribe for his assistance.

The introduction of Greek to the operations of the central administration under the Ptolemaic kings served to create yet another division in literacy levels, even among literate specialists. It is possible that the immigrant population was more literate in Greek than the native in Demotic; for example, the existence of a warning written in Greek to tell Alexander's soldiers to keep away from a priestly home at Saqqara implies that those soldiers could read.[117] The Greek language was originally used in those areas with a higher concentration of immigrants from the Greek-speaking world, such as the Fayyum, but gradually the film of Greek used by those of high social status gradually became thicker and denser.[118] The Ptolemies actively encouraged the adoption of Greek language and participation in Greek cultural traditions, and there seems to have been a greater incentive for Egyptian-speakers to learn Greek than the other way around. However, I know of little evidence of Greek being used between native Egyptian-speakers; on the

[117] Ibid., 72-73.
[118] Thanks to Brian Muhs for this metaphor of a film (January 23, 2018).

contrary, Greek was used between Greeks and often between Greeks and Egyptian subordinates. Whether the Ptolemaic rulers learned the Egyptian language themselves is questionable.[119] As Peremans and others have noted, it was far more likely for a native Egyptian-speaker to learn Greek than the other way around.[120]

The variety of languages spoken in Egypt meant that for most people, language served as a further divide in Egyptian society, and those speaking one language exclusively may very well have not known about the prices being determined by individuals speaking another language. It is thus certainly possible that prices could have clustered not only geographically, but also within certain social groups. Even individuals who could understand another language orally or even speak it fluently would not necessarily be able to read documents, so their ability to obtain price data would still have been limited to oral communication.

Since most information acquired day-to-day for most people likely passed via word of mouth, it would be ideal to unravel individuals' social networks to uncover who their associates were. Some associations are clear: people certainly knew their family members and the people they worked with. Presumably friendships also existed outside of family and work, which is reflected in letters and marriage patterns. It is certainly possible, for example, that a personal friend of the oikonomos would have greater knowledge of fair prices because of his access to his friend's knowledge, even if his own employment did not grant him direct access to such information. The existence of such a situation is presently pure speculation, but it is useful to note that work and family are not the only relationships that might have yielded greater access to information.

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[119] For example, in describing Kleopatra VII, Plutarch claims she was the first Ptolemaic ruler to learn the local language. See Plutarch, *Antony* 27. 3-4.

[120] Willy Peremans, "Over Tweetaligheid in Ptolemaeisch Egypte," *L'antiquité classique* 4.2 (1935): 403-17.

As mentioned above, geography is one factor that could certainly shape how much information an individual was aware of. Put simply, people living in a village would be more likely to know of common prices in their area than in cities farther away. What is generally considered a 'fair' price is shaped by all parties' knowledge. In larger cities with more concentrated populations, such as Alexandria, Thebes, Memphis, and Ptolemais, individuals would form these perceptions based on broader samples of price data than would individuals in small hamlets, and prices themselves may have differed spatially as a result of that knowledge rather than just supply and demand.[121] Elites, however, may have been able to bypass the geographical restrictions on information facing most peasants, since their social links with other elites, with whom they could communicate in written letters, would have spread over a wider geographical range, giving them an additional advantage.

4.3.6 Conclusion: The Scope of Human Knowledge

North has argued that technology is one of the key factors that can effect economic change, and new technological developments can affect prices drastically. Scientific inquiry was certainly carried out at a remarkable level in Ptolemaic Egypt. However, it seems this esoteric science did not trickle down into technological developments, certainly not to the degree that new technology has affected prices in recent centuries.[122] Still, shifts towards greater experimentation in agriculture and in navigation and shipping, cannot be discounted. Likewise, the rise of new cities

[121] For more information on the rise of new cities, see above in this chapter. For more on the ethnic dimension of geography in Ptolemaic Egypt, see also Jane Rowlandson, "Town and Country in Ptolemaic Egypt," in *A Companion to the Hellenistic World*, ed. Andrew Erskine (Malden, MA: Blackwell, 2005), 249-263.

[122] Helmuth Schneider, "Technology," in *The Cambridge Economic History of the Greco-Roman World*, eds. Walter Scheidel, Ian Morris, and Richard Saller (Cambridge: Cambridge University Press, 2007), 144-71.

and the growth of concentrated populations in new areas, as well as the development of institutions acting as in-groups, would have affected access to information on prices and therefore the levels of new prices knowledgeable individuals might agree upon. The in-group par excellence in Ptolemaic Egypt, with access to the greatest quantity and quality of information, was certainly the network of administrators who reported (frequently in writing) up the bureaucracy to the highest officials. The Ptolemaic bureaucracy and other social institutions of the period are the topic of the following section.

4.4 Ptolemaic Institutions

4.4.1 Introduction

While changes in the demographics of the population and the scope of knowledge and technology available to the people of Ptolemaic Egypt cannot be discounted, the most significant changes in the period occurred in the realm of socio-political institutions. 'Institution' is a widely used but famously malleable term, so an attempt at definition is necessary. At the foundation of institutional economics as a discipline, scholars like Veblen and Commons saw institutions as an element of social structure that had the ability to shape and change individual agents' purposes, preferences, and behavior. If generalized too broadly to represent social structure in general, institutions would encompass factors like demographics, which certainly influence social relationships but not in any regulated way. Thus institutions are set apart from other aspects of social life in that they regulate social life.

In explaining the importance of institutions, North writes, "The structure we impose on our lives to reduce uncertainty is an accumulation of prescriptions and proscriptions together with

the artifacts that have evolved as a part of this accumulation."[123] North's explanation thus establishes the importance of rules in defining institutions, and he points out that elements of those rules are accumulated over time in a way that might not be clear to those who have inherited them. Geoffrey Hodgson in turn has defined institutions as "systems of established and prevalent social rules that structure social interactions."[124] He furthers North's ideas in saying that they essentially make ordered thought and action possible, writing: "institutions enable ordered thought, expectation, and action by imposing form and consistency on human activities," and thus that "Institutions both constrain and enable behavior."[125] At the heart of any definition of institutions are socially transmitted rules, whether they be explicit or implicit. A given institution's set of rules actually or potentially provides norms of thought and behavior that enable individuals to form expectations of the thought and behavior of others.

The 'rules' established by institutions can perhaps be better understood as 'expectations.' Rules can be broken, but a rule-breaker will also have a certain expectation of the consequences of his behavior. Following North's model, institutions essentially supply the rules of the economic game by establishing the constraints that various economic actors must abide to avoid negative consequences. Institutions also supply the mechanisms for ensuring that those rules are followed (or that those who break the rules face consequences). Thus institutions create the conditions of possibility for actors to act in their own interest as well as the levels of risk or uncertainty different sorts of transactions entail—two factors which can have an enormous impact on prices.

The institutions that affected economic life in Ptolemaic Egypt were not distinct from institutions that organized the rest of social life. The considerations in this section are thus wide-

[123] North, *Understanding the Process of Economic Change*, 1.
[124] Geoffrey M. Hodgson, "What Are Institutions?" *Journal of Economic Issues* 40.1 (2006): 2.
[125] Hodgson, "What are Institutions?" 2.

ranging but share a focus on socially transmitted expectations that structured economic thought and behavior. It is necessary to consider how scholars have modeled the structure of Ptolemaic economic institutions, particularly in their historical context, the ways in which institutions protected property rights and enforced transactions, Egypt's productive and redistributive institutions, the ways the Ptolemaic state managed Egypt's money supply, monopolies and contracting regimes, and, finally, entrepreneurial trade and the role of traveling agents in moving among markets.

4.4.2 Modeling the Ptolemaic Economy

The last century of investigations of the Ptolemaic economy has witnessed a move away from models based on central planning towards more fluid approaches that allow for individual agency, even on the part of state officials. This new focus on individual choices and regionally or locally based organization of institutional structures opens up the possibility of understanding prices as more dynamic.

Traditionally, the Ptolemaic economy was framed as a "royal economy," one planned by the state and focused on raising revenues to finance the lifestyle and projects of members of the royal administration. This framework was promoted largely by Claire Préaux in her 1939 work, *L'Économie royale des Lagides.*[126] Préaux's model posits that the Ptolemies concentrated their economic policies and efforts on promoting the interests of their own royal "household." This model tends to highlight the tightness of state control of economic matters, particularly on Egypt's productivity, as well as the promotion of exports and restrictions on imports, royal monopolies, and regulations on exchange. Michael Rostovtzeff maintained this implicitly colonial perspective

[126] Claire Préaux, *L'économie royale des Lagides* (Brussels: Fondation Égyptologique Reine Élisabeth, 1939).

and privileged royal prerogatives when discussing Ptolemaic Egypt in his 1941 multi-volume tome, *The Social and Economic History of the Hellenistic World*.[127] In his section on Egypt, he first outlined the desires of the first two Ptolemies before explaining the rational economic system they developed in order to achieve those desires. Rostovtzeff had already emphasized the relationship between the king and his large bureaucracy who helped him achieve the goals of the royal state in his 1922 work on the Zenon archive, *A Large Estate in Egypt in the Third Century B.C.*, which highlights the close relationship between the king and Apollonios, his finance minister.[128] Both Rostovtzeff and Préaux, then, emphasized the interests of the state and downplayed the self-interest of parties outside of the king's ends. Administrative officials like Apollonios showed initiative in aiding the king, but there was little effort on the part of individuals to turn a profit or otherwise improve their own economic situations. This model of the Ptolemaic economy further assumes that royal institutions were largely effective in pursuing their interests.

In the second half of the 20th century, there was a rise in the influence of scholarly work that used Greek and Demotic documentary papyrology to develop institutional studies and histories.[129] Initially, the majority of the focus was still on the Greek texts and the economic histories were therefore lopsided, but as more Demotic texts were published, Egyptologists were able to move beyond simply getting texts published towards analyzing their contents in terms of the development of the Ptolemaic economy. As this more comprehensive picture of the Ptolemaic economy was coming together, many economic historians began to move away from the traditional focus on central planning and royal concerns. In 1989, Alan Samuel called for a

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[127] M. I. Rostovtzeff, *The Social and Economic History of the Hellenistic World*. 3 vols. (Oxford: Oxford University Press, 1941).
[128] M. I. Rostovtzeff, *A Large Estate in Egypt in the Third Century B.C.* (Madison: University of Wisconsin, 1922).
[129] To be sure, documentary papyrology was an active field in the early 20th century and heavily influenced the work of Rostovtzeff and Préaux. However, the field grew significantly in the 1960s and beyond.

reevaluation of the relationship between the king and bureaucratic institutions, emphasizing that "the bureaucracy had a vigorous life of its own, that it developed, changed, and operated in response to its internal logic rather than as an agent of Alexandrian authority."[130] Samuel noted that, for example, excessive exploitation of the countryside was not due to royal planning to exploit, but rather to the self-interest of those enmeshed in the third century BCE bureaucratic structure. In doing so, he moved beyond the models focused on the royal household, but at the same time, in focusing on "the bureaucracy" rather than the choices made by individual bureaucrats, Samuel took on a structuralist perspective that downplayed individual decision making.

The division Samuel drew between the efforts of "the bureaucracy" and "Alexandrian authority" is emblematic of the late 20th century emphasis on understanding the Ptolemaic economy through demarcating multiple institutional sectors of Ptolemaic economic life, each with its own goals. J. David Thomas subsequently regarded the Ptolemaic administration as having three "layers," with different officials operating at the level of the entire kingdom, an individual nome, and an individual village.[131] These organizational models allowed for an analysis of financial ends other than those of the king, which led to questions about the self-interested activity of non-royals and attempts to distinguish "private" economic activity from "public" efforts to benefit the interests of the state.

But as many have pointed out in recent years, any attempt at a strict categorization of various aspects of the Ptolemaic economy is bound to be faulty. Pierre Briant noted a great deal of

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[130] Alan E. Samuel, *The Shifting Sands of History: Interpretations of Ptolemaic Egypt*, Publications of the Association of Ancient Historians 2 (Lanham, MD: University Press of America, 1989), 64.
[131] J. David Thomas, "Aspects of the Ptolemaic Civil Service: The Dioiketes and the Nomarch," in *Das ptolemäische Ägypten: Akten des Internationalen Symposions, 27.-29. September 1976 in Berlin*, ed. Herwig Maehler and Volker Michael Strocka (Mainz am Rhein: Verlag Philipp von Zabern, 1978), 188.

overlap among so-called private, public, and royal sectors of the Ptolemaic economy.[132] Manning has noted likewise that the boundaries between "royal," "private," "public" and other such categories are blurry.[133] Furthermore, in Manning's view, models of the economy that set private ventures apart from royal ones have a tendency to privilege royal activities as more impactful (and therefore more worthy of close attention) and to ignore private exchange and production on temple estates, arenas in which the king was not directly involved. For this reason, Manning has advocated abandoning a focus on the "public" and "private" categories and instead stresses the flexibility of the Ptolemaic state's approach.[134] State officials took direction from above and therefore worked towards achieving the king's macro-level goals, but they often simultaneously endeavored to further their own ends and increase their capital, both financially and socially.

Through his allegiance to the New Institutional Economics and its focus on the integration and development of institutions and their resultant incentive structures, Manning has proposed a model of the Ptolemaic administrative system that approaches federalism (although not constitutionally).[135] In this model, the central state held control over taxation, but other than that, most of the administration was able to operate regionally. Regional state officials were responsible for maintaining knowledge of Egypt's agricultural conditions through monitoring Nile levels and surveying and registering land. On the local level, temple officials and other elites kept records and maintained granaries and other storage facilities—fucntions that, Manning argues, effectively marked these men as agents of the state. In return for their loyalty, local elites were able to achieve and/or maintain their social status. The state administration had to earn the loyalty of local elites,

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[132] Pierre Briant, "L'économie royale entre privé et public," in *Approches de l'Économie hellénistique* (Paris: Diffusion de Boccard, 2006), 343-58.
[133] Manning, *The Last Pharaohs*, 120.
[134] Ibid.
[135] Joseph G. Manning, "Property Rights and Contracting in Ptolemaic Egypt," *Journal of Institutional and Theoretical Economics* 160.4 (2004): 758-64.

and those elites did the same with their own employees. The obligations between these parties went both ways; the state was responsible for earning its people's loyalty, and revolts could and did follow when this balance was upset.

Manning further highlights the fact that the Ptolemies did not impose some sort of despotic foreign rule upon a colonized civilization; they rather incorporated older Egyptian and Persian institutions into the structure of their administration, to the extent that they should not be considered 'foreign' but rather rulers born and raised in Egypt. New land was brought into cultivation, and new types of taxes and media of exchange were introduced, but the older versions of land tenure, taxation, and media of exchange were not destroyed. The state administration was innovative but still displayed a degree of path dependence, especially with relation to a land tenure regime that never fully established private property as an official category or markets to support a real private property regime. Manning argues that this dependence on property as located within state service led state officials to pursue rent-seeking behavior, which prevented Ptolemaic Egypt from achieving "true" federalism.[136]

Andrew Monson has continued this work towards modeling a more limited role of the Ptolemaic state in the direct management of Egypt's economy, emphasizing that royal land (βασιλικὴ γῆ) was not actually directly managed "royally," i.e., by the state, but rather semi-communally on a local level.[137] His argument is that when populations were low and land therefore abundant, managing land communally spread and lessened the risks associated with agricultural production, whereas when populations were high and land therefore scarce, the

[136] Ibid., 764.
[137] Andrew Monson, "Royal Land in Ptolemaic Egypt: A Demographic Model," *Journal of the Economic and Social History of the Orient* 50.4 (2007): 363-97; Andrew Monson, "Communal Agriculture in the Ptolemaic and Roman Fayyum," in *Graeco-Roman Fayum: Texts and Archaeology: Proceedings of the Third International Fayum Symposion, Freudenstadt, May 29-June 1, 2007*, ed. Sandra Lippert and Maren Schentuleit (Wiesbaden: Harrassowitz, 2008), 173-86.

potential rewards of agricultural production were high enough to encourage the protection of private property rights more than the minimization of risk, and the private ownership of land rose in significance. Since population densities in the Nile Valley were higher than in the newly reclaimed Fayyum, a greater proportion of land in the Nile Valley was privately owned.[138] In effect, then, Monson's analysis brings the interests of individuals back into focus: individual actors had the opportunity to make real choices about whether to collaborate or compete.

In this new era of scholarship in Ptolemaic economic history, it is possible to understand price fluctuations as based on factors other than royal planning. The flexibility of the institutional system allowed enterprising individuals the room to seek their own profits and take actions to achieve them, for example, as state officials who also engaged in rent-seeking behavior. Likewise, the flexibility of the Ptolemaic economy meant that an individual was able to respond to the needs of his own specific time and location, so it is reasonable to expect that prices could vary not only over time but also on a regional or even village-to-village basis. Supply of produce and goods was not the only factor that could influence such fluctuations; the quantity and quality of people in different areas also played a role in how those people organized themselves and their relationship to the available resources. Essentially, the current, more flexible models of the Ptolemaic economy open up a multiplicity of possibilities in terms of potentially price-shaping factors.

4.4.3 The Ptolemaic Military: War, Spending, and Booty

The military is an incredibly costly state institution that also has the potential to generate revenue through booty and other means, as well as to ensure greater security for transactions. Joshua Goldstein has written that war can have a tremendous impact on economies, since wars are

[138] Monson, "Royal Land in Ptolemaic Egypt: A Demographic Model."

"expensive, destructive, and disruptive."[139] In this section, I will investigate the potential impact of Ptolemaic military activity on prices, particularly focusing on state spending, incoming plunder, effects on resources, and effects on security.[140]

Waging war is an expensive activity that entails high levels of state spending. As a result, wars have the potential to stimulate economies. For example, in the 20th century CE, states preparing for war increased their spending by rebuilding outdated infrastructure, investing in technological development, and reducing unemployment by conscripting soldiers and civilians to help make war possible.[141] The early Ptolemies, anxious to establish their kingdom's legitimacy and security, spent lavishly on warfare. Is it possible, then, that this military spending may have led to economic growth?

The first two Ptolemies were avidly pursuing dominance over their rivals in the eastern Mediterranean and were willing to engage in very high military spending to do so. Immediately after Alexander's death, Ptolemy I took funds from the Egyptian treasury to hire mercenaries—an act which won him the Battle of Gaza against Antigonus in 312 BCE.[142] Through the late fourth century and 290s BCE, Ptolemy I actively engaged in military expansion, conquering Cyrenaica, Coele-Syria, Cyprus, Lycia, Pamphylia, Sidon, and Tyre.[143] Ptolemy II continued his father's spending; by 281 BCE, Ptolemy II had the best navy in the Mediterranean and had founded the League of Islanders. The decades that follow are often referred to as the age of the Ptolemaic

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[139] Joshua S. Goldstein, "War and Economic History," in *The Oxford Encyclopedia of Economic History* 5, ed. Joel Mokyr (Oxford: Oxford University Press, 2003), 215-18.
[140] The summary of military events and the chronology presented here is based on Fischer-Bovet, *Army and Society in Ptolemaic Egypt*, because she focuses in particular on the institutional history of the military, but of course see also Hölbl's detailed and excellent *History of the Ptolemaic Empire*.
[141] Goldstein, "War and Economic History," 216
[142] Fischer-Bovet, *Army and Society in Ptolemaic Egypt*, 52-53.
[143] Ibid.

thalassocracy.[144] This navy was astronomically expensive, with the the salaries for the men who manned the fleet likely costing 4,000-4,800 talents per year.[145] The maintenance of the ships themselves required an additional 5,600-6,700 talents.[146] Ptolemy II also spent an enormous amount of money to display his wealth and power to his rivals, subjects, and potential subjects outside Egypt through the Ptolemaia, a Greek-style festival that took place every four years between 279/80 and 233/32.[147] Athenaeus records a lengthy description of the grand procession that was a part of the festival in Alexandria in his *Deipnosophistai* (5.197c-203b)—it was essentially a massive celebration of Ptolemaic excess. The details include thousands of people decked out in purple robes and golden jewelry, giant golden statues, elephants and other exotic animals, people bearing tribute from around Alexander's empire, and wine flowing freely in the streets.[148] The extreme nature of this description emphasizes the clear point remains that Ptolemy II was willing to spend massive amounts of money to signal his wealth—the many crowns alone are said to have cost 2,239 talents and 50 minas.[149]

Military spending under Ptolemy III and Ptolemy IV was more haphazard than under the reigns of the first kings. Ptolemy III initially continued his father's high spending when he carried out the Third Syrian War, a costly land war in Asia that required him to recruit many soldiers and

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[144] This thalassocracy probably peaked in the 270s and declined in the 250s. BCE.Fischer-Bovet, *Army and Society in Ptolemaic Egypt*, 55, 61-62.

[145] The salaries for the crew and officers of a ship fluctuated over time; Fischer-Bovet points out that officers needed to be paid more in times of conflict to ensure that they would not switch sides. Fischer-Bovet, *Army and Society in Ptolemaic Egypt*, 71-72.

[146] Ibid.

[147] Although this festival might not seem overtly 'miliary,' it was almost certainly designed as a tactic of propaganda and intimidation—a part of Ptolemy II's larger politico-military agenda in the eastern Mediterranean. For that reason, I am including this spending in the military section of this analysis. Fischer-Bovet, *Army and Society in Ptolemaic Egypt*, 55; E. E. Rice, *The Grand Procession of Ptolemy Philadelphus* (Oxford: Oxford University Press, 1983).

[148] Athenaeus, *Deipnosophistai* 5.197c-203b.

[149] Athenaeus, *Deipnosophistai* 5.203b.

confiscate property in preparation for the war.[150] After the end of the war in 241 BCE, however, Ptolemy III did not engage in military activity abroad for the next two decades, and he demobilized by settling more soldiers within Egypt. He still maintained garrisons of professional soldiers and supported the Achaean League financially, but his military spending decreased dramatically after this date. By 226/25 BCE, he stopped sending financial support to the Achaean League altogether.[151] When Ptolemy IV inherited this weaker military and dearth of allies, he soon had to re-start spending as Antiochus III endeavored to take over Ptolemaic territory in Coele-Syria. He faced a financial Catch-22, in that fighting was extremely costly, but losing the wealthy region of Coele-Syria would also be a major financial loss. Even though he had likely been unable to collect from that region since Antiochus III's invasion two years earlier and therefore was already facing financial trouble, Ptolemy IV spent the necessary funds to set himself up with a stronger military force.[152] He was victorious by 217 BCE, but suffered great losses and stirred up domestic unrest in the process.[153]

Thus, military spending was high under Ptolemy I and Ptolemy II, then fluctuated under Ptolemy III and Ptolemy IV. But how would this spending dynamic have influenced prices in Egypt? If the spending of the first two kings were to have contributed to economic growth, that money must have been spent in Egypt or on Egyptians. As these kings built up the great navy of the thalassocracy, a great deal of revenue was flowing into the royal dockyards in Alexandria and likely contributed a great deal to that city's economic growth.[154] Much was spent on the materials

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[150] Fischer-Bovet argues that these moves made him unpopular domestically. Fischer-Bovet, *Army and Society in Ptolemaic Egypt*, 65.
[151] Ibid., 66.
[152] This involved hiring mercenaries and re-organizing the land army. Ibid., 86-88.
[153] Ibid. 87.
[154] Muhs, *Ancient Egyptian Economy*, 252.

and labor required to build the ships, in addition to the funds necessary to maintain them.[155] Likewise, soldiers were paid for their services and would likely have spent their earnings in Egypt after the war.[156] The Ptolemaia festival probably also employed high numbers of craftsman, dancers, and other performers every four years under Ptolemy II. In modern contexts, wars have led to incredible inflation because of such high spending.[157] It is certainly possible that the spending of the first two Ptolemies may have had inflationary results.

Goldstein has argued that "the high costs of war outweigh the positive spin-offs. Indeed, a central dilemma for states is that waging wars—or just preparing for them—undermines prosperity, yet losing wars is worse."[158] Likewise, in her recent book on the Ptolemaic military, *Army and Society in Ptolemaic Egypt*, Christelle Fischer-Bovet argues that the Ptolemies faced a remarkably similar "dilemma" to the one described by Goldstein. She characterizes this dilemma as "a paradox of impossible demobilization."[159] The Ptolemies' military expenditures were an enormous drain on Egypt's resources, which led to conflicts at home, but if they demobilized, they could lose control over the kingdom entirely. The fluctuating spending dynamic under Ptolemy III and Ptolemy IV could certainly have led to corresponding volatility in prices within Egypt. The history of early Ptolemaic military spending would suggest growth and potentially inflation under Ptolemies I and II, followed by volatility under Ptolemies III and IV.

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[155] Fischer-Bovet, *Army and Society in Ptolemaic Egypt*, 71-72.
[156] Ibid.
[157] Goldstein, "War and Economic History," 215-16. Modern examples of inflation related to wars and political tensions are numerous. One can be found in the period of triple-digit inflation during Angola's civil war (1975-2002), when bottles of beer were preferred to cash as a means of exchange for everyday transactions. Likewise, in recent months, the rapid inflation caused by economic sanctions on Russia has led individuals there to turn away from the ruble towards "hard" goods like cars, furniture, electronics, and gold as stores of wealth.
[158] Goldstein, "War and Economic History," 216.
[159] Fischer-Bovet, *Army and Society in Ptolemaic Egypt*, 50.

War is costly, but historically, engaging in war was often a profit-seeking activity. Wars of conquest, especially, have historically generated a great deal of revenue from their conquered territories. Modern states with strong navies, such as the Dutch and the British of the 17th-19th centuries CE, were able to engage in greater quantities of trade over long distances and to establish profitable conditions for companies (such as these powers' respective East India Companies) in their overseas territories. In addition, states with stronger military forces have a greater capacity to extract customs duties and tariffs on trade at home and trade passing through territories they claim. Since Ptolemaic territory fluctuated over the course of the first four reigns, it is reasonable to investigate the extent to which territorial gains brought prosperity to Egypt through plunder and tribute.

The many wars of the early Ptolemies almost certainly earned booty for the soldiers who fought them. For example, P. Gurob records that over the course of the Third Syrian War, (246-241 BCE), Ptolemy III took 1,500 talents from the treasury in Cilicia in Asia Minor; Saint Jerome further attests that Ptolemy III captured another 40,000 talents in booty later on the same campaign.[160] Fischer-Bovet has argued that the prospect of booty represented a major incentive for the Ptolemies to invest their revenues in warfare, since they could distribute it to loyal elites and soldiers.[161] However, the extent to which this booty would have 'trickled down' through the Egyptian economy is unclear and should not be overestimated. It is more likely that soldiers and elites who benefitted directly from booty would have experienced an increase in their spending power. That could imply an increase in demand for goods preferred by these soldiers and elites—and an increase in prices in turn.

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[160] These figures are likely exaggerated, but they do indicate very high levels of plunder. Fischer-Bovet, *Army and Society in Ptolemaic Egypt*, 70.
[161] Ibid.

Aside from short-term plunder, wars could have brought the Ptolemies long-term revenue conquered territories. As discussed above, Ptolemaic territory expanded around the eastern Mediterranean from the fourth century through the 250s BCE. Conquered lands were taxed, and the revenues generated in territories outside Egypt were significant. For example, Fischer-Bovet has estimated that the income from the territories in Coele-Syria, Syria, and Asia Minor that Ptolemy V lost during the Fifth Syrian War (202-195 BCE) constituted about 20% of his total revenues at the time.[162] Most tax revenue was likely spent within the very territories that generated that revenue and did not come back to Egypt as proper tribute.[163] Therefore, despite its great size, this revenue is still unlikely to have impacted prices back in Egypt.

Wars also have an impact on access to resources, which therefore would have impacted the supply of those resources. When the Ptolemies were in control of territories that produced key resources, it is likely that the price of those resources would be lower than when those territories were in enemy hands (or, more generally, when those territories were more difficult to access).[164] Especially important were those resources that were naturally less plentiful in Egypt, such as wood (produced more readily in Coele-Syria), silver (found in mines in Greece and around the Mediterranean, but not Egypt), tin, and others. Early in the Ptolemaic period, the Ptolemies gained territories that were rich in resources. Ptolemy I conquered Cyrenaica and built alliances with Cyprus.[165] Over the first three Syrian wars, the early Ptolemies conquered the eastern

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[162] Ibid., 81-82.

[163] Cf. Keith Hopkins' 'taxes and trade' model of the Roman Empire, which explains that money taxes extracted from provinces had to flow back to those provinces in some way (e.g., through trade or state expenditures)—otherwise, the provinces would literally run out of money with which to continue to pay their taxes. Keith Hopkins, "Taxes and trade in the Roman Empire," *Journal of Roman Studies* 70 (1980): 101-125.

[164] For further discussion of when the Ptolemaic kingdom had control over which territories outside Egypt, see 4.2.5 "Boundaries of the 'Egyptian' Economy," above.

[165] Fischer-Bovet, *Army and Society in Ptolemaic Egypt*, 52.

Mediterranean coast.[166] But as the later Ptolemies lost territories, these resources would have grown more scarce and likely more expensive. Over the course of the Fifth Syrian War (202-195 BCE), Ptolemy V lost most of his territories around the Mediterranean, with the exception of Cyprus and Cyrenaica.[167] The later Ptolemies would never recover those regions or their resources.

Aside from raw materials, labor should also be understood as a critical resource. Periods of conflict can be draining to the labor supply, as men who otherwise would have labored productively are diverted to military concerns. I expect that the price of labor would have risen during the many wars fought in this period and during times of revolt within Egypt. For example, during the expensive Third Syrian War, Ptolemy III likely had to recruit soldiers from the Egyptian countryside, cutting into the available pool of men who could have worked the land.[168] On the other hand, successful wars could have led to increases in Egypt's labor supply. For example, Ptolemy I relocated his prisoners of war (former mercenaries) to Egypt, where he settled them in the countryside and therefore added to the supply of agricultural labor.[169] These shifts in the labor supply that were caused by military events likely impacted not only wages but also the prices of goods produced with that labor, particularly agricultural produce. Agriculture would probably have been the industry most impacted by wars, since most agricultural labor was relatively unskilled (and thus more readily shifted to other work) and since agricultural work required such a large force of men. Thus, wartime can be disruptive to regular economic activity, making it difficult to hire and manage labor and find adequate resources to engage in productive enterprise.

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[166] Ibid., 51-65.
[167] Ibid., 81-82.
[168] Ibid., 65.
[169] E.g., after the Battle of Gaza in 312 BCE. Ibid., 53.

The final component of warfare that is likely to have impacted prices is security. During active periods of conflict, prices usually rise. Joshua Goldstein has written that the "most consistent short-term economic effect of war is to push up prices, and consequently to reduce living standards."[170] These price rises can be driven by inadequate access to resources or products, as discussed above, but also by the increased level of risk in these areas of conflict. Higher risk leads to higher transaction costs, which can be added to the price of the product.

While war itself can be disruptive to commerce, the results of war could have made transactions easier. As Ptolemaic territory grew, the ease of doing business with people in more territories under the control of the same state expanded.[171] Essentially, as Ptolemaic territory grew or shrank, the Ptolemaic economy itself grew or shrank. As discussed above, the Ptolemaic kingdom and its economy expanded early in the period. Ptolemaic military power reached its apex during the thalassocracy (c. 280-250 BCE), when the Ptolemaic kingdom controlled the League of Islanders and offered greater security for long-distance trade. The League essentially consisted of a network of garrisons around the Aegean, accompanied by a large, powerful fleet that could travel among them. Ptolemy II's navy was mainly active militarily in the Mediterranean, but the king also used these forces to protect trade routes in the Red Sea and to transport troops along the Nile.[172] This navy allowed Ptolemy II to have influence as far north as Crimea.[173] During the period of the Ptolemaic thalassocracy, long-distance trade may have been better secured by the state and therefore less costly, perhaps resulting in lower prices for imported goods from regions where the navy was active. On the other hand, as Ptolemaic territory began to wane after the 250s

[170] Goldstein, "War and Economic History," 215.
[171] For more information on when the Ptolemies controlled which territories outside Egypt, see 4.2.5, "Boundaries of the 'Egyptian' economy," above.
[172] Fischer-Bovet, *Army and Society in Ptolemaic Egypt*, 58-59.
[173] Ibid., 61.

and particularly by the beginning of the 2nd century BCE, transactions would have likely become riskier and more expensive, with the result being an increase in price levels.

Likewise, security home in Egypt increased in the early Ptolemaic period, particularly through the establishment of the kleruchic system. Ptolemy I established this practice of settling soldiers on grants of land.[174] A soldier granted a plot of land (Greek κλῆρος) became known as a kleruch (Greek κληροῦχος). In general, the kleruchic system allowed the king to securely demobilize soldiers after wars, when he did not need as many active troops. He maintained their loyalty without having to pay them in cash or feed them directly by instead providing them land as a means to earn a living, saving the state's revenues in the process. These soldiers were also spread out throughout Egypt, ostensibly ready to mobilize whenever active forces became necessary. Because their land grants were diffuse, this reserve army did not become concentrated in Alexandria and therefore was also prevented from coming together as a potentially dangerous political force. The diffusion of men loyal to the Ptolemaic dynasty throughout Egypt is one example of the relatively high level of domestic security in third century Egypt. The state was stable at this time, and the risks associated with domestic transactions were also low – I expect that this security was a force that could have kept prices low.

Later in the period in question, though, revolts in Upper Egypt made domestic transactions more difficult: particularly transactions between north and south. Soon after 210 BCE, in the reign of Ptolemy IV, the Great Revolt began in both the Delta and the Thebaid and

[174] As he did so, he was following in a tradition that extended back to at least the New Kingdom (and perhaps as far back as the Sixth Dynasty) in Egypt and that was also used in Classical Athens. Fischer-Bovet argues that although there is no direct evidence for the kleruchic system under Ptolemy I, Diodorus' mentions of Ptolemy I's settling soldiers indicate that perhaps he at least laid the foundation for a practice that was more fully systematized under his son, Ptolemy II. Fischer-Bovet, *Army and Society in Ptolemaic Egypt*, 199-201.

lasted for another twenty years (206-186 BCE).[175] Fischer-Bovet argues that the revolt was caused by an alliance between unhappy elites, who wanted to rein in the political power of the king over the south, and the lower classes, as both parties' economic situations were likely worsening.[176] With the exception perhaps of a serious mob riot in Alexandria in 203 BCE, caused by the young Ptolemy V's regent Agathocles' egregious behavior and the Alexandrians' resulting move to "attack the government," the revolt seems to have been most disruptive in the south of Egypt.[177] With the outbreak of the Great Revolt, Ptolemy IV and, after his death in 203 BCE, his heir Ptolemy V, faced a similar predicament to that of the Fourth Syrian War: they could not collect taxes in the Thebaid and therefore were losing revenue, but to regain the revenue from the lost territories, they needed to spend more on the military once again. The Ptolemies responded by sending large numbers of troops to the south, establishing a network of garrisons of professional soldiers, and settling at least 4,000 new kleruchs in the Thebaid.[178] By the mid-180s BCE, Ptolemy V was able to regain control of the Thebaid. It is possible that the instability of the Great Revolt, as well as the poor economic conditions that contributed to it, could have raised prices throughout Egypt between 206-186 BCE.

This brief discussion has highlighted a clear divide in the military contexts experienced under the earliest Ptolemies (I-III) and Ptolemies IV and V. Under the early Ptolemies, military spending was high, resulting in greater plunder and access to imported resources, with greater security throughout the Mediterranean and at home. However, under the later Ptolemies in our

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[175] Fischer-Bovet, *Army and Society in Ptolemaic Egypt*, 92, citing Polybius 9.11a.2 for peace made after post-Raphia revolts.
[176] A. E. Véïsse, *Les « révoltes Égyptiennes » : recherches sur les troubles intérieures en Egypte du règne de Ptolémée III Evergète à la conquête romaine*. Studia Hellenistica 41 (Leuven: Peeters, 2004), 151-52, 245-48; Fischer-Bovet, *Army and Society in Ptolemaic Egypt*, 92.
[177] For the Alexandrian revolt, see Polybius 15.29.4 and Fischer-Bovet, *Army and Society in Ptolemaic Egypt*, 94-95.
[178] Fischer-Bovet, *Army and Society in Ptolemaic Egypt*, 93.

range of dates, access to resources dropped and the region became less stable, peaking with the breakoff of Upper Egypt during the Great Revolt (roughly 210-186 BCE). If we are to generalize, then, it is to be expected that prices would be higher in the latter half of the early Ptolemaic period.

4.4.4 The Legal System and the Protection of Property Rights

The structure of the Ptolemies' administrative institutions in Egypt is relevant to prices because of the state's role in protecting property rights and, by extension, in minimizing the risks and costs tied to transactions. Legal institutions can minimize risk and protect parties both by resolving conflicts after the fact and by dis-incentivizing offenses. In general, it is fair to expect that in societies with more effective legal institutions, the risk of transactions is lessened, and prices will be both lower and more stable. We must ask, then: to what extent was the Ptolemaic state concerned with the legal protection of property rights and successful in carrying out those protections? Likewise, were there changes in this effectiveness over time that might have coincided with price changes?

The Ptolemaic state was strongly concerned with the legal protection of property. The king in Alexandria and his local officials dispersed throughout Egypt were responsible for responding to crime and were particularly concerned with crimes that affected the state, especially its revenues. The king was personally responsible for maintaining the legal system, which was established through royal decree, and he could hear and judge legal cases himself.[179] Individuals could send

[179] Brian Muhs, *The Ancient Egyptian Economy* (Cambridge: Cambridge University Press, 2016), 212-13.

petitions (ἐντεύξεις) to the king for justice, and the king did sometimes personally respond to their complaints.[180]

Most of the petitions were handled by the king's representatives at a more local level. Among these local representatives were the regional governor (ἐπιστράτηγος) and the provincial governors (στρατηγοί) within his broader region. These provincial governors oversaw the local police and militias at the behest of the king. They could also render decisions on petitions sent to the king (or other complaints addressed directly to them) or send those matters on to courts. Disputes concerning private property unrelated to royal revenues generally were not handled by the central royal administration but rather by local courts.[181] These two levels of the legal system, central and local, nevertheless cooperated with each other. Royal support allowed the local courts to have validity and stability, while their ability to manage conflicts surrounding private property relatively independently at the local level ensured greater efficiency for the legal process. Combined, the validity and efficiency of the local courts helped to mitigate the risk associated with transferring or investing in private property.

These local courts actually consisted of two different sets of courts, based on the Egyptian and Greek languages and legal traditions.[182] Both sets of courts were mainly concerned with

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[180] Ibid.
[181] Ibid., 212-15.
[182] For more on the Egyptian courts, see Schafik Allam, "Regarding the *eisagogeus* (εἰσαγωγεύς) at Ptolemaic law courts," *Journal of Egyptian History* 1.1 (2008): 3-19; Manning, "Property Rights and Contracting in Ptolemaic Egypt," 762-763; S. L. Lippert, "Die sogennante Zivilprozessordnung, weitere fragmente der ägyptischen Gesetzesammlung," *Journal of Juristic Papyrology* 33 (2003): 134-35; P. W. Pestman, "Réflexions à propos du soi-distant Code de Hermoupolis," *Journal of the Economic and Social History of the Orient* 26 (1983): 17-18; Girgis Mattha and George R. Hughes, *The Demotic Legal Code of Hermopolis West* (Cairo: Institut Français d'Archéologie Orientale du Caire, 1975). The structure of the Egyptian courts is preserved in P. BM 10591.For more on the Greek-language courts, see Hans Julius Wolff, *Das Justizwesen der Ptolemäer* (Münchener Beiträge zur Papyrusfoschung und antiken Rechtsgeschichte 44. München: C. H. Beck'sche Verlagsbuchhandlung, 1962), 56-64, 99-112; J. G. Manning, "Law under the Ptolemies," in *Law and Legal Practice in Egypt from Alexander to the Arab Conquest: A Selection of Papyrological Sources in Translation, with Introductions and Commentary*, eds.

property disputes and therefore the documentation of property, so conflicts based on documents in Demotic would be handled in the Egyptian court and those based on Greek documents were handled in the Greek court. Pestman argued convincingly that the ethnicity of the parties involved was irrelevant.[183] Both Egyptian courts (Eg. *ꜥ.wyw wpy* "Houses of Judgment," Gr. λαοκρίται) and Greek courts (Gr. κριτήρια) were presided over by sets of judges (*wpṯy.w* and χρηματισταί, respectively), with a state representative (*ỉysws,* εἰσαγωγεύς) there to formally present the dispute before the judges. The Greek courts based their decisions on a different body of laws than did the Egyptian courts, but the precise source of these laws is more debated among legal historians, and it is likely that 'Greek law' was an amalgam of varied practices. As Manning writes, "there is unlikely to have been anything like a unified 'Greek' law applied in Egypt."[184] As in the Egyptian courts, written documents could be presented to protect property rights, as could reference to royal decrees.[185]

While it may seem that the Egyptian and Greek courts maintained separate jurisdictions, in fact there was considerable overlap.[186] For that reason, an individual could aim to have his dispute aired in a court that would be more conducive to the verdict falling in his favor. Women,

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James G. Keenan, J. G. Manning, and Uri Yiftach-Firanko (Cambridge: Cambridge University Press, 2014), 19.

[183] P. W. Pestman, "The Competence of Greek and Egyptian tribunals according to the decree of 118 B.C.," *Bulletin of the American Society of Papyrologists 22, Issue 1-4: Classical Studies Presented to William Hailey Willis on the Occasion of his Retirement from Duke University* (1985): 265-69. For a dissenting view on the role of ethnicity in law court selection, see Joseph Modrzejewski, "Chrématistes et laocrites," in Le monde grec: pensée littérature histoire documents: hommages à Claire Préaux, eds. Jean Bingen, Guy Cambier, and Georges Nachtergael (Bruxelles: Éditions de l'université de Bruxelles, 1975), 699-709.

[184] Manning, "Law under the Ptolemies," 19.

[185] Manning, "Law under the Ptolemies," 19.

[186] Cf. the 118 BCE royal decree of Ptolemy VIII, Cleopatra II, and Cleopatra III, preserved in P. Tebt. 1 5, which orders the courts to respect each other's jurisdiction and not to poach cases from other courts. Legal forum shopping was also discussed by Brian Muhs in "Legal Pluralism and Forum Shopping in Ptolemaic Egypt," 2015 Joint Regional Meeting of the Midwest Region of Society of Biblical Literature, Middle West Branch of the American Oriental Society, and American Schools of Oriental Research—Midwest, Bourbonnais, Illinois, February 6, 2015.

for example, could own property and draw up legal documents independently in Demotic, but for their Greek documents, they were required to have a male guardian. Although this rule was not always enforced, it would have incentivized women to manage their affairs using Demotic documents.[187] The choice of legal forum in such shopping situations seems to have been based less on the letter of the two sets of laws than on the personnel adjudicating the dispute. The overlap between jurisdictions led to the rising importance of an individual's being a client of a powerful official who would ensure his legal affairs were 'fixed' in exchange for favors.[188] Neither Greek nor Egyptian laws themselves would likely have had a profound advantage, but the architecture of relationships between clients and their 'fixers' did establish a structure of favoritism.

In court, the ownership of property was (at least ideally) proven through written documentation[189]. Documenting anything in Ptolemaic Egypt was expensive, and therefore most transactions were never written down. However, such undocumented transactions were also far riskier in terms of the resolution of potential disputes. The state developed a strong bureaucratic structure with which to oversee documentation and mitigate such risk, especially as it concerned its own revenues.[190] Mitigating risk in more private financial transactions was also in the state's

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[187] P. W. Pestman, "Les archives privées de Pathyris à l'époque ptolémaïque. La famille de Pétéharsemtheus, fils de Panebkhounis," in *Studia Papyrologica Varia*, eds. E. Boswinkel, P. W. Pestman, and P. J. Sijpesteijn. Papyrologica Lugduno-Batava 14 (Leiden: Brill, 1965), 47-105, esp. 102.
[188] Marta Piątkowska, *La ΣΚΕΠΤΗ dans l'Égypte ptolémaïque*, Archiwum Filologiczne 32 (Wrocław: Zakład Narodowy im. Ossolińşkich Wydawnictwo, Polskiej Akademii Nauk, 1975).
[189] Oral evidence was admissible, especially when no written evidence could be found, but written evidence did take precedence. For example, Demotic contracts often require sellers to relinquish older documents for use in court and to take an oath in court, if no written documents existed, to attest to the new owner's property rights.
[190] For an overview of the structure of scribal organization, see Muhs, *Ancient Egyptian Economy*, 223. Mark Depauw, *A Companion to Demotic Studies*, Papyrologica Bruxellensia 28 (Brussels: Fondation Égyptologique Reine Élisabeth, 1997), 132. Each nome had royal scribes (βασιλικοί γραμματεῖς, *sḫ pr-ꜥ*), who themselves managed more scribes at the district and village levels (τοπογραμματεῖς, *sḫ mꜣꜥ* and κομογραμματεῖς, *sḫ tmy*, respectively). These scribes were tasked with documenting royal revenues by taking censuses of the people, livestock, and real estate of their area as well as calculating and documenting the taxes owed to the state. Also within each nome, economic managers (οἰκονόμοι, *sḥn*) were responsible

interest, since stimulating economic activity would have also increased the amount of transactions, goods, and money available for the state to tax, generating potential revenues above the expense of documentation and enforcement of contracts.

Over time state representatives were tasked with greater responsibility in documenting even private transactions at the local level. The Ptolemaic state protected its own revenues by keeping records of what it was owed, and it also protected its people by issuing receipts for what it had been paid, especially in the form of tax receipts.[191] Such receipts are plentiful in the textual record. Tax receipts were written on ostraca and provide the names of the payer and the scribe recording the payment, as well as the date, the amount paid, and usually the type of tax.[192]

Over the course of the Ptolemaic period, the state took an increasing interest in registering private contracts. Before the arrival of the Ptolemies, Egyptians who wanted to document their property transfers usually would do so through contract scribes associated with temples, who would also collect the relevant property transfer taxes and fees.[193] In the reign of Ptolemy I and early into the reign of his son, individuals could draw up documents in Greek on their own and keep them themselves, presumably avoiding having to pay property transfer taxes in the process.[194] As Greek-speaking immigrants became more common in the early Ptolemaic period, Ptolemy II set up a state registry, known in Greek as the ἀγορανόμιον, where Greek sales

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for the collection of those taxes, and they would in turn auction off the rights to collect those taxes to private tax farmers. All these matters of revenue were under the control of the king, who oversaw the activities of a chief financial minister (διοικητής, *snty*), who in turn oversaw lower financial ministers (ὑποδιοικηταί).

[191] For census records, see Clarysse and Thompson, *Counting the People*. For land registers used to calculate and collect harvest taxes, see Dorothy J. Crawford (Thompson), *Kerkeosiris: an Egyptian village in the Ptolemaic period* (Cambridge: Cambridge University Press, 1971) and Arthur Verhoogt, *Menches, komogrammateus of Kerkeosiris: the doings and dealings of a village scribe in the late Ptolemaic period (120-110 BC)* (New York: Brill, 1998).

[192] Depauw, *A Companion to Demotic Studies*, 132.

[193] For more detail on this process, see Muhs, *Ancient Egyptian Economy*, 238-41; Depauw, *Companion to Demotic Studies*, 123-25.

[194] Muhs, *Ancient Egyptian Economy*, 240.

contracts had to be registered in order to ensure that the state could collect the relevant revenues from the transactions being documented.[195] Already in the reign of Ptolemy II, some Demotic contracts contain notes in Greek below them attesting to their registration at the ἀγορανόμιον, which might mean that temple notaries were required to register the documents they drew up with this state registry.[196] By the early second century BCE, the state registry no longer just registered documents but began to actually draw up Greek contracts in the same way that temple notaries had been doing for Demotic contracts, and it became known now as the "writing office" (γράφιον).[197] The fact that contracts still exist even as state oversight increased likely indicates that the cost of taxes was seen as less of a cost, at least for some, than the risk of handling transactions informally. Perhaps, then, the state registry also functioned to mitigate the risk of engaging in these transactions; the copy or abstract registered with the state ensured that property rights could be better enforced. Essentially, the state assumed shared responsibility for maintaining records of property ownership, where previously the only record of title lay with the contracts written by the notary and given to the second contractor.

Alongside the courts, property rights were protected through the actions of a police force (φυλακίται), with the cooperation of civil and military officials.[198] The police force had the power to conduct investigations, arrest and transport suspects, confiscate stolen property, protect

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[195] Ibid., 238-40.
[196] Ibid., 240.
[197] Muhs, *Ancient Egyptian Economy*, 240. First pointed out by Uri Yiftach, "Who killed the double document?" *Archiv für Papyrusforschung 54/2* (2008) 203-218. The "writing office" also began making fuller abstracts of Demotic contracts while registering them around this same period. See Brian Muhs, "A Late Ptolemaic Grapheion Archive in Berkeley," in *Proceedings of the 25th International Congress of Papyrology, Ann Arbor, July 29 – August 4, 2007*, ed. Traianos Gagos (Ann Arbor: University of Michigan Press, 2010), 581-88.
[198] John Bauschatz, *Law and Enforcement in Ptolemaic Egypt* (New York: Cambridge University Press, 2013), esp. 53-54.

individuals, and guard and protect the property of the state.[199] Most policing took place at the village level without much interference from the central administration, so local officials were allowed a relatively high degree of flexibility and ingenuity in responding to crimes.[200] John Bauschatz has argued that this flexibility led to the success of the Ptolemaic system of policing, which "processed criminals efficiently and effectively and provided protections and assurances to citizens" to a degree that was largely unheard of elsewhere in the ancient Mediterranean world.[201] While of course some corruption did exist within the police force, the population continued to turn to them for aid, which implies that the police were generally well trusted.[202]

The legal institutions of Ptolemaic Egypt established a high level of stability in terms of property rights. At the highest level, the Ptolemaic kings and queens, following the Macedonian model of kingship, took great personal responsibility for the legal functioning of their state, and as Manning has argued, the Ptolemaic state was invested in protecting private property rights.[203] On the village level, a flexible, effective policing system ensured both that crimes were dis-incentivized and that individuals could find redress if their property was victimized. The division of the local legal system into Greek and Egyptian courts likewise allowed individuals flexibility and agency as they aimed to mitigate the economic risk of their transactions. Thus, relative to the rest of the Mediterranean world at the time, Ptolemaic Egypt was a place where individuals' property rights could largely be protected, both by the state and by the flexibility allowed to individual actors.

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[199] Ibid., 53.
[200] Ibid., 34.
[201] Ibid., 4, 54.
[202] John Bauschatz, "The Strong Arm of the Law? Police Corruption in Ptolemaic Egypt," *The Classical Journal* 103, no. 1 (2007): 13-39.
[203] Manning, "Property Rights and Contracting in Ptolemaic Egypt," 758-64.

4.4.5 Private Associations and Social Networks

While the state institutions of the courts, police, and other officials added security to financial transactions, Ptolemaic Egyptians also participated in other private social groups that further helped to provide greater financial stability for their members. Among such networks were families and local communities, in which individuals knew each other and would face social consequences for any perceived misdeeds. The members of such networks served as formal witnesses to each other's contracts and other documents and could apply social pressure to make sure that agreements were kept and disputes resolved.[204]

Ptolemaic society also included many more formal private associations, which could ostensibly be based on any of a number of factors, including an occupation, a particular religious devotion, or mere conviviality.[205] This variety allowed members to belong to multiple such associations. Membership typically required an agreement to obey a set of written rules, a willingness to pay fines for breaking those rules, plus a willingness to pay regular dues and make other financial and social contributions to the group. Such associations were not unique to Egypt; private associations were very influential in this period around the Mediterranean. Gabrielsen has characterized the "*fenomeno associativo*" as "ubiquitous in the Hellenistic period" and growing in intensity throughout the period.[206] The practices of these associations were not narrowly focused; members engaged in social activities and drank together, practiced cultic and other religious activities as a group, and combined their resources to pay for each other's burials, among other

[204] Muhs, *Ancient Egyptian Economy*, 228.
[205] Vincent Gabrielsen, "The Rhodian Associations and Economic Activity," in *Hellenistic Economies*, ed. Zofia Archibald et al. (London: Routledge, 2001), 218.
[206] Ibid., 215.

activities.[207] Private associations were active in mercantile activity throughout the Hellenistic Mediterranean.[208]

Within Egypt, formal private associations, which had existed in Egypt already by the 6th century BCE, played an important part in the Ptolemaic economy.[209] Ptolemaic associations could be based on a shared profession (for example, bankers or salt merchants) or religious devotion (for example, falcon mummy bearers, mortuary priests, or those dedicated to a particular cult), although there was considerable overlap between these ostensible categories, since participation in religious activities could also constitute an individual's livelihood.[210] Members of these associations

[207] Muhs, "Membership in Private Associations in Ptolemaic Tebtunis," 1-2.
[208] Gabrielsen, "The Rhodian Associations and Economic Activity," 215-44; Vincent Gabrielsen, "Rhodes and the Ptolemaic kingdom: the commercial infrastructure," in *The Ptolemies, the Sea, and the Nile: Studies in Waterborne Power*, eds. Kostas Buraselis, Mary Stefanou, and Dorothy J. Thompson (Cambridge: Cambridge University Press, 2013), 66-81. Gabrielsen has described how, on Rhodes, groups of business partners banded together to engage in commercial activity, effectively as corporations. The activities of these associations were fluid; they are known to have collectively engaged in religious practices, owned vineyards as a corporation, shipped large cargoes together, and shared information. The Rhodian associations included members of different occupations, such as farmers and shippers who were able to work together as a corporation to engage in long-distance trade of agricultural produce and share the risk involved in doing so. Gabrielsen argues that membership in these associations gave the Rhodian aristocracy greater access to labor, which was always in short supply. These associations also funded public projects on Rhodes, a practice which enhanced their brands and promoted their power, allowing them to recruit even more members, including foreigners. Granted, the organizations Gabrielsen describes were on Rhodes, but it is perhaps reasonable to expect that they may have had an impact on the Ptolemaic economy. Rhodes was a major commercial center in the eastern Mediterranean. Rhodian traders were some of the most active merchants importing goods from the Aegean into the port of Alexandria, Egypt exported a great deal of grain to Rhodes, and Rhodes was almost always an ally of the Ptolemaic state politically. Ultimately, the Rhodian associations are a prime example of how the face of long-distance integrated trade in the Hellenistic Mediterranean was changing, as small-scale or individual entrepreneurs were losing ground to these larger groups of business partners.
[209] These associations were referred to in Demotic by the general term *p3 ḥ.wy* "the association" (literally, "the house" or "the temple") and in Greek by the analogous οἶκος "house"; the more technical Demotic term for private religious and professional associations was *swn.t* "(cult) association." Andrew Monson, "The Ethics and Economics of Ptolemaic Religious Associations," *Ancient Society* 36 (2006): 222; G. R. Hughes, *The Sixth Day of the Lunar Month and the Demotic Word for 'Cult Guild.'* Mitteilungen des Deutschen Archäologischen Instituts, Abteilung Kairo 16 (1958): 147-60.
[210] Muhs, "Membership in Private Associations in Ptolemaic Tebtunis," 3-4.

held meetings, drank together, made communal sacrifices, participated in religious processions together, and paid taxes and fees collectively.[211]

Membership in an association granted a member insurance benefits that mitigated social risks (and perhaps, by extension, the risk of his transactions) and provided access to the precious resources of credit and labor. Members were expected to help each other when one of their own was facing a financial hardship, in prison, seeking asylum at a temple, or in need of burial after death, so to pay to join an association could be seen as buying a form of insurance.[212] Monson further emphasizes that many of the harshest penalties that could be imposed on members were ethical, which meant that these associations worked to foster trust among members beyond just individual wealth maximization and to encourage members to resolve disputes within the association.[213] It is possible that the trust generated through participation in these associations, coupled with what Monson describes as high payments to the group used to generate further trust from other members, fostered differing prices within and outside the group. By analogy with Gabrielsen's discussion of the Rhodian associations, it might also be possible to expect that members could rely on each other as a ready source of manpower when necessary, i.e., if labor were scarce.

Membership came at a price. Members agreed to follow a set of written rules and regulations and to pay fines if they transgressed those rules. Members were also required to pay dues and to make various other contributions over the year. The Demotic documents mention general "contribution fees" (*ḥḏ.w n ꜥ*), which all members paid monthly, and "fees of office" (*ḥḏ.w n ỉ̈w.t*), payable only by the holders of offices, which leads Monson to note that the level of

[211] Ibid., 3; Monson, "The Ethics and Economics of Ptolemaic Religious Associations," 230.
[212] Muhs, "Membership in Private Associations in Ptolemaic Tebtunis," 3; Monson, "The Ethics and Economics of Ptolemaic Religious Associations," 229.
[213] Monson, "The Ethics and Economics of Ptolemaic Religious Associations," 233-38.

contribution required by members differed according to their status within the association's hierarchy.[214] He further argues that the contributions of office holders were so high that these members must have been relatively wealthy individuals and that, based on the standard contributions, even ordinary members would have had an above average economic status.[215] Regarding religious institutions in Tebtunis, Muhs has argued the reverse, i.e., that the membership of certain associations consisted of lower-ranking priests who used the association to compensate for the fact that they were denied participation in aspects of the temple institution open to those of higher rank.[216] In any case, the benefits of membership seem to have outweighed the costs.

In addition to such horizontal social networks, vertical varieties existed, in the form of a system of patronage (σκέπη, literally "protection").[217] Unlike the formal private associations discussed above, patronage was a system based on unwritten expectations, likely developed through social custom. Institutions, state officials, and prominent individuals acted as patrons to their clients, who expected to be protected from other authorities and to receive favorable outcomes from their interactions with their patrons in an official capacity (for example, in the courts).[218] Temples also were able to shield their clients who were laborers and dependent farmers in need of refuge from their landlords through the practice of ἀναχώρησις (literally, "retreat" or "strike").[219] Clients could call upon patrons for financial support in times of need, often in the

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[214] Ibid., 223.
[215] Ibid., 224-28.
[216] Muhs, "Membership in Private Associations in Ptolemaic Tebtunis," 18-19.
[217] Piątkowska, *La ΣΚΕΠΗ dans l'Égypte ptolémaïque*; Sitta von Reden, *Money in Ptolemaic Egypt, from the Macedonian Conquest to the End of the Third Century BC* (Cambridge: Cambridge University Press, 2007), 228-39.
[218] von Reden, *Money in Ptolemaic Egypt*, 234-35.
[219] Ibid., 229.

form of loans.[220] In return, patrons could probably call upon their clients for labor or various other forms of social support when it was necessary for them. While patronage was not based on written rules and regulations, it was a well-recognized institution. Von Reden has pointed out that in Ptolemaic Egypt, an individual's affiliation was commonly described with reference to his patron, and letters of recommendation from patrons were quite common when seeking employment or accommodation.[221] To a certain extent, σκέπη seems to have also been legally recognized, since, beginning in the reign of Ptolemy IV, likely after the Battle of Raphia, some royal decrees grant and/or refuse this right of protection to certain officials, temples, and categories of individuals.[222]

In general, the private associations of Ptolemaic Egypt served a number of economic functions. The formal associations helped to effectively lower transaction costs by enforcing agreements and ensuring that members of associations got along. It is theoretically possible that transactions between members of the same association thus may have been handled for lower prices—although no evidence for such a phenomenon currently exists. The associations also may have provided a ready source of labor, and relationships of patronage opened up greater access to money and credit. Both formal and informal, socially understood relationships also provided a measure of security for those who participated in them.

4.4.6 Temples and Funerary Endowments

Temples remained powerful institutions in Ptolemaic Egypt, especially in the south. In tandem with their religious functions, temples served as redistributive and productive institutions

[220] Ibid., 235-39.
[221] Ibid., 231-35.
[222] Piątkowska, *La ΣΚΕΠΗ dans l'Égypte ptolémaïque*, 52-54; von Reden, *Money in Ptolemaic Egypt*, 229-31.

in Ptolemaic Egypt. They generated revenue through individual donations, rents and taxes on temple lands, and sales taxes on property transfers, as well as fees paid for the management of necropoleis, the mummification of bodies, and the production of byssos linen.[223] Temples maintained large staffs of priests with stipends in kind, Temple stipends included bread rations as well as other basic staples like beer, oil, and linen.[224] The state allowed temples to produce such goods—an exception to the state's commodity monopolies—but stipulated that they must be used for consumption rather than for sale.[225] The priests themselves could earn extra income through a variety of other mechanisms. These mechanisms included priests' leasing out temple positions and their stipends in exchange for regular payments in cash or other goods (a practice which grew even more common in the second and first centuries BCE), working as choachytes who performed ongoing rites for the dead through private funerary endowments, and selling scribal services—the income from such work was likely paid in money.[226]

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[223] Initially, the temples surveyed lands and collected harvest taxes directly, but over time, the state took over much of this process and gave a share of the tax revenue to the temples. The state likewise began to claim the revenues from sales taxes directly later in the period. Willy Clarysse, "The Archive of the Praktor Milon," in *Edfu, an Egyptian Provincial Capital in the Ptolemaic Period: Brussels, 3 September 2001*, eds. Katelijn Vandorpe and Willy Clarysse (Brussel: Koninklijke Vlaamse Academie van België voor Wetenschappen en Kunsten, 2003), 17-27, esp. 21; J. G. Manning, "Edfu as a Central Place in Ptolemaic History," in *Edfu, an Egyptian Provincial Capital in the Ptolemaic Period: Brussels, 3 September 2001*, eds. Katelijn Vandorpe and Willy Clarysse (Brussel: Koninklijke Vlaamse Academie van België voor Wetenschappen en Kunsten, 2003), 61-73, esp. 64-65; Muhs, *Ancient Egyptian Economy*, 255.
[224] Muhs, *Ancient Egyptian Economy*, 255.
[225] Ibid.
[226] Choachytes treated these mummies and tombs as income-generating assets, and as such they passed them down in wills and even bought and sold them. Ursula Kaplony-Heckel, "Rund um die thebanischen Tempel (Demotische Ostraka zur Pfründen-Wirtschaft)," in *Res severa verum gaudium: Festschrift für Karl-Theodor Zauzich zum 65. Geburtstag am 8. Juni 2004*, eds. F. Hoffmann and H. J. Thissen (Leuven: Peeters, 2004), 283-337; Brian Muhs, "Demotic Ostraca in Amsterdam," *Enchoria* 30 (2006/2007): 53-70, esp. 63-67; Muhs, *Ancient Egyptian Economy*, 255; P. W. Pestman, *The Archive of the Theban Choachytes (Second Century B.C.): A Survey of the Demotic and Greek Papyri Contained in the Archive* (Leuven: Peeters, 1993). Muhs, *Ancient Egyptian Economy*, 256-265; Carol A. Andrews, *Catalogue of Demotic Papyri in the British Museum IV: Ptolemaic Legal Texts from the Theban Area* (London: British Museum Publications, 1990), Text 14, 48-50, pl. 36; Brian P. Muhs, *Receipts, Scribes, and Collectors in Early Ptolemaic Thebes (O. Taxes 2)* (Leuven: Peeters, 2011), Text 156, 208-209. Cf. Depauw's

The fact that, in cities and villages with large temples, many men were being paid in kind may have led prices in these areas to differ from those in areas with more state employees, who were paid in cash. The ready supply of grain and other basic commodities to the priests could have influenced demand for these goods and therefore prices in turn. In particular, the fact that priests were receiving in their stipends steady supplies of those commodities under state monopolies likely impacted retail demand for these commodities, especially in cities and villages with large priestly populations like Thebes and Edfu. Retail supply may also have been affected, since priests could have sold their earnings to non-priests—an act that was technically illegal but clearly still occurred, as evidenced by the leases of priestly incomes cited above.

While the temples were productive and redistributive agents for these goods, each temple seems to have acted as a financially independent unit; I know of no evidence for temples' transferring grain from one to another. Thus the supply of goods generated by temples would have mainly been influential to the economy on a local level only.

4.4.7 Granaries and Banks

The state was able to redistribute grain throughout Egypt via networks of granaries, following a system the Ptolemies inherited from the Saites and Persians.[227] Grain collected through harvest taxes was gathered at a local granary (θησαυρός) within an individual village, and the state could then pay out that grain locally as the grain or bread portion of the salaries of officials, soldiers, and police, as loans for farmers in the area, or as grants made to local temples.[228] If a local

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discussion of the 2.5-qite tax on sales of houses and tombs, where 0.5 qite of the 2.5-kite tax is sometimes specified as being for the scribe. Mark Depauw, *The archive of Teos and Thabis from early Ptolemaic Thebes: P. Brux. Dem. Inv. E. 8252-8256* (Turnhout: Brepols, 2000).

[227] Muhs, *Ancient Egyptian Economy*, 245.

[228] Ibid., 245-46.

granary needed to pay out more grain than it had, grain could be transferred from another θησαυρός. On the other hand, if a local granary had more grain than it needed to pay out, the surplus would be shipped to the royal granary in Alexandria (if not needed at a nearby granary). At least in the Fayyum, the village granaries could often function as branches of a district granary (ἐργαστήριον).[229] Decisions about the distribution of grain were made by the provincial grain accountant (σιτολόγος).[230] Ultimately, then, the state could spread out the supply of grain based on demand. While this grain was produce from taxation rather than grain produced for sale on the market, this manipulation of the grain supply could have stabilized grain prices spatially. It is not unreasonable to expect, then, that grain prices might show less volatility—at least from place to place—than the prices of other commodities.

Beginning around 265 BCE in the reign of Ptolemy II, the state also developed a system of a royal banks (βασιλικαὶ τράπεζαι, *šḫn(.w) n Pr-ʿ3*) which redistributed money in parallel to the granaries for grain.[231] The origins of the banking system have been much debated. The administration of the state's banks showed many similarities to the contemporary and traditional Egyptian granary administration, as Preisigke noted already in 1910, so it is possible that the management of Egypt's grain resources served as an inspiration for the development of Ptolemaic

[229] Ruth Duttenhöffer, "Die Funktion und Stellung des ἐργαστήριον in der Getreideverwaltung der Ptolemäerzeit," *Zeitung für Papyrologie und Epigraphik* 98 (1993): 253-62.
[230] T. Reekmans and E. Van 't Dack, "A Bodleian Archive on Corn Transport," *Chronique d'Égypte* 27 (1952): 149-95; Katelijn Vandorpe, "Paying taxes to the thesauroi of the Pathyrites in a century of rebellion (186-88 BC)," in *Politics, administration and society in the Hellenistic and Roman world: Proceedings of the International Colloquium, Bertinoro 19-24 July 1997*, ed. Leon Mooren, Studia Hellenistica 36 (Leuven: Peeters, 2000), 405-36.
[231] Bogaert 1994, 4; Muhs, *Tax Receipts*, 22; Katelijn Vandorpe and Willy Clarysse, "Egyptian Bankers and Bank Receipts in Hellenistic and Early Roman Egypt," in *Pistoi dia tèn technèn: Bankers, Loans and Archives in the Ancient World: Studies in Honour of Raymond Bogaert*, ed. Koenraad Verboven, Katelijn Vandorpe, and Véronique Chankowski (Leuven: Peeters, 2008), 154.

banking.[232] As with the granaries, the banks formed a network. Individual villages maintained treasury or tax offices (λογευτήρια), where money taxes, such as the salt tax, were collected.[233] Although the λογευτήρια were only concerned with tax collection and therefore had limited functionality, they formed the foundation of the Ptolemaic banking system. These tax offices should be considered branches of the royal banks, as their directors were sometimes called bankers (τραπεζιταί) and subordinates of (ὁ παρά) the royal banker or director of the local bank.[234] Some villages also maintained local banks (each called the τράπεζα or *shn* of a given village),

[232] Money taxes were also collected in the Saite and Persian periods, namely customs duties paid to the state and sales and burial taxes paid to the temples. Although coins only became widespread under the Ptolemies, there was thus still a precedent for the collection and redistribution of coins in Egypt before Alexander's arrival. Nonetheless, many, including Préaux and Bingen, have assumed that banking could not be envisioned without coinage and therefore that the models for the Ptolemaic banking system must have had their origins in Greece, which adopted coinage earlier than in Egypt. Bogaert conceded that the Egyptians did use some coins before the Ptolemaic period began, but even in making that concession he demonstrated the necessary connection he, too, drew between banking and coins. Despite his acknowledgement of the occurrence of coins in Egypt before Alexander, Bogaert still stated simply: "Je crois que la banque est un exemple frappant de ce que l'Égypte doit à la Grèce." Instead of this straightforward view of banks as an Egyptian debt to the Greeks, in light of the way the Ptolemies developed their other institutions, it might be more plausible to envision the banks as another example of the Ptolemaic state's adoption of existing structures and adaptation of those structures to its own needs and to existing Greek institutions, like coinage. Friedrich Preisigke, *Girowesen im griechischen Ägypten, enthaltend Korngiro Geldgiro Girobanknotariat mit Einschluss des Archivwesens: Ein Beitrag zur Geschichte des Verwaltungsdienstes im Altertume* (Strassburg im Elsass: Verlag von Schlesier & Schweikhardt, 1910); Muhs, *Ancient Egyptian Economy*, 246-47; Claire Préaux, "De la Grèce classique à l'Égypte hellénistique: la banque-témoin," *Chronique d'Égypte* 33 (1958): 243-55; Jean Bingen, *Hellenistic Egypt: Monarchy, Society, Economy, Culture* (Berkeley: University of California Press, 2007), 183-84 ; Raymond Bogaert, "Les modèles des banques ptolémaïques," in *Egypt and the Hellenistic World, Proceedings of the International Colloquium, Leuven 24-26 May 1982*, eds. E. van 't Dack, P. van Dessel, and W. van Gucht, Studia Hellenistica 27 (Lovanii: Orientaliste, 1983), 13-29, reprinted in Raymond Bogaert, *Trapezitica Aegyptiaca: Recueil de recherches sur la banque en Égypte gréco-romaine*, Papyrologica Florentina 25 (Firenze: Edizioni Gonnelli, 1994), 33-45. Brian Muhs, "Egyptian and Greek Banking Traditions in Ptolemaic Egypt," paper given at the 62nd Annual Meeting of the American Research Center in Egypt (Chicago, 1-3 April, 2011); Brian Muhs, "The Institutional Models for Ptolemaic Banks and Granaries," paper presented at the 12th International Congress for Demotic Studies (Würzburg, September 2014). See also Brian Muhs' forthcoming paper on the topic in *Ancient Society* (forthcoming, 2018).

[233] Muhs, *Ancient Egyptian Economy*, 246-47.

[234] Ibid., 248; Karolien Geens, "Financial Archives of Graeco-Roman Egypt," in *Pistoi dia tèn technèn: Bankers, Loans and Archives in the Ancient World: Studies in Honour of Raymond Bogaert*, ed. Koenraad Verboven, Katelijn Vandorpe, and Véronique Chankowski (Leuven: Peeters, 2008), 133, 139-40.

which were also branches of the royal bank but with a wider range of functions than the λογευτήρια.[235] These village banks were subordinate to banks in the nome centers, also called τράπεζαι.[236] The nomes' royal bankers were subordinate to the nome's οἰκονόμος, who in turn answered to the διοικητής, Egypt's chief financial manager in Alexandria.[237] The hierarchy of bankers as a specific category of personnel thus only rose within the nome, since the nome's οἰκονόμος and Alexandria's διοικητής were responsible for far more than just banking: there was no one chief officer in charge of managing Egypt's banking system.[238] As von Reden has noted, even at the local level, the relationship between the banks and the central administration is unclear, since a village banker would have been answerable both to the banker of the nome and to the superior administrative officials in the village, at least in theory.[239] In any case, although Ptolemaic Egypt had a state-run banking system, this was not an institution analogous to the Federal Reserve; there was no central banker manipulating monetary policy to "promote the health of the economy" writ large for the broader public interest.[240] The Ptolemaic royal bank did not develop or maintain a general fiscal policy or manipulate credit to strengthen the Egyptian economy overall.

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[235] Jozef Vergote, "DÉM. *sḫn* : τράπεζα « BANQUE »," in *Mélanges Adolphe Gutbub* (Montpellier: Université de Montpellier, 1984), 231-32; Jozef Vergote, "Bilinguisme et calques (translation loan-words) en Égypte," in *Atti del XVII Congresso Internazionale di Papirologia (Napoli, 19-26 maggio 1983)*, vol. 3, (Napoli: Centro Internazionale per lo Studio dei Papiri Ercolanesi, 1984), 1385-89, esp. 1389; Bogaert, "Les modèles des banques ptolémaïques," (reprint) 24-26.
[236] von Reden, *Money in Ptolemaic Egypt*, 258.
[237] Hans-Albert Rupprecht, *Kleine Einführung in die Papyruskunde* (Darmstadt: Wissenschaftliche Buchgesellschaft, 1994), 72ff; Geens, "Financial Archives of Graeco-Roman Egypt," 133-34; von Reden, *Money in Ptolemaic Egypt*, 253.
[238] von Reden, *Money in Ptolemaic Egypt*, 255, who cites Bogaert generally for this point but does not provide a specific reference.
[239] Ibid., 255.
[240] For comparison, see the Federal Reserve's "Overview of the Federal Reserve System," < https://www.federalreserve.gov/aboutthefed/files/pf_1.pdf> (accessed February 11, 2018).

Rather, those in the royal banking system were more concerned with monetary record-keeping than manipulation of the broader economy. The royal banking system primarily functioned to gather revenues collected in money and to pay the state's expenses from those funds. At each branch, bankers were responsible for keeping track of the funds deposited and withdrawn from the bank.[241] Bankers accepted deposits in the form of revenue from taxes, state monopolies, rents on royal land, penalty payments, priestly dues, sales of royal produce, and any other irregular payment that an individual or institution owed the state.[242] They received orders from superior officials in the state bureaucracy, most often the οἰκονόμος, to make payments from the state to various parties, especially as wages for soldiers and other state officials and payments to those involved in the state's monopolies.[243] Other payments included travel expenses for those employees, grain purchases, spending on public works, spending on cult activities and feasts, and repairs to state-funded infrastructure like the dyke system.[244] Bankers took action based on specific orders or instructions from their superiors; they were not following any general budgets or spending policies.[245] This lack of overarching budgets highlights once again the flexibility and responsiveness of the Ptolemaic economic system. Officials would have been able to make adjustments to their offices' spending according to changing conditions. Prices thus may have been more stable with the greater presence of banks.

Still, one macroeconomic concern that did apply to ancient banks was the spread of monetization. Von Reden has convincingly argued that, in addition to collecting revenues and making payments, the royal banking system served to increase the circulation of money by making

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[241] For an example of the duties of an assistant banker, see P. Fuad Crawford 3, in Bagnall and Derow, *The Hellenistic World*, Text 84; Geens, "Financial Archives of Graeco-Roman Egypt," 139-40.
[242] von Reden, *Money in Ptolemaic Egypt,* 273.
[243] For more on royal monopolies, see below in this chapter.
[244] von Reden, *Money in Ptolemaic Egypt*, 273, 279.
[245] Ibid., 255.

cashless transactions more efficient and enforceable through its record-keeping operations. The Revenue Laws papyrus (259 BCE) provides a useful example of just such a cashless, ledger-based transaction:[246]

[...]ς συναγομ[εν . . . . .] παρεχέτω [κέραμον] τ[ῶι ἀ]ποδοχίωι καὶ κ[η]ρόν ἔστω δὲ ὁ κέρ[α]μος κεράμια στέγνα, [διασκο]πούμενα, ἱκανὰ τῶι συνα[γομένωι ὑπὲρ τῆς] ὠνῆς. Ὁ δὲ οἰκονόμος καὶ ὁ ἀντιγραφεύς, πρό[τερον ἢ] τρυγᾶν τοὺς γεωργοὺς ἔμπροσθεν [ἡμέραις .], δότωσαν τοῖς γεωργοῖς τιμὴν τοῦ [κερά]μου ὃ[ν] δεῖ ἕκαστον παρασχεῖν εἰς τὴν ἀπόμ[οιρα]ν τῶ[ν] ἰδίων γενημάτων, τὴν συνταχθε[ῖσαν] ὑπὸ τοῦ ἐπὶ τῆς διοικήσεως τεταγμ[ένου], καὶ δ[ι]αγραψάτω τὴν τιμὴν [[τοῖς]] διὰ τῆς τ[ρ]απ[έ ζ]ης τῆς βασιλικῆς τῆς ἐν τῶι νομῶι. [Ὁ] δὲ γε[ωργ]ός, λαβὼν τὴν τιμήν, παρε[χ]έτω κ[έρα]μον ἄρ[ι]στον. [Ἐ]ὰν δὲ μὴ δοθῆι αὐτῶι [ἡ] τ[ι]μή τὸμ [μὲν] κέραμον παρεχέτω, κομιζέσθω δὲ ἀπὸ [τῆς] ἀπομ[οίρας] ἧς δεῖ αὐτὸν [ἀ]ποδοῦναι τὴν τιμήν, λ[αμβάνων τιμὴν τοῦ] οἴνου το[ῦ] (ὀκτά)χο(υ) [με(τρητοῦ) δραχμὰς)]	[… the cultivator] shall supply [pottery] for the storehouse, as well as sealing wax. The pottery shall consist of waterproof jars that have been examined(?)[247] and which are adequate [for the] wine being collected. [… days] before the cultivators gather the crops, the οἰκονόμος and the ἀντιγραφεύς shall give to the cultivators the price of the pottery which each has to supply for the apomoira upon his own produce; the price shall be assessed by the one appointed as the dioiketes, and he shall write an order for the price (to the οἰκονόμος and ἀντιγραφεύς) through the royal bank in the nome; the cultivator, on receiving the price, shall supply the best-quality pottery. If the price is not given to him, he shall still supply the pottery, but he shall receive the price (of the pottery) out of the apomoira that he has to pay, r[eceiving a price for the] wine of [… drachmas] per 8-chous [metretes].

This text is discussing the apomoira, a tax on the produce of vineyards and orchards that could be paid either in kind or in coins. P. Rev. discusses how the οἰκονόμος was responsible for setting up storehouses in each village for the wine collected for the apomoira. Since the cultivators naturally

[246] P. Rev., 32/1-20. The Greek presented here is primarily from Jean Bingen, *Sammelbuch Griechischer Urkunden aus Ägypten, Beihaft 1: Papyrus Revenue Laws*, ed. Emil Kiessling (Göttingen: Hubert & Co., 1952), 12, except where noted.

[247] This translation is admittedly unsatisfactory. Bingen's restoration of [πισσοκο]πούμενα would suggest "which have been smeared with pitch" (from πισσοκοπέω, LSJ 1407b). Although smearing a jar with pitch would indeed render it waterproof, presumably doing so could affect the taste and safety of the wine contained. Alternatively, Wilcken restored this word as [διασκο]πουμενα (DLZ 1897, p. 1019, n. 1), which could be translated "which have been examined" (from διασκοπέω, LSJ 412a). I have adopted this restoration here. Bagnall and Derow seem to have followed this restoration (in *The Hellenistic World*, p. 186), where they translate the word as "which have been tested." In any case, the point seems to be that the jars need to be sufficiently waterproof to be able to reliably hold wine.

could not bring just the wine itself, but needed to carry that wine in a container, the state (in the persons of the οἰκονόμος and the ἀντιγραφεύς) would give the cultivators money (presumably coins) upfront to buy or produce the necessary pottery for transporting the wine to pay the tax. These officials would obtain the necessary money to pay the cultivators through an order at the royal bank. If for whatever reason a cultivator had not been given the money for the pottery ahead of when his tax was due, he still had to pay the tax, so in that case he would have to supply the necessary pottery out of his own funds. When he paid the tax, the state still owed him for the cost of the pottery. At this point, the use of money becomes quite interesting: the banker to whom he paid the tax would deduct the cost of the pottery from his tax liability.

In this case, the transaction in which the state paid the cultivator for the pottery was cashless and existed entirely in the form of the banker's records.[248] Here it is evident that banks had the ability to streamline the processing of transactions involving money, a crucial function especially at times when physical coins may have been scarce.[249] Banks could therefore increase the quantity of money above the volume of available coins; it is technically possible that this increase in the availability of money could have been inflationary, but more likely that it actually served as a palliative for a chronic lack of liquidity. In addition, the fixed price given for wine (unfortunately in a lacuna at the end of the excerpted portion of the text) allowed the banker to convert between what the cultivator owed the state in wine and what the state owed the cultivator in coined money. Thus banks could further streamline transactions involving multiple media of exchange by converting these into one standard unit of account as the case required. This unit of

[248] For many more examples of similar cashless transactions between the state and individuals facilitated by royal banks, see von Reden, *Money in Ptolemaic Egypt*, 273-79.
[249] Since the cultivator could pay his apomoira liability in kind or in coins, the fact that the cultivators in question here would clearly have been paying in kind, despite having not received their payment for the pottery, might indicate that coins were more cumbersome to acquire in cases like this one at this time.

account, based in records rather than tangible reality, served as the form of 'money' that essentially embodied debts owed from one party to another (in this case, between the state and the cultivator).[250] The establishment of this banking system created the conditions of possibility for a greater volume of transactions, greater efficiency of those transactions based on changing monetary circumstances, and greater security and predictability of those transactions, all via reliable, efficient record-keeping operations. While the increase in the availability of money driven by banks might seem as though it would be an inflationary factor, the way that banks were able to decrease transaction costs likely counteracted this potential rise in prices – I therefore expect that banks would have helped prices not only to stabilize but also to reach lower levels.

These banking capabilities were not limited to the state's transactions; the royal banks also managed private accounts and could provide financial services to private individuals. The distinction between public and private funds held in the banks is, however, difficult to unravel. Von Reden has emphasized this blurriness, in part through the example of Zenon and Apollonios, who regularly mixed their salaries and the state's funds entrusted to them into one pool of money that they used to conduct various business operations, without a clear dividing line between 'state' and 'private' money.[251] The state itself maintained multiple accounts named according to the office or general purpose of the funds it contained and under the control of the official in charge of that particular institution or project (although, as von Reden has noted, in practice funds could easily be transferred from state accounts that ran a surplus to those with a deficit).[252] If each of

[250] If I may take this debt/credit theory of money even further, perhaps it is not unreasonable to say that coins were ultimately placeholders for debt, and that therefore the use of money as a unit of account had precedence over the use of coined money as a medium of exchange, since the unit of account could thus also function as a medium of exchange.
[251] von Reden, *Money in Ptolemaic Egypt*, 275-78, 282-86.
[252] Ibid., 277.

these officials managed his money as Apollonios did, then there may have been quite a tangle of official and private funds within many accounts within the network of royal banks.

At times royal banks could serve as credit institutions. There is evidence that royal bankers at times made personal loans from the state's accounts in their charge, without collateral, to individuals they knew in exchange for favors; they did not limit themselves to making withdrawals based on official orders.[253] Still, such loans seem to have been quite exceptional, and their impact on economic life for the vast majority of the population was minimal. There is also evidence of a few loans made by royal banks to finance business activities. Von Reden has argued that the very low number of loans made by royal banks towards private commercial activity does not necessarily mean that such loans were rare, but still, these loans likely "played no particular role vis-à-vis other credit facilities open to individuals."[254] This evidence of credit—an increase in the money supply—was still probably too limited and minimal to have caused real inflationary effects.

On the contrary, banks may have even brought prices down by making transactions easier and more secure. Royal banks aided in the management of payments for their non-state account-holders, just as they did for state accounts. For example, private contractors who bought the right to the profits from the state's oil monopoly, discussed below, held individual accounts at royal banks. According to P. Rev., the state agents who actually sold the oil would deposit the revenue thus generated into the contractor's account, simultaneously debiting the account for the cost of transporting the oil.[255] The royal banks thus facilitated payments to and from their account-holders, regardless of whether the account-holders were salaried state employees. Moreover, as in

[253] For more detail and discussion of an example of such a loan based on evidence in a series of letters in the Zenon archive, see von Reden, *Money in Ptolemaic Egypt*, 283-86.
[254] Ibid., 286.
[255] P. Rev., 48/10-12.

the example of the pottery associated with payment of the apomoira discussed above (in which case the cultivators did not hold accounts at the bank), the payments related to the oil monopoly show how the royal banks made transactions more efficient. With one order, the state could both pay the contractor and have the contractor pay the state back for transportation costs. While the bank would have to keep track of both this credit and debit on the contractor's account as two separate transactions, for the individuals directly involved in the oil monopoly, the simultaneity of the transactions effectively condensed them into one.

The geographic distribution of the banks within this system was uneven and almost always in flux. Due to banks' practice of facilitating payments, it is possible that the supply of money (and, by extension, prices) would have been steadier in those areas that were better served by banks, so it is useful to keep the unevenness of this distribution in mind. Von Reden, following Bogaert, has compiled a very useful list of banks by region over time, but as she notes, the apparent dearth of banks in the Delta is likely due to the fact that very few texts survive from this region.[256] The Fayyum seems to have had an exceptionally high number of banks, which von Reden suggests may have been due to its higher population, its more urbanized settlement patterns, its greater number of administrative subdivisions for taxation, or the state's greater involvement in the financial management of the region.[257] In Middle and Lower Egypt, at least in theory, banks were organized with one main royal bank in each metropolis (or nome center), which was fed by a τράπεζα or λογευτήριον in each toparchy, an administrative subdivision of the nome.[258] In Upper Egypt the banks seem to have been more centralized in the major cities,

[256] Raymond Bogaert, "Liste géographique des banques et des banquiers de l'Égypte ptolémaïque," *Zeitschrift für Papyrologie und Epigraphik* 120 (1998): 165-202; von Reden, *Money in Ptolemaic Egypt*, 258-68.
[257] von Reden, *Money in Ptolemaic Egypt,* 262.
[258] Ibid.

with few branches in the smaller villages.[259] The Thebaid thus had fewer banks than elsewhere in Egypt, but not because it was processing less cash, so perhaps individual bankers in this region simply had control over more money than the more subdivided resources of bankers to the north. Bogaert has noted that one banker could even have managed multiple banks in different districts.[260] It seems possible that the more control one banker had over the money supply, the more susceptible that money supply would be to manipulation at the hands of that individual.

The distribution of banks in Egypt also varied over time. According to von Reden, in the Thebaid, most banks seem to have been established later, in the second and first centuries BCE, perhaps because the state was aiming for greater control of that region after the instability of the late third and early second centuries.[261] Vandorpe and Clarysse have likewise emphasized that during times of political instability, the royal banks and granaries may not have functioned, as records for their activities, at least, have not survived. For example, before the Great Revolt, there were royal banks in Thebes, Edfu, Arsinoe, and Syene, but all of these seem to have ceased functioning during the two decades of the revolt (207-186 BCE), when the central administration was unable to collect taxes in the region.[262] Afterward, banks and granaries were reestablished in Thebes, as was the bank in Syene, and a new bank and granary are attested in Hermonthis.[263] The reestablishment of state control after times of unrest led not only to rebuilding what had existed

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[259] Ibid., 263.
[260] Bogaert, "Liste géographique des banques et des banquiers de l'Égypte ptolémaïque," 166, 187-92.
[261] von Reden, *Money in Ptolemaic Egypt,* 259-62.
[262] Katelijn Vandorpe and Willy Clarysse, "Egyptian Bankers and Bank Receipts in Hellenistic and Early Roman Egypt," in *Pistoi dia tèn technèn: Bankers, Loans and Archives in the Ancient World: Studies in Honour of Raymond Bogaert*, ed. Koenraad Verboven, Katelijn Vandorpe, and Véronique Chankowski (Leuven: Peeters, 2008), 159; Vandorpe, "The Ptolemaic epigraphe or harvest tax (*shemu*)," 177; Bogaert, "Liste géographique des banques et des banquiers de l'Égypte ptolémaïque," 188-89.
[263] Katelijn Vandorpe, "Paying Taxes to the Thesauroi of the Pathyrites in a Century of Rebellion (186-88 BC)," in *Politics, Administration and Society in the Hellenistic and Roman World: Proceedings of the International Colloquium, Bertinoro 19-24 July 1997*, Studia Hellenistica 36, ed. by Leon Mooren (Leuven: Peeters, 2000), 405-36; Vandorpe, "The Ptolemaic epigraphe or harvest tax (*shemu*)," 177; Bogaert, "Liste géographique des banques et des banquiers de l'Égypte ptolémaïque," 188-93.

before but even to the construction of new banks and granaries, as Vandorpe and Clarysse have reasoned.[264]

Outside of the system of state-run royal banks, the Ptolemaic state leased out the right to change money to concessionary banks, also known in the scholarship as "farmed" or "monopoly" banks (and in the papyri usually called simply τράπεζαι, which makes them difficult to distinguish from royal banks).[265] Bogaert wrote that "il est certain qu'il y avait des rapports entre les banques affermées et les βασιλικαὶ τράπεζαι," and the functions of the two certainly overlapped, but he acknowledged that the exact connection between the two remained lost in P. Rev.'s lacunae and that any link remains unclear.[266] The concessionary banks seem to have been established in the reign of Ptolemy II as he expanded the minting of bronze coins. They thrived for several decades, since the state required that certain taxes be paid in silver as opposed to bronze coins and money-changing was therefore a necessary service.[267] Anyone who went to a concessionary bank to exchange his bronze coins for silver ones had to pay a 10% fee (ἀλλαγή) on the silver, and the concessionary banks were allowed to make these exchanges and therefore collect these fees.[268] A concessionary banker could thus be understood in a similar light to a tax farmer, discussed below, since in both forms of farming contracts, an individual could create a profit-generating business through a contract with the state. The rate of the exchange fee a banker could charge was fixed by the state at 10%, but the volume of exchanges he could process would presumably vary based on demand. The banker made a bid to the state for the right to conduct

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[264] Vandorpe and Clarysse, "Egyptian Bankers and Bank Receipts in Hellenistic and Early Roman Egypt," 159 and references there.
[265] Raymond Bogaert, "Les banques affermées ptolémaïques," *Historia: Zeitschrift für Alte Geschichte* 33.2 (1984): 181-98; von Reden, *Money in Ptolemaic Egypt*, 258-59.
[266] Bogaert, "Les banques affermées ptolémaïques," 189-91; von Reden, *Money in Ptolemaic Egypt*, 254.
[267] Muhs, *Ancient Egyptian Economy*, 248.
[268] Bogaert, "Les banques affermées ptolémaïques," 181-98; von Reden, *Money in Ptolemaic Egypt*, 253.

this service and collect the fees, hoping that the demand for money-changing would be greater than his bid – he would profit the excess. Demand for currency exchange, and in turn the banker's profits, were dependent to a large extent on the state's monetary policies, i.e., potential clients' need to exchange coins. As the state's policies regarding currency were variable, an attempt to make a profit through a banking concession would have been quite risky in the long term.

Around 210 BCE, Ptolemy IV shifted his monetary policy from the silver to the bronze standard and eliminated the official ἀλλαγή fee on exchanging bronze for silver coins. The end of the ἀλλαγή effectively eliminated the potential profits to be made in running concessionary banks, which cease to be attested after this time.[269] In the late third century, however, new money-changing banks (κολλυβιστικαὶ τράπεζαι) began to exchange coins for a fee, but now without a state concession and probably without official state policies regarding that fee.[270] State regulation of the exchange rates for these transactions remains uncertain.[271] The money-changing banks likely eventually developed into private banks (ἰδιωτικαὶ τράπεζαι), first attested in Oxyrhynchos in the first century BCE.[272]

The concessionary banks, money-changing banks, and private banks provided more services than just money-changing.[273] For one, they issued loans, likely more frequently than did the royal banks, for which the evidence of loans is very limited. However, while the loans that were made at royal banks did not require any security (other than the social connection between

[269] Bogaert, "Les banques affermées ptolémaïques," 185-86, 194-98; Muhs, *Ancient Egyptian Economy*, 248; von Reden, *Money in Ptolemaic Egypt*, 253-54.
[270] von Reden, *Money in Ptolemaic Egypt*, 254.
[271] Bogaert, "Les banques affermées ptolémaïques," 184.
[272] Ibid., 195; von Reden, *Money in Ptolemaic Egypt*, 254.
[273] Raymond Bogaert, "Les banques affermées ptolémaïques," *Historia: Zeitschrift für Alte Geschichte* 33.2 (1984): 181-98; Bogaert, "Liste géographique des banques et des banquiers de l'Égypte ptolémaïque," 169-70; Raymond Bogaert, "Les opérations des banques de l'Égypte ptolémaïque," *Ancient Society* 29 (1998-1999): 49-149, esp. 124-28; Muhs, *Ancient Egyptian Economy*, 248

borrower and lender), concessionary bankers did require security, in the form of land or personal valuables, for the loans they issued.[274] As von Reden has pointed out, therefore, these loans, unlike unsecured loans, did not increase the real supply of available money, since the value was still tied to the land or object that was used for security rather than being created out of mere trust.[275] There was no creation of value out of nothing; rather a simple exchange of forms of value—liquidity might be created in a secured loan, but not new value, not a change in the *quantity* of the real supply of money but rather in its *form* and degree of *liquidity*.[276] Nonetheless, an individual who wanted or needed a loan but who did not have the necessary clout or to obtain a loan at a royal bank might have had the privately managed banks to turn to as a real alternative. Based on evidence in the Zenon archive, von Reden has argued that in all cases, a potential borrower still would have needed to be an account-holder at the bank and to have some sort of personal relationship with the banker. She writes that banks "do not appear as anonymous credit institutions offering loans as a matter of routine to anybody who could provide sufficient warranty."[277] A loan also created or added to the reciprocal nature of the social bond between lender and borrower; the lender had essentially done the borrower a favor that was expected to be repaid. Thus, von Reden continues, bank loans did not play a major role in the financial life of the

[274] Geens, "Financial Archives of Graeco-Roman Egypt," 134, n. 4.
[275] von Reden, *Money in Ptolemaic Egypt*, 287.
[276] An unsecured loan is fundamentally different from a loan based on collateral because unsecured loans create value. For example, if I borrow $1000 and secure that debt with my laptop (worth $1000) and which can be seized if I do not pay back the loan, I am essentially conducting a hypothetical exchange (my laptop for $1000) which I hope will not take place. There is no value creation but rather exchange. However, if I borrow $1000 without securing the debt and then do not pay it back, I essentially just got $1000 out of nothing.
[277] von Reden, *Money in Ptolemaic Egypt*, 288.

majority of people. Moreover, banks were likely limited in their cash reserves, and therefore their lending capacity was similarly limited.[278]

These banks held accounts for private individuals, who could make deposits and withdrawals as they wished. The accounts were not interest-bearing and thus did not aid in the production of wealth, but they did provide clients with a measure of security for their money, perhaps more than they would have if simply storing that money at home.[279] Perhaps most importantly, the privately-managed banks facilitated transactions for their clients by keeping track of the various parties' funds and making payments from their accounts.[280] Just as state officials could issue orders to royal bankers to make payments from the relevant official accounts, account-holders at privately managed banks could issue payment orders (χρηματισμοί), addressed to private bankers.[281] These payment orders were used in a few different ways. Most simply, the account holder (i.e., the payer) could send the payment order directly to the banker, usually having sealed the order and having written the name of the banker on the outside of the sealed packet. This payer could then tell the payee to go to the bank to get his money, or the banker could inform the payee accordingly via a credit note.[282] Alternatively, the payer and payee could go to the bank together in person, where the payee would present the payment order to the banker, who would then give the payee his money.[283]

Another method of payment is evident in a set of payment orders addressed to the banker Hephaistion now in Berlin (from the Herakleopolite nome and dating to 83-82 BCE); these texts

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[278] Ibid., 289.
[279] Bogaert, "Les opérations des banques de l'Égypte ptolémaïque," 124.
[280] Muhs, *Ancient Egyptian Economy*, 248.
[281] Geens, "Financial Archives of Graeco-Roman Egypt," 142.
[282] Raymond Bogaert in Roger Bagnall and Raymond Bogaert, "Orders for Payment from a Banker's Archive: Papyri in the Collection of Florida State University," *Ancient Society* 6 (1975): 79-108, esp. 102-103 and textual references there.
[283] Bogaert in Bagnall and Bogaert, "Orders for Payment from a Banker's Archive," 103.

fall outside the chronological scope of the present study, but after 210 BCE, money-changing banks may have begun performing these tasks on their way to becoming private banks in the first century BCE. In these texts, the payer seems to have given the payment order, addressed to the banker, to the payee, who would then take the order to the bank himself to receive the funds he was owed.[284] The amounts of the payments were given twice—once written out in words and once with the numeral—to prevent fraud or misreadings. Bogaert called these payment orders given directly to payees "checks." Significantly, he noted that "it is beyond doubt that a payee could accept a check in payment only when he knew the payer and trusted him; the payer might be a member of the family, a friend, or an official," since obviously a check had the potential to be worthless.[285] The banker in turn had to know the payee, so he could ensure he was paying the correct person named on the check, and the checks generally do not provide physical descriptions of the parties involved in the transaction.[286] The efforts made to reduce fraud, such as writing the payment amount two different ways, did add security to these transactions, but the deeper social bonds among the various parties in these transactions, who must have known and trusted each other, presumably secured those transactions more than any textual formulae could.

Texts now in Florida addressed to the banker Protarchos and his successor Apollonios (also from the Herakleopolite nome, dating to 87-84 BCE) indicate that another layer of security could be added to payments made through banks.[287] In these texts, the payer still gave the check to the payee, but he also sent a second check—including the name of the payee and the amount of the payment—directly to the banker as a control to prevent any tampering with that payment

[284] Ibid.; Geens, "Financial Archives of Graeco-Roman Egypt," 142-43.
[285] Bogaert in Bagnall and Bogaert, "Orders for Payment from a Banker's Archive," 105.
[286] Ibid.
[287] As discussed above, these texts are outside the chronological scope of the present study but might reflect the acts of money-changing banks earlier in the Ptolemaic period.

order.[288] These checks would then be stored in the banker's archives.[289] Bogaert hypothesized that the Florida papyri, unlike those in Berlin, "n'étaient pas de réels instruments de paiement, mais des billets de contrôle," and were therefore not "réels chèques."[290] The first century BCE was a period of transition for the Egyptian banking system, in which bankers and their clients seem to have been experimenting with different formulas in the texts and different transactional modes. The experimentation aimed at making transactions easier and more secure, therefore lowering transaction costs. Bogaert noted that the payments recorded in the Florida checks were "for the most part of a rather humble order, showing that these payment-orders were used for payments of even the smallest sizes," which indicates that perhaps the benefits of these reduced transaction costs did not accrue only to the very wealthy.[291] Alternatively, the low payment amounts could indicate that even small payments were considered worth securing, regardless of the degree of wealth of the parties involved.

There is evidence from the early Roman period, in the reign of Tiberius, of private bankers' issuing payments via transfer, i.e., directly from one client's account to another client's account, but I know of no such transfers from the Ptolemaic period.[292] Thus the payments facilitated by Ptolemaic private banks likely still involved actual coins; no matter the extent of the documentation of the transactions, there were not transactions made only 'on paper.' In that respect, then, private banks did not have the full functionality of royal banks, which were able to

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[288] Bogaert in Bagnall and Bogaert, "Orders for Payment from a Banker's Archive," 105-106; Raymond Bogaert, "Note sur l'emploi du chèque dans l'Égypte ptolémaïque," *Chronique d'Égypte* 58 (1983): 212-21, esp. 216-218; Raymond Bogaert, "Les documents bancaires de l'Égypte gréco-romaine," *Ancient Society* 31 (2001): 173-288, esp. 209-10; Geens, "Financial Archives of Graeco-Roman Egypt," 142-43.
[289] Bogaert, "Note sur l'emploi du chèque dans l'Égypte ptolémaïque," 213-14.
[290] Ibid., 214, 216.
[291] Bogaert in Bagnall and Bogeart, "Orders for Payment from a Banker's Archive," 93.
[292] George M. Parássoglou, "A Canceled Order on a Bank," *Bulletin of the American Society of Papryologists* 8.1 (1971): 11-14.

transfer funds from one account to another, in the case of the state's various accounts, and which could also tabulate various payments against each other, as was the case in the example of the pottery involved in apomoira payments in P. Rev. discussed above.

Ptolemaic banks, whether managed by state officials or individuals acting in a private capacity, made transacting business in Ptolemaic Egypt easier and potentially cheaper, at least for some. While everyone would have had some contact with the banking system when he paid his taxes, the proportion of the population that actually held bank accounts is uncertain but probably rather low. Essentially all the documentation on banking exists in Greek rather than Demotic. The banks were not distributed evenly around Egypt, and there were more banks in Greek-speaking areas, so it is reasonable to assume that Greek-speakers had greater access to the services banks offered. Certain of those services, such as lending, depended on personal acquaintances and relationships that necessarily excluded many. For those who could make use of them, banks seem to have been very beneficial, but the reach of the banking system should not be overestimated. Ultimately, areas with greater access to banks may have had prices that were more stable, since they had greater access to money (both physical and in alternative forms). These prices also may have been lower, since banks smoothed transactions and lowered the risk of enterprise.

4.4.8 Monetization and the Money Supply

The credit and accounting systems banks facilitated were especially useful in Ptolemaic Egypt, since this was a society in which the money supply was not always adequate. Economists typically define 'money' by its many functions; most prominent among these functions are that it can serve as a unit of account, a medium of exchange, and a store of wealth. Since the prices analyzed in this dissertation have been tabulated from written texts, a deep understanding of

Ptolemaic units of account is crucial, and Chapter 5 is dedicated to elucidating their complex history. These units of exchange did have a relationship to physical media of exchange and stores of wealth, and the people of Ptolemaic Egypt made conscious choices about which sorts of money to spend and which to save based on the monetary changes that occurred throughout the period. At times, the state's monetary policies inhibited such choices by regulating which forms of money were allowed to circulate legally. Shifts in the money supply, coupled with the Ptolemies' dynamic relationship to the production and regulation of money, likely played a role in price fluctuations.

The Ptolemies introduced systematized coinage to Egypt for the first time (a process generally referred to as 'monetization'), but other forms of money continued to exist alongside coins. Grain, including wheat, emmer, barley, and vetch could be stored in granaries as wealth and sold or traded when necessary. Grain was used as a medium of exchange in certain types of transactions, such as the payment of most harvest taxes.[293] Temples usually paid their employees in kind, as did the state on occasion. Moreover, metals, including those made into jewelry and coins, were hoarded as stores of wealth, and weighed pieces of metal circulated for the purpose of exchange. As the demand for coins was unable to keep up with the supply, even though the volume of coins did increase over the course of the period, credit also became crucial as a means of exchange.

It is also worth noting that coins were present in Egypt before the Ptolemaic period. By the late 6th century BCE at least until the conquest of Alexander, coins were used along with other bits of metal known as Hacksilber, metal used by weight as a medium of exchange and store of

[293] Muhs, *Ancient Egyptian Economy*, 242; see also Sitta von Reden, who has argued that since grain was also intended for consumption, we should avoid viewing grain paid out for salaries as a medium of exchange: Sitta von Reden, "The Politics of Monetization in Third-Century BC Egypt," in *Money and its Uses in the Ancient Greek World*, eds. Andrew Meadows and Kirsty Shipton (Oxford: Oxford University Press, 2001), 65-76, esp. 73.

wealth.[294] On Elephantine, shekels and imitations of Athenian tetradrachms circulated within an Aramaic military district in the 5th century BCE.[295] Buttrey has argued that Athenian-style tetradrachms may have been minted in Memphis as early as the late 5th century BCE, although a 4th century date is perhaps more likely.[296] Pseudo-Athenian tetradrachms were more certainly minted within Egypt beginning in the late 340s BCE.[297] It is very possible that these coins were used in transactions with the Greek-speaking world, namely for paying mercenaries and for interregional trade conducted by satraps and temple officials.[298] Some fractional coins modeled on Athenian types include the legend NAY, which probably indicates an association with Naucratis, a city in the Delta with strong links to trade with Greeks.[299] Other types include the Egyptian legend *wꜣḥ* (meaning "enduring") in hieroglyphs: a legend that demonstrates that these coins were handled to a certain extent by Egyptians.[300] The *wꜣḥ*-coins were very small, with weights about

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[294] J. G. Milne, "Trade between Greece and Egypt before Alexander the Great," *Journal of Egyptian Archaeology* 25.2 (1939): 177-83; Joachim Höltz, *Kritik der Geldentstehungstheorien: Carl Menger, Wilhelm Gerloff, und eine Untersuchung über die Entstehung des Geldes im alten Ägypten und Mesopotamien* (Berlin: Reimer, 1984), 127-30; H. C. Noeske, "Prämonetäre Wertmasser und Münzfunde aus Elephantine," *Mitteilungen des Deutschen Archäologisches Institut in Kairo* 49 (1993): 203-209; Peter van Alfen, "Herodotus' 'Aryandic' Silver and Bullion Use in Persian-Period Egypt," *American Journal of Numismatics* 16-17 (2004-2005): 7-46; Muhs, *Ancient Egyptian Economy*, 196-200.

[295] P. Naster, "*Karsha* et *sheqel* dans les documents araméens d'Élephantine (Ve siècle avant J.-C.)," *Revue Belge de Numismatique* 116 (1970): 31-35; Hélène Nicolet-Pierre, "Les monnaies des deux derniers satraps d'Egypte avant la conquête d'Alexandre," in *Greek Numismatics and Archaeology: Essays in Honour of Margaret Thompson*, ed. Otto Mørkholm and Nancy M. Waggoner (Wetteren: NR, 1979), 221-30.

[296] T. V. Buttrey, "Pharaonic imitations of Athenian tetradrachms," in *Actes du 9ème Congrès International de Numismatique, Berne, septembre 1979*, eds. Tony Hackens and Raymond Weiller (Louvain-La-Neuve, Luxembourg: Association internationale des numismates professionels, 1982), vol. 1, 137-140; T. V. Buttrey, "Seldom what it seems—the case of the Athenian tetradrachm," in *Ancient coins of the Graeco-Roman World: The Nickle Numismatic Papers*, eds. Waldemar Heckel and Richard Sullivan (Waterloo, Ontario: Wilfred Laurier University Press, 1984), 292-94; Muhs, *Ancient Egyptian Economy*, 198.

[297] Nicolet-Pierre, "Les monnaies des deux derniers satraps d'Egypte avant la conquête d'Alexandre," 221-30; Peter van Alfen, "The 'owls' from the 1989 Syria hoard, with a review of pre-Macedonian coinage in Egypt," *American Journal of Numismatics* 14 (2002): 1-57, esp. 24-31, pl. 120-21, 125-31.

[298] von Reden, *Money in Ptolemaic Egypt*, 32.

[299] van Alfen, "The 'owls' from the 1989 Syria hoard," 21-22.

[300] Ibid., 20.

halfway between an Athenian obol and hemiobol, an indication that they could have been used for transactions of a wide range of sizes. Some Egyptian kings minted their own coins; a gold coin, again an Athenian imitation, includes the legend ΤΑΩ, a reference to the Egyptian pharaoh Teos (r. 363/2-362/1 BCE).[301] While its iconography mimics the Athenian style, the coin's weight is not on the Attic standard but rather corresponds to the Persian daric, perhaps because, as van Alfen has proposed, the coin was somehow related to Teos' campaign against the Persians in the Levant.[302] While only a single example of Teos' coin is extant, at least 80 coins attributed to Nectanebo II (r. 361/60-343 BCE) are known, these featuring the hieroglyphic legend *nb nfr* "good gold."[303] When the Persian king Artaxerxes III (r. 343-338 BCE) took control of Egypt, he minted silver tetradrachms in Memphis with Demotic inscriptions reading *ꜣrt ḫšss Pr-ꜥꜣ* "Artaxerxes Pharaoh."[304] One of the last Persian satraps to manage Egypt before the Macedonian conquest, Sabakes (340-333 BCE, in the reigns of Artaxerxes III, Arses, and Darius III), minted a series of Athenian-style coins with the legend *SWYK* in Aramaic, along with an unknown symbol that seems to have been his personal emblem.[305] After Sabakes' death at the battle of Issos, the new satrap Mazakes minted similar coins but with his own Aramaic legend, *MZDK*, and his own symbol. Thus not only were coins present in and minted in Egypt before the time of the Ptolemies, but the men who ruled Egypt were already using text and imagery on coins to further their own political agendas and to attempt shape their public image.

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[301] Ibid., 23.
[302] Ibid.
[303] Ibid.
[304] S. P. Vleeming, *Some coins of Artaxerxes and other short texts in the Demotic script found on various objects and gathered from many publications.* Studia Demotica 5 (Leuven: Peeters, 2001); van Alfen, "The 'owls' from the 1989 Syria hoard," 24-27.
[305] van Alfen, "The 'owls' from the 1989 Syria hoard," 27-31.

It has typically been assumed that the coins issued by Persian satraps were intended to be used to pay mercenaries in the various wars of the time. Van Alfen has persuasively argued the contrary: that the coins imitating Athenian styles but with Aramaic or Egyptian legends were not primarily intended to pay soldiers but rather for use within Egypt. He provides many reasons for this argument, one being that presumably soldiers would prefer to be paid in authentic (or at least more authentic-looking) Athenian tetradrachms, which would be more widely accepted around the Mediterranean.[306] Most Egyptians did not require coins to conduct their day-to-day transactions, since they had a wide range of media of exchange available to them, and Egypt did not have one stable system of coinage of various denominations before the Ptolemaic period. Nevertheless, it is important to note that before Alexander's arrival, not only did rulers make use of coins for political purposes, but individuals could and did use coins for exchange and as a store of wealth.

The early Ptolemies established the first full *system* of coinage in Egypt (as opposed to mere isolated coins not integrated with each other into a systemic quantification of value), and, following the practice inherited from their predecessors, they used coins and their iconography politically, to demonstrate their power and to distinguish Egypt from the other Successor kingdoms.[307] Initially after Alexander's conquest, his soldiers were paid with Macedonian coins.[308] In 326/25 BCE, a mint was established at Memphis, a move which allowed the satrapy to produce coins within Egypt rather than ship them in from Macedonia or one of the other mints

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[306] van Alfen, "The 'owls' from the 1989 Syria hoard," 34-42; Peter van Alfen, "Mechanisms for the imitation Athenian coinage: Dekeleia mercenaries reconsidered," *Revue belge de numismatique de sigillographie* 157 (2011): 55-93, esp. 55-57, 72-73, 84-85.

[307] By "system," I mean a collection of coins of different metals and weights that could be exchanged with each other at clearly understood rates. Technically this was a tri-metallic system of coinage, at a time when tri-metallic systems were still relatively young in the eastern Mediterranean, dating back only to the 4th or early 5th centuries BCE.

[308] von Reden, *Money in Ptolemaic Egypt*, 33.

around Alexander's empire.[309] In these first years before Ptolemy I's arrival as satrap, von Reden argues that the coins produced in Egypt were of limited quantity and were not recognizably different from coins produced elsewhere in the empire.[310] A few years later, after Ptolemy I had taken control in Egypt, hijacked Alexander's body, established a funerary cult for Alexander in Alexandria, and moved the capital from Memphis to Alexandria, he also transferred the mint from Memphis to Alexandria. At that point, he issued "a new, recognisably Ptolemaic coinage," featuring a head of Alexander with an elephant scalp and ram's horn on the obverse and maintaining the traditional seated Zeus on the reverse.[311] Ptolemy I continued this practice of distinguishing Egypt from the rest of the empire before he even claimed the kingship. He issued the first coins bearing his name (ΠΤΟΛΕΜΑΙΟΥ) in 315/14 BCE, although they still also referenced Alexander (ΑΛΕΞΑΝΔΡΕΙΟΝ).[312] After his army declared him king in 306, he issued a series of gold chrysoi coins with his own portrait, featuring Ptolemy I wearing the royal diadem and carrying the aegis: the first coins in world history to bear the image of a living king.[313] The reverse depicted Alexander holding a thunderbolt and drawn by a quadriga of elephants, a move which established Ptolemy I as a descendent of Alexander, Zeus, and even Amun.[314]

Von Reden has rightly emphasized that these first forays into the development of Ptolemaic coinage highlight Ptolemy I's desire to distinguish himself, and perhaps later his dynasty, both as legitimate rulers of Egypt and as distinct from Alexander's other successors: in effect, to demarcate his kingdom and declare his power over it. While the soldiers and other immigrants from the Greek-speaking world were accustomed to using coins by the beginning of

[309] Ibid.
[310] Ibid., 33-36.
[311] Ibid., 34-36.
[312] Ibid., 36-37.
[313] Ibid., 39.
[314] Ibid.

Ptolemy I's kingship, the native Egyptians had been functioning quite well without it and using other forms of money. Coins may have been useful for payments to soldiers and interregional trade, as before Alexander's conquest, but a system of coinage was not necessary for Egypt to function domestically. If Ptolemy I had minted a only few series of coins resplendent with imagery linking him to Alexander and demonstrating his own power, those coins would not have circulated very deeply into the Egyptian villages and would not have been economically significant. What he and his descendants did instead, i.e., to mint as many coins of as many denominations as possible—a full *system* of coinage, made those coins and their iconography much more influential than those of the Saites and Persians. Essentially, the coins of the early Ptolemies represent their intent to bring Egypt and its diverse peoples together under unified fiscal policies. These kings used coins as an integrative tool of state formation.[315] Ultimately, the most important monetary innovations of the early Ptolemies were their separation of coins' value from their weights (implicit in Ptolemy I's reduction of his coin weights – discussed in more detail below) and their introduction of bronze denominations that had no intrinsic value—further separating coins' value from metallic content and weight.[316] Previously, gold and silver coins were interchangeable with Hacksilber, so the money supply was limited by the supply of precious metals. Once the link between face value and metallic value was weakened, however, the monetary supply could be expanded virtually infinitely (as long as people accepted the values the state assigned to its currency).

In order for their coins to serve their various purposes, the Ptolemies needed people to actually use them. The Ptolemaic state ensured participation in its system of coinage in part

[315] Ibid., 66.
[316] Brian Muhs, "Money, coinage, and the ancient Egyptain economy," *Oriental Institute News and Notes* 233 (Spring 2017): 4-9.

through its tax policies.[317] While most harvest taxes were paid in kind, the ἀπόμοιρα, a harvest tax on vineyards and orchards instituted by Ptolemy II, could be paid in kind or in coins in the case of vineyards, and only in coins in the case of orchards. Thus cultivators of orchards faced an imperative to sell their produce in order to obtain the coins necessary for paying their ἀπόμοιρα liability. Even those taxes collected in kind were often then sold by the state; the resulting coins were then paid out to state employees as wages, ensuring those employees' participation in the coinage system.[318] From the reign of Ptolemy II until the reign of Ptolemy IV, almost all adult individuals, male and female, were responsible for paying the salt tax, a capitation tax that could only be paid in coins. Many other taxes were likewise monetized.[319] Thus nearly everyone was forced to obtain coins, if only to pay this tax. Individuals could obtain the coins they needed through wages, especially wages earned from the state, by selling goods in local markets, or by taking out loans of cash.

The early Ptolemies established a fiscal system that enabled coins to serve their political ends, but Egypt's dearth of metallic resources, especially silver, meant that it was always difficult for them to produce enough coins to satisfy their own demand. In order to compensate, already in his satrapy, Ptolemy I began the practice of manipulating the weight standard of his coinage so as to produce more coins, a practice which was to become central to Ptolemaic monetary policy. Silver and gold stater coins were minted in accordance with the Attic standard, but silver drachmas and half-drachmas were minted at lower weights.[320] Thus larger denomination coins, which were more likely to be used for transactions that crossed Egypt's borders, maintained their weights in accordance with more commonly understood Mediterranean standards, whereas the

[317] For more detailed information on Ptolemaic taxes, see below in this chapter.
[318] von Reden, "The Politics of Monetization in Third-Century BC Egypt," 73.
[319] Muhs, *Tax Receipts*; von Reden, *Money in Ptolemaic Egypt,* 84-110.
[320] von Reden, *Money in Ptolemaic Egypt*, 38.

need for more coins to circulate within Egypt led to the weight reductions for lower denomination coins. By 312-10 BCE, Ptolemy I had reduced the weight of silver staters too, which could indicate that he was in need of more coins than he had, perhaps in part because of his recent loss of Cyprus and expedition in Syria.[321]

The reduction in the weights of Ptolemaic coins led the Ptolemies to introduce a closed currency system within Egypt and the other Ptolemaic territories around the beginning of Ptolemy I's kingship. Evidence from contemporary coin hoards suggests that over time, individuals began to notice the weight reductions and react by holding onto their older, heavier coins--effectively pulling them from circulation--and spending the newer, lighter coins instead.[322] Among the hoarded heavier coins were foreign coins, which other kings, who did not face the same scarcity of metals, were continuing to mint at higher-weight standards. It would have been in the state's interest for the heavier coins to circulate and make their way to the treasury to be re-minted at the current lighter standard, since that would allow a greater quantity of coins to be produced. Von Reden argues persuasively that it was as a result of the hoarding of heavier coins, including foreign coins, that Ptolemy I outlawed the use of foreign coins within Ptolemaic territory and mandated that all foreign coins arriving in Egypt be re-minted.[323] In making this move (which was highly unusual for the ancient Mediterranean world), Ptolemy I made foreign coins officially worthless as media of exchange within Egypt.

The ban on the exchange of foreign coins is initially only evident in numismatic material, but there is evidence in the texts for later royal decrees regarding requirements on re-minting older, heavier coins. A letter in the Zenon archive, P. Cairo Zenon I 59021 (259/58 BCE, in the

[321] Ibid., 38-39.
[322] Ibid., 43-46.
[323] Ibid., 43-48.

reign of Ptolemy II), records the potentially confusing and frustrating effects of the closed currency system:[324]

Ἀπολ[λων]ίωι χαίρειν Δημήτριος. καλῶς ἔχει εἰ αὐτός τε ἔρρωσαι καὶ τἄλλα σοι κατὰ γνώμην ἐστίν. καὶ ἐγὼ δὲ καθάπερ μοι ἔγραψας προσέχειν ποιῶ αὐτὸ καὶ δέδεγμαι ἐκ χρ(υσίου) Με ʾΖ καὶ κατεργασάμενους ἀπέδωκα. ἐδεξάμεθα δ ἂν καὶ πολλαπλάσιον, ἀλλὰ καθά σοι καὶ πρότερον ἔγραψα ὅτι οἵ τε ξένοι οἱ εἰσπλέοντες καὶ οἱ ἔμποροι καὶ οἱ ἐγδοχεῖς καὶ ἄλλοι φέρουσιν τό τε ἐπιχώριο[ν] νόμισμα τὸ ἀκριβὲς καὶ τὰ τρίχρυσα ἵνα καινὸν αὐτοῖς γένηται κατὰ τὸ πρόσταγμα ὃ κελεύει ἡμᾶς λαμβάνειν καὶ κ[ατερ]γάζεσ[θα]ι, Φιλαρέτου (?) δέ με οὐκ ἐῶντος δέχεσθαι, οὐκ ἔχον[τ]ες ἐ[πὶ] τίνα τὴν ἀναφορὰν ποιησώ[με]θα περὶ τούτων, ἀναγκαζ[όμεθ]α τ[ὰ .] . . τα μὴ δέχεσθαι, οἱ δὲ ἄνθ[ρω]ποι ἀγανακτοῦσιν οὗ[τ]ε τ[ῶν] τραπεζῶν οὔτε εἰς τὰ τ[.].[.] τα ἡμῶν δεχομ[ένω]ν οὔτε δυνάμενοι εἰς τὴν χώραν ἀποστέλλειν ἐπὶ τὰ φορτία, ἀλλὰ ἀργὸν φάσκουσιν ἔχειν τὸ χρυσίον καὶ βλάπτεσθαι οὐκ ὀλίγα ἔξοθεν μεταπεπέμμενοι καὶ οὐδ' ἄλλοις ἔχοντες ἐλάσσονος τιμῆς διαθέσθαι εὐχερῶς. καὶ οἱ κατὰ πόλιν δὲ πάντες τῶι ἀποτετριμένωι χρυσίωι δυσχερῶς χρῶνται. οὐδεὶς γὰρ τούτων ἔχει οὗ τὴν ἀναφορὰν ποιησάμενος καὶ προσθείς τι κομιεῖται ἢ καλὸν χρυσίον ἢ ἀργύριον ἀντ' αὐτοῦ. νῦν μὲν γὰρ τούτων τοιούτων ὄντων ὁρῶ	Demetrios to Apollonios, greeting. If you are in good health and your affairs are going well, that is good. As for me, I am acting according to what you wrote to me to attend to, and I have received 57,000 (drachmas?) in gold which I re-minted and returned. We might have received many times more, but as I wrote to you earlier, the foreigners who sail in and the merchants and the agents and others bear both the accurate local coins[325] and the *trichrysa* to be made into new (coins) for them in accordance with the royal decree which orders us to receive and re-mint (them). [But with Philaretos' not allowing me to accept (them)][326] and (our) not having anyone to refer to, we are compelled not to accept (them). And the people are vexed because their gold is accepted neither by the banks nor by us for ..., nor are they able to send it into the countryside to buy goods, but they believe their gold is lying idle and they are suffering not a little (loss), having sent for it from abroad and not being able to dispose of it easily to other persons even for a reduced price. And all the people in the city find it difficult to make use of the worn *chrysoi*. For none of them knows to whom he can refer and for a fee receive for them either good gold or silver. Now with things being as they are, I see also that the revenues of the king are suffering not a little. Therefore I wrote these (words) to you that you

[324] P. Cairo Zenon I 59021, 1-34. The Greek text below is from von Reden, *Money in Ptolemaic Egypt*, 47 n. 74. and A. S. Hunt and C. C. Edgar, *Select Papyri* II, Loeb Classical Library 282 (Cambridge: Harvard University Press, 1934), 548-51. Also see von Reden's references on p. 46, n. 72, for more discussion of potential readings.

[325] For more on the translation of τό τε ἐπιχώριο[ν] νόμισμα as "local currency" and the potential implications of this translation, see Georges Le Rider, "Sur un passage du papyrus de Zénon 59021," in *Commerce et artisanat dans l'Alexandrie hellénistique et romaine: Actes du Colloque d'Athènes organisé par le CNRS, le Laboratoire de céramologie de Lyon et l'École française d'Athènes, 11-12 décembre 1988*, ed. Jean-Yves Empereur (Paris: Boccard Édition-Diffusion, 1998): 403-407.

[326] For this solution to the illegible portion of the text here, see von Reden, *Money in Ptolemaic Egypt*, 47, with n. 73.

καὶ τὰς τοῦ βασιλέως προσόδους βλαπτομένας οὐκ ὀλίγα. γέγραφα οὖν σοι ταῦτα ἵνα εἰδῆις καὶ ἐάν σοι φαίνηται τῶι βασιλεῖ γράψηις περὶ τούτων καὶ ἐμοὶ ἐπὶ τίνα τὴν ἀναφορὰν περὶ τούτων ποιῶμαι. συμφέρειν γὰρ ὑπολαμβάνω ἐὰ[ν] καὶ ἐκ τῆς ἔξοθεν χώρας χρυσίον ὅ τι πλεῖστον εἰσάγηται καὶ τὸ νόμισμα τ[ὸ] τ[ο]ῦ [β]ασιλέως καλὸν καὶ καινὸν ἦ διὰ παντός, ἀνηλώματ[ος] μηθενὸς γινομένου αὐτῶι. περὶ μὲν γάρ τινων ὡς ἡμῖν χρῶνται οὐ καλῶς εἶχεν γράφειν, ἀλλ᾽ ὡς ἂν παραγένηι ἀκούσει[ς . . . . . .] γράψον μοι περὶ τούτων ἵνα οὕτω ποιῶ. ἔρρωσο.	might know and, if it were revealed to you, you might write to the king about these matters and also tell me to whom I might refer about these things. For I take it to be beneficial if as much gold as possible be imported from the external countries[327] and the king's coinage be good and new always, with no cost falling on him. As for the way in which certain people are mistreating us, it is not well to write, but as soon as you are nearby you will hear ... . Write to me about these matters that I might act accordingly. Farewell.

In this letter, Demetrios, an accountant, writes to Apollonios, his boss and the chief financial minister under Ptolemy II, about problems he is facing with coinage (gold coins in particular). In the late 270s (a little over a decade before this letter), Ptolemy II had minted a new series of gold coins that were lighter than the old *chrysoi* (worth 100 silver drachmas) and *trichrysa* (worth 50 silver drachmas) gold coins.[328] The new, lighter coins caused some confusion about exchange rates between silver and gold coins, but before this letter, the old and new gold coins seem to have both circulated at the same time. Here, Demetrios mentions a new royal decree that now required the old gold coins to be recalled and re-minted. He mentions that he has already received 57,000 (drachmas or coins) and has had them re-minted, and it seems that Apollonios' office was a usual place to turn to exchange heavy for light coins. However, Demetrios feels the need to write to Apollonios because his associate Philaretos is now refusing to accept heavy coins at the office for re-minting. Von Reden suggests that perhaps Philaretos was uncertain of the proper exchange rates following the latest royal decree (i.e., whether the heavy gold coins should be exchanged for

[327] I.e., from Ptolemy II's territorial posessions outside Egypt proper. For this interpretation, see Le Rider, "Sur un passage du papyrus de Zénon 59021," 403-407.
[328] von Reden, *Money in Ptolemaic Egypt*, 46-48.

silver based on their actual weight or their nominal value) and was therefore waiting for guidance from Apollonios before conducting any further exchanges.[329] When the people with these heavy coins were turned away by Demetrios and Philaretos, they tried to exchange their money at the banks, who also turned them away, likely because of the same confusion and perhaps because the royal decree did not reach them all at the same time.[330] As a result, all the various traders and agents with heavy coins found them tied up until the exchange rates were worked out, a waiting period which was clearly frustrating. Demetrios also shrewdly appeals to the king's self-interest towards the end of the letter in his request that this matter be better clarified, emphasizing that it would be good for the king if more money were able to come into his treasuries through recalling and re-minting.

The letter demonstrates that while the shifts in monetary policy of the early Ptolemies did add to the volume of coinage circulating in Egypt eventually, the process was not always smooth. The dissemination of royal decrees was not immediate, and communication via letters like these was quite slow by modern standards. It is clear that one response to a lack of reliable information was to simply cease business, but that doing so was stressful, since the time lost while exchange rates and other issues were worked out meant the loss of potential profits while money sat idle. This sense of uncertainty slowed the volume of transactions. These men's lack of knowledge of the rate at which they would eventually be able to exchange their money must have also led to difficulty in even setting up or planning transactions that could take place once the issue was resolved. With a certain portion of "the foreigners who sail in and the merchants and the agents and others" unable to do business with their coins, i.e., to buy goods or make other investments, prices for the goods they were usually expected to buy may have fallen. Those who did have the

[329] Ibid., 47-48.
[330] Ibid., 48.

usable lighter coins could perhaps have made a profit by buying in this interim of confusion and reselling once those with the heavy coins were able to trade again.

In response to the scarcity of silver, the Ptolemies made greater use of bronze over the course of the period. In fact, Catherine Lorber has shown that silver virtually vanished from the Egyptian chora under Ptolemy III and Ptolemy IV; it was almost completely replaced by bronze.[331] This shift from silver to bronze was not the result of private hoarding, Lorber has shown through the hoard evidence, but rather a deliberate policy on the part of the Ptolemaic state towards removing silver from circulation. Bronze had been used for coins by the Macedonians as soon as the early 4th century BCE, and Ptolemy I began to mint bronze coins in Egypt by 312/11 BCE.[332] Beginning under the reign of Ptolemy II, these bronzes took on unusually massive dimensions of up to 45 mm in diameter, which allowed these coins to be useful for transactions beyond just those requiring coins of very small denominations.[333] As von Reden has aptly noted, the striking size of the Ptolemaic bronze coins marks them as "an entirely new form of money," and "bronze and silver coins were different commodities."[334] She bases her argument on the evidence that bronze and silver coins were hoarded separately and that the state stipulated which of the two it would accept for payments it was owed.[335] If a person wanted to exchange some bronze coins for silver, he could do so only at a bank, and, as discussed in the previous section, he would be required to pay a fee (the ἀλλαγή) to make the exchange.[336] Bronze and silver coins were thus not simply different denominations of the same form of money.

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[331] C. Lorber, "Overview of Egyptian Silver Hoards under the First Five Ptolemies," in *Egyptian Hoards I: The Ptolemies*, eds. Thomas Faucher, Andrew Meadows, and Catherine Lorber (Paris: IFAO, 2016), 35-40.
[332] von Reden, *Money in Ptolemaic Egypt*, 58.
[333] Ibid.
[334] Ibid., 58-59.
[335] Ibid.
[336] Ibid., 59.

Bronze and silver should be more correctly understood as two different monetary systems operated by the same state in the same place, often at the same time.

While silver coins were used and commonly understood as valuable all around the eastern Mediterranean world, bronze was less common and therefore could have been seen as a riskier form in which to hold one's wealth or try to make exchanges. The quantities of silver in extant coin hoards peaks in the reign of Ptolemy II, which suggests not only a greater accumulation of private capital, as Muhs has noted, but also greater anxiety about the value of the various types of coins then in circulation, as, according to Gresham's Law, individuals tend to hold on to the money they deem more valuable and spend that which seems less certain.[337] Smaller, low-value bronze coins had a practical advantage over silver for cheap purchases (and von Reden has argued for the rising importance of bronze for "everyday exchange"), but nevertheless, the Ptolemies still seem to have needed to introduce specific policies to encourage individuals to engage with the bronze coinage.[338] In part, they may have done so by essentially pulling the available silver out of circulation. For example, on the side of expenditures, the salt tax was due in silver but could be paid in bronze with the addition of an agio—thus people were encouraged to spend their silver to get the lower rate. On the income side, state employees were paid in bronze; for example, P. Rev. stipulates that payments related to the state's oil monopoly be paid in bronze.[339] Wages for work on the Fayyum reclamation project beginning in the late 260s were also based on bronze.[340] Therefore people were spending silver and taking in bronze; over time,

[337] Muhs, "Literacy, Law and the Economy in Ancient Egypt," 2.
[338] von Reden, *Money in Ptolemaic Egypt*, 60.
[339] Ibid.
[340] Ibid.

therefore, silver was replaced by bronze. As Lorber has written, Ptolemy III "made a deliberate choice to eliminate virtually all silver coinage from the Ptolemaic economy."[341]

In an analysis of payments made in bronze vs. silver, or even coins vs. kind, it is crucial to keep in mind the difference between the use of words related to bronze, silver, and coins generally as units of account or standards of value and the use of physical coins as media of exchange and stores of wealth.[342] The fact that a text records a thing's value in terms of silver coins does not necessarily mean that it was purchased with silver coins. This distinction has been at the core of the debates concerning the nominal rise in prices under Ptolemy IV that were discussed in Chapter 3. Cadell and Le Rider have argued that this rise in prices represents actual inflation, due to an oversupply of coinage in the countryside and scarcity of produce following the Fourth Syrian War in 221 BCE.[343] In this view, massive numbers of soldiers hired from the countryside were paid in coins, and after Ptolemy IV's victory, he also made lavish donations in coins. At the same time, the soldiers who had been away at war were therefore not farming, and that lack of farming, coupled with the expenditures from Egypt's grain reserves to feed the soldiers during the war, led to a scarcity of grain. Cadell and Le Rider argue that the result was massive inflation. Their proposal of real inflation related to an oversupply of coinage was a move away from Reekmans's argument, that the 'inflation' was actually just a shift in accounting standards from silver to bronze.[344] More recently, von Reden has argued that the rise in prices was "most probably the result of a re-valuation of the bronze currency in relation to silver rather than of inflation."[345] She thus focuses on textual references to coins as units of account rather than physical objects, and she argues that

[341] Lorber, "Overview of Egyptian Silver Hoards under the First Five Ptolemies," 37.
[342] Chapter 5 discusses units of account in Greek and Demotic texts in Ptolemaic Egypt.
[343] Cadell and Le Rider, *Prix du blé.*
[344] Reekmans, "Ptolemaic Copper Inflation."
[345] von Reden, *Money in Ptolemaic Egypt*, 77-78.

the economy of the countryside was not based in the use of physical coins. The supply of actual coinage in the countryside was never high enough to lead to real inflation. Exchanges could be completed not only via coins, but also with other media of exchange, such as grains.

Transactions could also be handled in ledger form, without any physical exchange. This practice has already been discussed in the context of banks, but accurate bookkeeping enabled 'on paper' transactions outside the banking system as well. Many letters in the Zenon archive record debits and credits that were able to count against each other and thus prevent or minimize the quantity of coins that needed to be exchanged. An excerpt from a letter to Zenon from Iason (P. Lond. VII 2008, 2/37-51), dated May 1, 247 BCE, provides an excellent example of such accounting:[346]

προσέγγειλεν ἡμῖν Τιμοκλῆς τῶν προσβυτέρων τις ὀφίλειν σοι τοὺς λοιποὺς πρεσβυτέρους τοὺς ἐν τῆι Διννέως Κοίτηι [ὃ] ἀνήλωσας εἰς τὴν διώρυγα εἰς (δραχμὰς) νς (ὀβολὸν) ἐφ' ὧι ἐὰν διαλογισώμεθα πρὸς αὐτοὺς καὶ ἔλθηι εἰς ὁμόλογον, ἀφεθήσεταί τὸ ἐπιβάλλον αὐτῶι μέρος ἀπὸ τῶν νς (ὀβολοῦ), (δραχμαὶ) ς (τετρώβολον). διαλελογεισμένοι οὖν ἰσιν καὶ συνεγράψαντο δώσιν εἰς τὰ ἀργυρικὰ τοῦ λς (ἔτους). ἐὰν δὲ ἡμῖς καταβάλωμεν, ὑπολογήσομεν αὐτοῖς εἰς τὸ ἐκφόριον τοῦ λθ (ἔτους).	Timokles, one of the veterans, announced to me that the rest of the veterans in Dinneos Koite are indebted to you for what you spent on the canal, 56 drachmas and 1 obol. His condition is that, if we balance accounts with them and come into agreement, his own share of the 56 drachmas and 1 obol, i.e., 6 drachmas and 4 obols, will be deducted. Now they have balanced accounts, and wrote an agreement that they pay towards the money taxes of year 36. But if we should make the payment, we will deduct the money from the rent of year 39.

Iason, one of Apollonios' employees on his estate, is writing to Zenon about the resolution of various debts. Zenon had fronted 56 drachmas and 1 obol to be spent on the canal-work, and now the veterans in Dinneos Koite needed to pay him back. One of those veterans, Timokles, asks that his portion of that 56 drachmas and 1 obol be deducted from the debt, likely because Zenon also

[346] The Greek presented here is from the Papyrological Navigator <http://papyri.info/ddbdp/p.lond;7;2008> (accessed August 17, 2015). For further discussion, see von Reden, "Politics of Monetization in Third-Century BC Egypt," 70-71.

owed a debt to Timokles. After that portion (6 drachmas and 4 obols) is deducted, the group of veterans would then collectively owe Zenon 49 drachmas and 3 obols. The veterans have discussed these accounts amongst themselves and decided that they wish to settle that debt by paying money taxes on Zenon's behalf that Zenon owed the state from three years prior. If the taxes have already been paid, then they agree to deduct their debt from the rent Zenon owes them for this year.

This letter and others like it demonstrate how, especially on large estates like that of Apollonios, a whole network of debts existed, involving individuals and larger groups. Those debts could be offset against each other in a way which enabled transactions to occur without coins exchanging hands, or at least with a minimal number of physical transactions at the ends of the chain of debt.[347] The parties involved converted between debts accounted in coins and those in kind, as the veterans' debt to Zenon, calculated in drachmas and obols, could be deducted from Zenon's rent (ἐκφόριον) to them, which presumably would have been calculated in kind. These debts, then, themselves all served as a sort of medium of exchange. As von Reden has continually and rightly reasoned, this network of debt, in addition to other credit mechanisms, allowed more coins to exist 'on paper' than were ever actually minted.[348]

In a famous piece of Demotic wisdom literature, in which the sage 'Onchsheshonqy sends life advice to his son from prison, a few statements on borrowing money can be found among 'Onchsheshonqy's pronouncements.[349] He says:

r-ỉny ḥḏ r ms.t ḥwy r sḫt	Borrow money at interest and put it into the land.
r-ỉny ḥḏ r ms.t ỉỉry n=k ḥm.t	Borrow money at interest and take a wife for yourself.

[347] von Reden, "Politics of Monetization," 71.
[348] von Reden, "Politics of Monetization"; von Reden, *Money in Ptolemaic Egypt*.
[349] P. 'Onch., 16/9-12.

r-ỉny ḥḏ r ms.t ỉỉry pȝy=k hrw ms.t	Borrow money at interest and celebrate your birthday.
m-ỉr ỉn ḥḏ r ms.t r ỉr ꜥnḫ ꜥȝ n-ỉm=f	Do not borrow money at interest to live a great life on it.

'Onchsheshonqy does not clearly specify who one should borrow from, i.e., whether these loans would be from banks or acquaintances. Either way, this advice demonstrates that debt for investment, or even just for short-term enjoyment, was something accessible and feasible to take on (and perhaps more common than the written record may make it seem). Later on in the same column, he advises: *m-ỉr tỉ ḥḏ r ms.t ỉw mn tȝ ỉw.t n ḏr.t=k* "Do not lend money at interest without security in your hand"—perhaps an indication that lending was also feasible on a personal level.[350] Many of the other bits of wisdom in column 16 relate further to the personal side of business relationships, including how to behave around superiors and subordinates. The networks of debt that seem to have been quite common in Ptolemaic Egypt meant that social capital was crucial. With a physical coin supply that never seemed capable of meeting demand, the people of Ptolemaic Egypt used the social bonds they held with each other as a mechanism to enable credit relationships that could satisfy their monetary needs.

4.4.9 Taxes

Taxes can influence prices for a variety of reasons too numerous to be listed here. Since the present study focuses on price variation, it is perhaps most germane to consider how, theoretically, taxes might cause such variation. In one case, taxes might be applied unevenly to different goods. For example, a tax might be the cause of Product X's higher price than Product Y's if Product X were subject to a tax that Product Y was not: in that case, the transaction costs (i.e., in this case,

[350] P. 'Onch., 16/21.

the tax) of Product X were higher—the tax was subsumed into its price. In theory, the same uneven application of taxes might apply to economic actors themselves; individuals who are liable to taxes others are not will face different economic pressures that might affect the prices they charge or accept. Likewise, if taxes are different in different locations, prices might vary in between those locations. If tax rates change, prices might change in turn. Ultimately, to understand how taxes might lead to price variability, we thus need to investigate the unevenness of taxation (either from good to good, actor to actor, time to time, or place to place). This section provides a brief investigation of the possibility of variation in Ptolemaic taxes, ultimately concluding that taxes likely played a limited role in price variations.

The early Ptolemies established a series capitation taxes at flat rates, made possible through the census.[351] Following a long tradition of compulsory labor duties in Egypt, Ptolemy II instituted the yoke tax (*ḥḏ nḥḥ*) in 285 BCE as a capitation tax paid by men.[352] The tax burden was extended to women in 263 BCE, when the salt tax (ἁλικῆς, *ḥḏ ḥmȝ*) replaced the yoke tax.[353] The salt tax consisted of different flat fees for men and for women, and remained in use until 217 BCE.[354]

[351] In defining a capitation tax, I follow Monson: "The main characteristic of any capitation tax is that it is levied on persons at a standard rate, independently of their income, property, consumption, or occupation, and typically according to some kind of census." Andrew Monson, "Late Ptolemaic Capitation Taxes," *Bulletin of the American Society of Papyrologists* 51 (2014): 128-29.
[352] The yoke tax rate was up to 4 qite (8 drachmas) per year, perhaps paid in monthly installments. Muhs, *Tax Receipts*, 30-39; Muhs, *O. Taxes 2*, 7-19.
[353] Muhs, *Tax Receipts*, 41-51; Muhs, *O. Taxes 2*, 21-86; Muhs, *Ancient Egyptian Economy*, 234.
[354] Muhs, *Tax Receipts*, 41-51; Muhs, *O. Taxes 2*, 21-86; Muhs, *Ancient Egyptian Economy*, 234.

Table 4.1. Salt Tax Rates for Men and Women.

Date Range	Rate for Men	Rate for Women
Years 22-31 of Ptolemy II (263-254 BCE)	¾ qite (1 drachma and 3 obols)	½ qite (1 drachma)
Year 31 of Ptolemy II – Year 5 of Ptolemy III (254-243 BCE)	½ qite (1 drachma)	¼ qite (3 obols)
Year 5 of Ptolemy III – Year 4 of Ptolemy IV (243-217 BCE)	1/3 qite (4 obols)	1/8 qite (1 ½ obols)

Almost everyone had to pay this tax, with the exception of certain (likely quite small) categories of people whose work promoted Greek culture.[355] Likewise, there is some evidence that ethnic Egyptians were charged extra fees on top of their salt tax liability in the Fayyum.[356] Additional capitation taxes were levied against certain categories of individual, perhaps because of their employment in certain industries.[357] These included the wool tax (ἐρέα, *ḥḏ ỉnw*, introduced in 254 BCE and restricted to women), the server tax (*ꜥq rmṯ ỉw=f šms*, attested from 262 BCE and paid only by men), the staff-bearer tax (ῥαβδοφορικόν, known from the 230s BCE), and the guard tax (*ꜥq rsy*, instituted in 253 BCE).[358] In addition, men continued to be liable for compulsory labor for the state, which they could avoid through paying a fee, the compulsory

[355] E.g., teachers of writing and physical education, performers of Dionysus, and victors at the Alexandrian, Ptolemaia, and Basileia games Muhs, *Tax Receipts*, 42.
[356] Muhs, *Tax Receipts*, 43; Françoise de Cenival, *Papyrus démotiques de Lille* 3, 52; Willy Clarysse, "Some Greeks in Egypt," 52; Dorothy Thompson, "Literacy and Administration," 324-26; Shelton, "Notes," 135, n. 16.
[357] Muhs, *Tax Receipts*, 43; Muhs, *O. Taxes 2*, 91-92; Muhs, *Ancient Egyptian Economy*, 234.
[358] Muhs, *Tax Receipts*, 53, 56; Muhs, *O. Taxes 2*, 91-92; Muhs, *Ancient Egyptian Economy*, 234; Andrew Monson, *Agriculture and Taxation in Early Ptolemaic Egypt: Demotic Land Surveys and Accounts (P. Agri)* (Bonn: Dr. Rudolf Habelt GMBH, 2012), 140; Vleeming, *Ostraka Varia*, 31.

labor tax (λειτουργικόν, *ḥḏ ʿrt*).[359] These capitation taxes seem to have ceased in Year 5 of Ptolemy IV (217 BCE), after which date no receipts for these taxes are attested. However, the Ptolemies continued to keep track of their people with censuses and tax registers at least into the second century BCE, and there is some evidence that new capitation taxes or general contributions were associated with these registers.[360]

Capitation taxes were thus quite plentiful in early Ptolemaic Egypt; however, they were unlikely to influence prices directly. Since they were levied at fixed rates and were almost inescapable, they were unlikely to influence incentive structures and behavior. If they added to the transaction costs associated with living in Egypt, they did so almost universally. These taxes on people should not be taken as price-shaping factors; however, their rates may prove to be a useful benchmark for understanding price fluctuations. Since the state was primarily concerned with raising revenue, higher or lower taxes on the population might signal changes in the people's own

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[359] Some, most notably kleruchs, were exempt from the compulsory labor requirement entirely but instead were taxed on a proportional rate on their land via the dike tax (χωματικόν), charged at 1 obol per aroura of land. Muhs, *Tax Receipts,* 58-59.

[360] Three texts (P. Tebt. I 103, P. Tebt. I 121, and P. Tebt. I 189) mention a λαογραφία, which was likely a new form of the census. These papyri, which are from Theognis, in the Fayyum, date to a Year 21, probably of Ptolemy XII (61 BCE). The λαογραφία seems to have enabled new taxes on people. Two of the Theognis papyri, P. Tebt. I 103 and 189, list adult males paying a tax called the σύνταξις, which Francisca Hoogendijk reads as "a general term for a tax payment, either in full or in an instalment, of either a single tax or a number of different taxes grouped together under this name." The specific type of σύνταξις paid in these two texts was the ἐπιστατικόν-tax, which Hoogendijk argues might represent a capitation tax. Monson points out, however, that based on a more plausible restoration of the text of P. Tebt. I 189, the σύνταξις and the ἐπιστατικόν might have actually been two different taxes. In that case, the σύνταξις would have constituted a general "contribution," with the ἐπιστατικόν as a separate tax for the maintenance of the ἐπιστάτης τῆς κώμης, the overseer of the village, or the ἐπιστάτης τῶν φυλακιτῶν, the overseer of the police. Hoogendijk points out, though, that if the ἐπιστατικόν were a separate tax for the upkeep of this local office, the rate paid to the ἐπιστάτης would be unexpectedly high.[360] In any case, the tax was likely paid monthly. Muhs, *Ancient Egyptian Economy*, 234-35; Clarysse & Thompson, *Counting the People* vol. 2, 350-56. Francisca A. J. Hoogendijk, "The Practice of Taxation in Three Late Ptolemaic Papyri," in *Proceedings of the Twenty-Fifth International Congress of Papyrology, Ann Arbor 2007*, ed. Traianos Gagos. (Ann Arbor: American Studies in Papryology, 2010): 313-22, esp. 313-15. Monson, "Late Ptolemaic Capitation Taxes and the Poll Tax in Roman Egypt," 132-134.

income, i.e., that they were more or less capable of absorbing those taxes. Changes in tax rates, especially for those taxes that were charged as flat fees rather than percentages, might also be an indicator of inflation or deflation.

Thus flat taxes on people would have been unlikely to shape prices, since no human behavior could change the level of the tax. Flat taxes on the sale of assets were similarly unavoidable and therefore unlikely to shape price fluctuations. For example, when a burial plot was purchased, a burial tax (*ḥḏ mr ḫ3s.t* "money of the Overseer of the Necropolis," or *tny mr ḫ3s.t* "tax of the Overseer of the Necropolis," or just *r ḥ.t-nṯr* "for the temple") had to be paid to the temple in coins at a fixed rate.[361] It was a flat tax levied on burials per person (usually ½ qite per person, later ½ qite + 1 obol), paid each time an individual was buried. In addition, there was the price of the burial plot—the plot of land on which the tomb was constructed—at a rate of 2.5 qite/plot, irrespective of the size of the plot. One burial plot and the tomb constructed on that plot could contain multiple burials. For that reason, the effective cost per burial would be lower for those interred within multi-burial tombs. Therefore the flat burial plot price encouraged family tombs. Nonetheless, the tax did not demonstrate variation over time or geography, and therefore would not have caused fluctuations in price over time or geography.

While flat taxes on people and on sales did not fluctuate enough to have materially impacted prices, different categories of income-generating assets in Ptolemaic Egypt were taxed differently: investments in assets taxed at flat rates may have been managed more conservatively than those taxed at rates proportional to their yield. Flat taxes on income-generating assets may have encouraged more conservative investment because taxes were unavoidable even if the yield

[361] From Year 2 of Alexander IV (315 BCE) through Year 6 of Ptolemy III (241 BCE), the rate was ½ silver qite (1 drachma) per plot; by Year 13 of Ptolemy III (234 BCE) through the early reign of Ptolemy IV (222 BCE), the rate was raised by 1 obol to ½ silver qite and 1 obol (7 obols) per burial plot. Muhs, *Tax Receipts,* 88; Muhs, *Ancient Egyptian Economy*, 236-37.

in a given year were low. Since even in cases of poor yields, the tax fee would still be due, owners were under pressure to at least reach that minimum break-even threshold.[362] For example, texts from the second and first centuries BCE mention that grain lands in Middle Egypt and the Fayyum were liable to a flat tax on land known as the "artaba tax" (mentioned in the Rosetta Decree (196 BCE) as ἡ ἀποτεταγμένη ἀρτάβη τῆι ἀρούραι and *p3 rtb r 1 3 ḥ*).[363] Generally speaking, the landowner paid a fixed amount of grain per aroura of land, regardless of its actual productivity.[364] Since productivity was irrelevant, the state could predict the revenue it would generate from the tax well before the harvest. In theory, the uncertainty inherent in agricultural production was thus passed down to landowners, who were incentivized to minimize the riskiness of their efforts on these plots. The Ptolemaic state generally used harvest taxes calculated at a fixed rate per aroura because of the ease of such calculations: it was easy to calculate how much was due, to determine whether it had been paid in full, and to predict future revenues (without having to assess actual yields). The rate per aroura varied based on the administrative category of the land (e.g., royal, temple, kleruchic) and the crop being sown.[365] The Ptolemies did adjust harvest taxes if fields were not reached by the inundation, so they never fully shifted the risk of agricultural production onto taxpayers. Instead, these low fixed tax rates actually encouraged investment in land, then, because there was a low risk of insufficient harvest and a high rate of return.

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[362] Monson, *From the Ptolemies to the Romans*, 192.
[363] Vandorpe, "The Ptolemaic epigraphe or harvest tax (*shemu*)," 174.
[364] Ibid., 174-75.
[365] Land in Ptolemaic Egypt was divided into different administrative categories, and these categories were subject to different tax systems and rates. What follows is merely a brief analysis of how those systems may have impacted prices: a full summary of Ptolemaic land taxes would be beyond the scope of the present project. Land categories and associated tax systems have been discussed extensively in recent years by Manning and Monson, and interested readers should consult their works for more detailed information. See, for example Manning, *Land and Power in Ptolemaic Egypt*; Monson, "Royal Land in Ptolemaic Egypt: A Demographic Model," 363-97; Muhs, *Tax Receipts*, 61.

When income-generating assets were taxed at rates proportional to their yield, owners would be under less tax pressure in more difficult years. Proportional taxes allowed the state to share risk with farmers. The state's revenue was not guaranteed; if the harvest failed, then little to no tax would be collected. Since the risk of a failed harvest was shared, it is likely that lands subject to proportional taxes could have been farmed in riskier or more experimental ways. In theory, greater experimentation and liberality in farming could have led to greater variation in yields and greater variation in prices in turn. Harvest taxes proportional to yield were not collected on grains but rather on cash crops.[366]

However, newer crops to Egypt, such as fruits, were inherently riskier to farm than traditional grains like barley and emmer. Greek-speaking communities nonetheless adored these risky crops; perhaps it was in order to encourage investment in these crops that the Ptolemaic state taxed them proportionally. Vineyards and orchards were subject to a particular sort of proportional tax known as the apomoira (ἀπόμοιρα, literally "portion").[367] The apomoira developed out of Ptolemy II's reforms of 264/263 BCE, preserved as royal decrees in the Revenue Laws Papyrus (P. Rev.).[368] This text describes how Ptolemy II extended an earlier harvest tax, known as the "sixth" (ἕκτη, *p³ 1/6*), which had been levied on vineyards and orchards on temple lands and which was paid to those temples. The "sixth" was now extended to all vineyards and orchards on all categories of land. Those on temple land still paid their tax to the temple, but those on other sorts of land paid to the newly established cult of Ptolemy II's deceased sister/wife,

366 E.g., seeds and orchard crops. See P. Rev.
367 Muhs, *Tax Receipts*, 63.
368 Willy Clarysse and Katelijn Vandorpe, "The Ptolemaic Apomoira," in *Le culte du souverain dans l'Égypte ptolémaïque au IIIe siècle avant notre ère: Actes du colloque international, Bruxelles 10 mai 1995*, ed. Henri Melaerts (Leuven: Peeters, 1998), 7.

Arsinoe II Philadelphos.[369] Unlike other sorts of harvest taxes, which were paid in kind with the agricultural produce itself, the apomoira on vineyards could be paid in kind (i.e., wine) or in coins, and that on orchards could only be paid in coins--perhaps because fruits spoil much faster than grains and other crops.[370] Payment in coins was based on the value of the 1/6 portion of the produce, which meant that the state calculated a price by which the banks could make the conversion.

While most of these lands owed 1/6 of their produce, the Ptolemies especially encouraged investment in certain categories of vineyard by subjecting them to a lower 1/10 tax (this type of the apomoira was known as the "tenth"-- δεκάτη, *p3 1/10*).[371] The lower tax rate was charged on vineyards in Upper Egypt that required artificial irrigation and were therefore more difficult and expensive to set up and manage than vineyards in other regions.[372] The Ptolemies may have used this lower rate on Upper Egyptian vineyards to incentivize wine production in a region that otherwise would have avoided it.[373] Lands could also be subject to the lower rate because of their owner: throughout Egypt, vineyards belonging to kleruchs who planted the vineyards themselves and who were στρατευόμενοι—perhaps meaning "on campaign," or just involved with the army, whether active or not—were also allowed to pay the lower apomoira rate of 1/10.[374] The lower apomoira rate gave the state a way perhaps to incentivize the establishment of vineyards and orchards in inconvenient, high-risk areas and perhaps also to recognize that the expenses

[369] Ibid., 10-13.
[370] Muhs, *Tax Receipts*, 63.
[371] Ibid.
[372] Clarysse and Vandorpe, "Ptolemaic Apomoira," 20.
[373] Likewise, one particular area in the Oxyrhynchite nome received the better 1/10 rate, likely because it was only recently being brought into cultivation. Clarysse and Vandorpe, "Ptolemaic Apomoira," 20.
[374] Clarysse and Vandorpe, "Ptolemaic Apomoira," 19-20. In the case of certain kleruchs' receiving the lower rate, the 1/10 rate could have been a perk of their service, or it could be due to the fact that they were also expected to use their labor for the military and thus could not pour all their time into their vineyards.

associated with such an undertaking meant that the cultivators of those vineyards and orchards would not yet have been as able to pay a higher rate.

While proportional taxes on income may have encouraged riskier investments and thus greater price variability, proportional taxes on sales within Egypt were unlikely to have shaped price fluctuations.[375] Since sales taxes were uniform across Egyptian territory, tax shopping was not possible within Egypt, so it is unlikely that prices would have varied geographically in compensation for different sales tax rates. For example, the Ptolemies collected sales taxes on transfers and sales of property: e.g., the "tenth" (*p3 1/10*), a sales tax maintained early in the period, had been instituted before the Ptolemies came to Egypt and consisted of a 10% sales tax collected by the temples.[376] An additional flat fee of 2 ½ qite was charged for the sale of houses and burials, on top of the 10% sales tax—this was paid to the state rather than the temples.[377] It is theoretically possible that tax rates in Greek sales contracts may have differed from those in Demotic contracts, but the commodities discussed in the rest of this dissertation were not subject to variable sales tax rates, so a deeper analysis of sales taxes is beyond the present scope.

While the sales tax did not vary geographically within Egypt, there is evidence of temporal changes in the system of sales taxes, particularly around the same time as the fiscal reforms of

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[375] Sales tax could only be collected on sales which were documented, i.e., whose terms were specifically written in a document by a scribe and then registered. This tax was thus only collected on a small fraction of sales, likely those carried out by individuals who could already afford to legally document the property. It is unknown whether undocumented sales were even liable to sales tax, i.e., whether the tax was really on the sale itself or on the documentation of the sale.

[376] Since the tenth was charged at a rate of 10% of the sales price (or the value of the property involved), this tax is incredibly useful in establishing the prices of property for which prices were not normally recorded, such as houses. Muhs, *Tax Receipts*, 66-68; Muhs, *Ancient Egyptian Economy*, 235.

[377] Another "house tax" (*ḥḏ ʿ.wy*) is attested in a small sample of documents in early Ptolemaic Thebes, perhaps only early in the reign of Ptolemy II. Muhs has suggested that these mentions of payments of the house tax might actually be referencing partial payments towards the 2 ½ qite fee. In addition, receipts for burial plots in early Ptolemaic themes usually record a price of 2 ½ qite, regardless of the plot's size, which might indicate that the temples also charged their own fee on 'houses' for the dead. Muhs, *Tax Receipts*, 66-71, 95-96; Muhs, *Ancient Egyptian Economy*, 235.

Ptolemy IV; however, the new taxes did not coincide with a shift in rates that would have been significant enough to materially impact prices. Towards the end of the early Ptolemaic period, the tenth and the 2 ½ qite fee were replaced by a new pair of sales taxes, the copper tax (χαλκιαία or χαλκιεία) and the enrollment tax (ἐγκύκλιον, *jggryn*).[378] The copper tax was a sales tax of 4.188% of the sales price; Muhs suggests that it could be a reformulation of the 2 ½ qite fee for the tax of a house now under this new fiscal regime.[379] The enrollment tax was a sales tax: initially of 8.375% (exactly double the copper tax rate), later 5-10%, of the sales price to be paid at the tax office or royal bank.[380] As the copper tax was a reformulation of the 2 ½ qite fee, Muhs postulates that the enrollment tax might have been analogous to the tenth.[381] Despite the existence of change in sales taxes in the reign of Ptolemy IV, the changes were minor in degree and unlikely to have caused significant price fluctuations.

As discussed previously, sales taxes in Egypt did not vary regionally and therefore were not shoppable, but at an inter-kingdom scale, proportional taxes on imports were significantly higher in Egypt than taxes on domestic goods and on customs duties in other kingdoms.[382] These high customs duties likely discouraged imports into Egypt and drove up prices on those imports. These duties were assessed as a percentage of the declared value of the goods and paid in coins at the ports of Alexandria and Pelousion; the taxes had to be paid before arriving ships could unload

[378] The copper tax and enrollment tax were introduced around the same time as Ptolemy IV's fiscal reforms of his year 13 (210 BCE). The enrollment tax may have been related to the copying and registration of Demotic contracts. Another sales tax, known as the hundredth of heralds (ἑκατοστὴ κηρυκικῶν or ′ρ κηρυκικῶν) was a 1% tax on the sale price of goods bought at public auctions. Muhs, *Tax Receipts*, 66, 71-73.
[379] Muhs, *Tax Receipts*, 72.
[380] Ibid., 71.
[381] Ibid., 72.
[382] Muhs, *Ancient Egyptian Economy*, 237.

their cargoes.[383] The Ptolemies' unusually high customs duties have led some to deem their economic policies 'protectionist.' The state was certainly interested in protecting its own monopolies, but the extent to which the Ptolemies explicitly aimed to protect Egyptian industry in general from foreign competitors is much less clear, so the 'protectionist' label must be used with caution.

Customs duty rates differed depending on the type of goods imported. A papyrus from the Zenon archive, P. Cairo CG 59012 (259 BCE) records the tax rates on goods imported through Pelousion on two ships from Syria. A 50% customs duty was paid on sweet wine (γλυκύς), filtered wine (σηστός), vinegar (ὄξος), and white oil (ἔλαιον λευκόν).[384] A 33 1/3% customs duty rate was applied to wine from Chios and Thasos as well as dried figs.[385] A 25% rate was charged on honey, cheese, salt, fresh fish and meats, Samian earth, nuts, pomegranate seeds, and sponges.[386] The lowest rate, 20%, was paid on washed wool.[387] Alain Bresson has pointed out that while the high taxes (33 1/3%) on high-quality goods like Chian and Thasian wine seem logical, the even higher taxes (50%) on lower-quality goods like vinegar are more difficult to make sense of.[388] He argues that the goods taxed at the highest rate may have had a higher value per unit volume or per unit weight than the ostensibly higher-quality items taxed at lower rates—based on

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[383] Ships arriving at Alexandria came from around the Aegean world, while Pelousion was the main aquatic port of entry from Syria and Palestine. It is likely that goods arriving at the Red Sea ports and along the Nile at Egypt's southern border, likely at Elephantine, were also charged customs duties, but no texts survive to record such taxes. Muhs, *Ancient Egyptian Economy*, 237; P. J. Sijpesteijn, *Customs Duties in Graeco-Roman Egypt.* Studia Amstelodamensia ad Epigraphicam Ius Antiquum et Papyrologicam Pertinentia 17 (Zutphen: Terra Publishing Co., 1987), 1-2.

[384] Alain Bresson, "Wine, oil and delicacies at the Pelousion customs," in *Das imperiale Rom und der hellenistischen Osten: Festschrift für Jürgen Deininger zum 75. Geburtstag*, eds. Linda-Maria Günther and Volker Grieb (Wiesbaden: Franz Steiner Verlag, 2012), 69-72, 86-87; Muhs, *Ancient Egyptian Economy*, 238.

[385] Bresson, "Wine, oil and delicacies at the Pelousion customs," 69.

[386] Ibid.

[387] Ibid., 70.

[388] Ibid., 70-71.

the assumption that the value of the good and the rate at which it was taxes were likely directly correlated.[389]

The fact that people still imported even at these high rates indicates that some profit must still have been gained, implying a high retail markup on such imported goods as well as a sector of the population in Egypt with enough purchasing power to keep demand relatively high. Bresson estimates that the price of "white oil" imported into Pelousion from the Aegean was valued at a price three times as high as the price of the same good in Delos.[390] He reasons that the cost of transporting high value goods would have only made up less than 10% of their final sales price, so despite the seemingly exorbitant customs duties, merchants could still profit by importing such luxury goods.[391] There is also evidence of smuggling in an effort to bypass the high customs duties.[392] In any case, customs duties (along with the other high transaction costs associated with importing) would have led prices on imported goods in Ptolemaic Egypt to be significantly higher than those sourced domestically.

While the cost of taxes certainly contributed to part of the price of goods in Ptolemaic Egypt, most taxes did not display enough variation from region to region or reign to reign to have caused significant shifts in prices. However, greater price variability may be expected from those crops taxed proportionally than those taxed at flat rates. In particular, I hypothesize that the price of fruits and wines might have been more variable than the price of grains, in part because the Ptolemaic tax system encouraged investment in farming fruits by allowing the state to absorb the risk associated with those crops. High taxes on imports likely also contributed to high variability in the price of wines, as imported wines would have gone for much higher prices than domestic

[389] Ibid., 71, 78.
[390] Ibid., 79.
[391] Ibid.
[392] Manning, "Hellenistic Trade(rs)," 116, citing P. Lond. 7 1945 and P. Cairo Zenon 2 59240.

wines (as would have been the case for any imported products). Overall, though, most taxes were applied so generally, whether to people, grain crops, or sales, that they would have been unlikely to directly cause price fluctuations for most goods and services in Ptolemaic Egypt.

4.4.10 Private Contracting of State Commodity Monopolies

The Ptolemaic state insured its tax revenue through a system of private contractors; a similar system was also employed to insure the revenues from the sale of certain key commodities. While the specific mechanisms of the system differed for each commodity, in general, I expect that the greater the degree of the state's supervision, the less variation would exist in the commodity's supply. The more stable the supply, the more stable prices likely would have been in turn. Therefore, in theory, the institutions in place to supervise the production and/or sale of commodities would have effectively stabilized prices.

In the case of taxes, the state sold the rights to the revenue from money taxes at auction, and the highest bidder agreed to pay his bid for that tax in exchange for the revenues that were collected. If the taxes collected were higher than his bid, he would keep the profits, but if they were lower, he would be required to make up the difference. Thus these private tax farmers (τελῶναι) insured the state against potential losses and allowed the state to have a predictable stream of income from taxes, regardless of how much money was actually collected. The tax farmer paid a fixed wage to money tax collectors (λογευταί), who were appointed through an agreement between the tax farmer and the οἰκονόμος.[393] The tax farmer naturally wanted to collect as much revenue as possible, and even though he did not personally carry out the tax

[393] Muhs, *Tax Receipts*, 13.

collection, he could encourage tax collectors to be rather forceful in collecting.[394] The tax farming system allowed the state to maintain a consistent revenue base from taxation.

The Ptolemaic state employed a similar system of private contracting to insure its revenues from certain key commodities. These commodities—including seed oils, cloth, and beer—were produced and sold under the organization of the state, with the financial backing of private contractors.[395] Because it was technically illegal to produce the oils, in particular, for sale outside the state system, these industries have traditionally been referenced by historians as "monopolies."[396] In the case of other commodities, the state managed the production and distribution of some quantities of these goods, but without any stipulation that others could not do so outside its direct control. The state minimized its risk in the monopolies by farming its risks and profits off to private entrepreneurs, much as it did through tax farming. The revenues of a certain commodity in a certain district were sold at auction, and the highest bidder paid his bid for the expected revenues upfront into the royal bank. That contractor had bought the right to keep the revenues that were actually collected from that particular commodity monopoly. The contractor assumed the risk that he might collect less than he had bid at the auction in the hopes that he would actually be able to collect more in revenues and make a profit, which he would then keep. The state, in turn, could take in money sooner, and its revenues would not be damaged in the case of a poor harvest or problems in production. Since the contractor was assuming the risk associated

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[394] This may be the reason the state began to issue tax receipts to taxpayers: these taxpayers had written proof that they had already paid and could avoid the pressure to pay more than they owed. Since the state's revenues from money taxes were guaranteed, it was in the state's interest politically to protect taxpayers from overactive collecting. Muhs, *Tax Receipts,* 7.

[395] In part, the state's motivation in such activities seems to have been to obtain enough coined money to pay its employees. As with taxes, the state was able to have greater control over the transactions associated with the monopolies than with other, more private transactions, and for that reason it could stipulate that payments for these commodities be made in specific media of exchange, namely coins. This practice incentivized the circulation of coinage and ensured a stable flow of cash revenues into the royal bank.

[396] E.g., Muhs, *Ancient Egyptian Economy*, 236-238.

with the production and sale of these commodities, the state needed to make contracting attractive; it tempered the associated risks by supervising the production and regulating the prices of the commodities. As a result, I expect the prices of commodities within this system to have been stable over time and geography.

The most extensive of the state monopolies was that on certain seed oils, which were staple products for everyday use within Ptolemaic Egypt. The primary evidence for the organization of the oil monopoly comes from the Revenue Laws Papyrus (P. Rev.), which dates to 259 BCE, in the reign of Ptolemy II.[397] The text consists of a collection of instructions on how to protect the interests of contractors through supervised production and price regulation.[398] Columns 38-72 describe the ἐλαική, the state's monopoly on seed oils. Unfortunately the text does not discuss the process of auctioning off the contract for the ἐλαική's revenues, which occurred very early on in the process, before the seeds were harvested. However, P. Rev. does provide evidence of

[397] B. P. Grenfell, *Revenue Laws of Ptolemy Philadelphus* (Oxford: Clarendon, 1896); Roger S. Bagnall and Peter Derow, eds. *The Hellenistic Period: Historical Sources in Translation* (Malden: Blackwell, 2004), 181-195, Text 114.

[398] Although P. Rev. explains many of the rules and procedures associated with this monopoly, since it consists of an amalgamation of various royal decrees put forth at different times, and sometimes revised, its status as a neat, clear legal code has been disputed. As a result, the uniformity of the state's policies with regard to the monopoly can also be called into question. Rostovtzeff saw the texts as codified laws, complied into a codex, when he wrote that "The whole document seems to be an attempt at a codification of the rules which regulated those parts of the State economy which were organized as incomes of the state collected by tax farmers ... The 'Codex' was published by order of the king by the dioiketes Apollonius." However, more recently Jean Bingen has emphasized the less formal use of the texts, writing matter-of-factly, "It was not a code." Since the text originally represented a series of separate documents, Bingen does not think that they were originally intended as a single manuscript intended to dictate the management of the royal revenues. Instead, it is "a collection of documents for administrative or private use," or some intermediate blend of the two. As Bingen has pointed out, P. Rev. was not composed to provide full instructions for the organization of oil production. Instead, it is concerned with fiscal policy, how to financially protect contractors from bad outcomes. The current interpretation of P. Rev. as not a fixed code but rather as a set of various instructions that were collected over time implies that the monopoly might not always have been administered uniformly in actual practice and that the rules it includes might have been composed in response to specific problems administrators and contractors had faced. While the regulations and processes it describes might not have been universal, P. Rev. still does constitute the most complete explanation of the practice of private contracting of state monopolies. For further discussion, see Rostovtzeff, *A Large Estate in Egypt in the Third Century B.C.*, 165-66; Bingen, *Hellenistic Egypt*, 160 & 176.

supervision and planning at every stage in the oil supply chain: seed farming, oil production, wholesale distribution, and retail sale.

Although the actual farming of the plants that produced seeds from which oils could later be extracted was carried out by individual cultivators, it was state officials who developed annual agricultural plans (known as "sowing schedules") and oversaw farming to ensure that the plans were followed. The Ptolemaic state measured the level of the Nile inundation each year, and, based on these Nile levels, devised a sowing schedule for which crops should be sown on which lands once the waters receded.[399] A reference to such a sowing schedule can be found in P. Yale 1 36, dating to 190 BCE.[400] According to this letter, the sowing schedule was worked out among various officials of the central administration, but it was the responsibility of the local officials, including local police, to ensure that the schedule was implemented properly. P. Rev. specifies that sixty days before the harvest, the nomarch had to report the amount of land that each cultivator actually had sown.[401] If the amount was less than that agreed to in the sowing schedule, then the nomarch himself paid a penalty to the contractor.[402] He could then attempt to pass that penalty down to the individual cultivators and collect the cost of the payment from them.[403] Contractors assessed the fields once again right before the harvest and kept close track of production.[404] The

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[399] Pierre Vidal-Naquet, *Le Bordereau d'ensemencement dans l'Égypte ptolémaïque*. Papyrologica Bruxellensia 5 (Bruxelles: Fondation égyptologique reine Elisabeth, 1967); Hélène Cuvigny, *L'arpentage par espèces dans l'Égypte ptolémaïque*. Papyrologica Bruxellensia 20 (Bruxelles: Fondation égyptologique reine Elisabeth, 1985).

[400] John F. Oates, Alan E. Samuel, and Charles Bradford Welles, *Yale Papyri in the Beinecke Rare Book and Manuscript Library* I. American Studies in Papyrology 2 (New Haven: American Society of Papyrologists, 1967); Bagnall and Derow, *The Hellenistic Period*, 172-73, Text 106.

[401] P. Rev., 43/3-12.

[402] Ibid.

[403] Ibid.

[404] Once an individual cultivator was almost ready to harvest, he contacted his local nomarch or toparch (or, failing that, the οἰκονόμος) to contact the contractor who had won the collection contract for that area. This contractor then visited the cultivated land with these state officials and assessed it. The cultivator

nomarch thus had personal responsibility to the contractor for ensuring that the cultivators in his nome lived up to the sowing schedule the state had designed. The incentives were in place, therefore, for state officials and cultivators to work together to ensure that the supply of seeds at least met certain minimum thresholds.

After the harvest, the contractor had the exclusive rights to buy the seeds; as described by P. Rev., this process seems to have ensured minimal price variation. First, he was entitled to collect a 25% tax on the sesame and castor (i.e., he simply claimed 25% of the seeds upfront as a tax paid in kind).[405] After that first 25%, the contractor then purchased the rest of the seeds from the cultivators at prices specified by the state.[406] The cultivators were banned from selling the seeds to anyone other than the designated contractor, and, with some exceptions, all the produce was to be bought up by that contractor.[407] The contractor then stored the seeds in the countryside before their oil could be extracted.

Variation in the supply of seed oils was also minimized through state supervision of the process of producing oils from the seeds. It was a state official, the οἰκονόμος, who was responsible for setting up the oil factories and paying the wages of their employees in coins.[408] There are rules which aimed to prevent poorly organized work, oil-workers' leaving their assigned nome, outsiders' possessing oil-making equipment, and the import of oil from other nomes or from abroad.[409] The contractor, the οἰκονόμος, and the ἀντιγραφεύς, who was responsible for auditing the accounts, shared authority over the oil makers and the oil factories and thus could

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also assessed the amount of land he had sown with each type of seed, then the contractor and the cultivator signed an oath agreeing to this assessment. P. Rev., 42/5-20.
[405] P. Rev., 39/13-18.
[406] P. Rev., 39/1-7.
[407] R. Rev., 39/19-20.
[408] P. Rev., 45-46.
[409] Bingen, *Hellenistic Egypt*, 175-176.

enforce these rules.[410] P. Tebt. 3 703, a late third century BCE papyrus from Tebtunis, also explains that the οἰκονόμος should inspect the local oil factories regularly to ensure that they were as productive as possible in order to ensure higher rates of sale in the area.[411] He was ordered to be vigilant against theft from the factory; to this end, the οἰκονόμος was required to seal the factory's storehouses, which were to house seeds, oil, and any of the factory's implements which were not in use (to prevent others from using them for their own ends). While the contractor did take on financial risk, the state did not wash its hands of the monopoly once it had sold the contract.

State officials and private contractors collaborated to devise clear plans for the oil's wholesale distribution: again minimizing volatility in the process. After the oil was produced and ready to be sold, state agents (appointed by the οἰκονόμος and ἀντιγραφεύς) registered a list of oil dealers and retailers in each village.[412] These state agents then consulted with the contractors and together decided how much oil to take to which traders on which days.[413] The οἰκονόμος and ἀντιγραφεύς handled the transportation of these agreed-upon amounts of oil to each village.[414] Every five days, these state agents measured the oil out to each dealer and retailer, and collected payment in return.[415] They would then deposit this money into the contractor's account at the royal bank and debit his account for the cost of the transportation of the oil.[416] Since state agents were the ones who sold the oil to dealers, the state clearly had control over the wholesale price of these oils. It is to be expected that the wholesale price would therefore be relatively stable.

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[410] P. Rev., 46.
[411] Arthur S. Hunt and J. Gilbert Smyly, *The Tebtunis Papyri* III, Part I (London: Humphrey Milford, 1933), 66-102; Bagnall and Derow, *The Hellenistic Period*, 165-169, Text 103.
[412] P. Rev., 47/10-18.
[413] Ibid.
[414] P. Rev., 48/3-6.
[415] P. Rev., 48/7-12.
[416] Ibid.

It is unclear from P. Rev. whether retail prices were similarly fixed. Evidence in this regard can perhaps be found in P. Tebt. 3 703, which specifies that the οἰκονόμος should ensure that goods not be sold at prices higher than those prescribed:[417]

μελέτω δὲ σοι καὶ [ἵ]ν̣α̣ τ̣ὰ̣ [ὤ]ν̣ι̣α̣ μὴ πλείονος πωλῆται τῶν διαγεγραμ[μ]ένων τιμῶν· ὅσα δ᾽ ἂν ᾖι τιμὰς οὐχ ἑστη[κ]υ̣ίας ἔχοντα, ἐπὶ δὲ τοῖς ἐργαζομένοις [ἐσ]τὶν τ̣[άσ]σειν ἃς ἂν βο[ύ]λωνται, ἐξεταζέσ[θ]ω καὶ τοῦτο μὴ παρέργως, καὶ τὸ σύμμετρον ἐπιγένημα ⟦τα⟧ τάξας τῶν πω[λ]ουμένων φ̣ο̣ρ̣τίων συνανάγκα⟦ι⟧ζ̣ε̣ τ̣ο̣ὺ̣ς̣ . [.] . . κ̣ο̣υ̣[. .] . ς̣ τ̣ὰς διαθέσεις ποιεῖσθα[ι].	Take care that commodities not be sold for more than the prices fixed by ordinance. Examine closely all those which do not have fixed prices, and those for which it is up to the traders to set (the price) as they wish, and after you prescribe a moderate profit for the goods that are being sold, you must make the … dispose of them.

This text indicates that the οἰκονόμος had the authority to enforce market prices, both for goods for which the price is fixed and even for other goods. It is likely that "the prices fixed by ordinance" is a reference to the price of oil and perhaps other commodities for which the state maintained a monopoly. For other goods, the οἰκονόμος could determine the seller's profit and force the seller to sell at the appropriate price. It appears that for these other goods, the exact retail price was not fixed, but local authorities could fix levels of profit.

While P. Rev. indicates that the state fixed the price of oil, that price was not always adequately enforced by the authorities. The letter Chrest. Wilck. 300 (July 28, 217 BCE) demonstrates that at times, sellers overcharged for oil:[418]

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[417] P. Tebt. III 703, 174-182. The Greek presented here is from the Papyrological Navigator, <http://papyri.info/ddbdp/p.tebt;3.1;703#to-app-subst05> (accessed September 13, 2015). The translation is my own. See also Bagnall and Derow, *The Hellenistic Period,* 165-69, Text 103; Michel Austin, *The Hellenistic World from Alexander to the Roman Conquest: A Selection of Ancient Sources in Translation*, 2nd ed. (Cambridge: Cambridge University Press, 2006), 558-562, Text 319.

[418] Bagnall and Derow, *The Hellenistic Period*, 196-97 (Text 116). The Greek presented here is from Trismegistos < http://www.trismegistos.org/tm/detail.php?tm=7471> (accessed August 31, 2015). The translation is my own.

Ὧρος Ἁρμάει χαίρειν. προσπέπτωκέ μοι παρὰ πλειόνων τῶν ἐκ τοῦ νομ[οῦ] καταπεπλευκότων τὸ ἔλαιον π[ωλ]εῖσθαι πλείονος τιμῆς τῆς ἐν τῶι προστάγμα[τι] διασεσαφημένης, παρὰ δὲ σοῦ οὐθ[ὲ]ν ἡμῖν προσπεφώνηται οὐδ' Ἰμούθηι τ[ῶι] υἱῶι ἐπὶ τῶν τόπων μεταδεδώκα[τ]ε. ἔτι οὖν καὶ νῦν διασάφησόν μοι, πῶς πωλε[ῖται] τὸ ἔλαιον ἐν τοῖς κατὰ σὲ τόποις, ὅπως ἀνενέγκωμεν ἐπὶ Θεογένην τὸν διοικητήν. καὶ εἰς τὸ λοιπὸν δ' ἐπι[μ]ελὲς ὑμῖν γι[νέ]σθω, ἐάν τι τοιοῦτο γίνηται ἢ παραλογεύωνται οἱ γεωργοὶ καὶ οἱ ἄλλοι ἢ ἐὰν ἄλλο τι ἀδίκημα γίνηται, γράφειν πρὸς ἡμᾶς ἢ Ἰμούθηι τῶι υἱῶι ἐπὶ τῶν τόπων ἐπιδιδόναι, ὅπω[ς] διὰ τούτου πέμπηται ἡμῖν καὶ ἀναφέρωμεν ἐπὶ τὸν διοικητήν. (hand 2) ἔρρωσο. (ἔτους) ε Παῦνι ις.	Horos to Harmais, greeting. I have heard from many of those who have sailed down from the nome that oil is being sold at a higher price than what was made clear in the ordinance, but nothing from you has been reported to me, nor have you communicated to Imouthes my son, who is on location. Still now, then, inform me how the oil is sold in your *topoi*, so that I might report to Theogenes the *dioiketes*. And from now on be careful, if such a thing should happen or the cultivators and the others should suffer extortion or if any other injustice should occur, to write to me or to give (a report) to Imouthes my son on location, so that it may be sent to me through him and I may report to the *dioiketes*. Farewell. Year 5, Pauni 16. (Address) To Harmais.

Horos, who was presumably the basilikos grammateus of the Arsinoite nome, is writing to his subordinate Harmais, who was the topogrammateus, because Horos was hearing from travelers from the Arsinoite nome of exorbitant prices being charged there for oil.[419] He should have heard about this activity directly from Harmais, but Harmais seems to be either negligent or deliberately keeping Horos in the dark. The wording of the letter does not specify who, exactly, was overcharging, i.e., at what stage in the process of the monopoly this illegal behavior was taking place. Bagnall and Derow presume the high prices were being charged at the wholesale level "by the contractors from the government," which may have been the case especially if the contractors were colluding with state agents.[420] On the other hand, the price gouging may have been at the retail level at the hands of the oil dealers, as P. Tebt. 3 703 warns the οἰκονόμος to be vigilant against such activity. Another letter from the time, W. Chr. 301, warns oil dealers of the judgments that will come to them if they overcharge. The existence of regulations against

[419] Ibid., 196.
[420] Ibid., *The Hellenistic Period,* 197.

overcharging indicates that the price of oils was not absolutely fixed, but also that institutions were in place to attempt to minimize potential price volatility.

Private contracting systems similar to that of the seed oil monopoly may also have existed for other commodities: namely, cloth, beer, and aromatics. There is evidence that the Ptolemaic state set a schedule for the amount of cloth to be produced in each nome and then contracted with weavers to weave certain quantities.[421] P. Tebt. 3 703 explains that the duties of an οἰκονόμος include ensuring that the maximum number of looms are in operation and that the productivity of the weavers is up to quota.[422] The text indicates that the state also charged fixed fines to any weavers who did not make their quotas. The οἰκονόμος was also required to inspect the quality of the linen and to provide other supplies, such as castor-oil and natron, that the weavers might need. These supplies and the looms themselves seem to have been provided to the weavers by the state, since the οἰκονόμος was responsible for taking away any unused looms.[423] Weavers were also paid by the state, either through the purchase price of the cloth or through rations in kind paid for their services.[424] Muhs, Grünewald, and van den Berg-Onstwedder have reasoned that, if the analogy

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[421] This state involvement is usually referenced as the 'cloth monopoly,' by analogy to the oil monopoly, but in this case the term 'monopoly' does not fit the evidence, since there were no regulations in place to limit the production of cloth outside this state-managed system. Brian Muhs, Arno Grünewald, and Gonnie van den Berg-Onstewedder, "The Papyri of Phanesis Son of Nechthuris, Oil-Merchant of Tebtunis, and the Ptolemaic Cloth Monopoly," *Enchoria* 28 (2002-2003): 80-81; Muhs, *Ancient Egyptian Economy*, 250.

[422] Hunt and Smyly, *The Tebtunis Papyri* III, Part I, 66-102; Bagnall and Derow, *The Hellenistic Period*, 165-169, Text 103.

[423] In some cases, weaving-houses were owned and operated by state officials, such as Ptolemy II's dioiketes, Apollonios, or by major institutions like temples. D. J. Thompson, *Memphis under the Ptolemies* (Princeton: Princeton University Press, 1988), 53-59; Ariel Loftus, "A Textile Factory in the Third Century BC Memphis: Labor, Capital and Private Enterprise in the Zenon Archive," in *Archéologie des textiles des origines au Ve siècle: Actes du colloque de Lattes, octobre 1999*, ed. Dominique Cardon and Michel Feugère (Montagnac: Éditions Monique Mergoil, 2000), 173-86; Muhs, et al., "The Papyri of Phanesis Son of Nechthuris," 81.

[424] P. Hibeh 1 67 and 68 (228 BCE) constitute letters from the state to a royal banker ordering him to pay certain fixed prices (in coins) to weavers in the Herakleopolite nome for fabrics of various sorts woven on behalf of the state. P. Lille dem. 3 99 records a census from c. 228 BCE that contains a list of payments

of the oil and cloth monopolies is appropriate, there may have been a contractor in between the weavers and the state to financially insure the planned quota of weaving.[425] Three texts published by de Cenival--P. Lille 50, P. Lille 51, and P. Lille 64--mention payment of a *prbwỉ*, or "deposit," made on the value of quotas of oil, and it is possible that similar deposits were made by private individuals on behalf of weavers.[426] In any case, after the quotas of cloth were produced, they were sold to dealers, who then presumably sold it to individual buyers.[427] Since the state supervised the production levels of cloth through quotas, the cloth supply was likely steady. Prices would likely be steady in turn; however, the lack of defined, fixed prices for cloth (as opposed to oils) indicates that cloth prices probably varied more than did oil prices.

The production and sale of beer may have fallen under a similarly contracted operation. A Greek account, P. Hibeh Greek 1 113, mentions the oil monopoly (ἐλαική) in parallel with ζυτηρά, the "revenues from beer," which Muhs has interpreted as the name of the 'beer monopoly' and the payments involved in it.[428] In any case, the parallel mention indicates some similarity between the two. A beer tax (*pȝ tny ḥnq.t*, *ḥḏ ḥnq.t*, *pȝ ḥnq.t*, or simply *ḥnq.t*) known

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made annually and monthly by the royal bank to weavers for their cloth. These payments were in coins, and although some weavers also received rations (Demotic *ʿq.w*) in kind, those rations were deducted from their payments in coins. Bernard P. Grenfell and Arthur S. Hunt, *The Hibeh Papyri* I (London: Egypt Exploration Fund, 1906), 214-18; Muhs et al., "The Papyri of Phanesis Son of Nechthuris," 80.

[425] Muhs, et al., "The Papyri of Phanesis Son of Nechthuris," 81. The viability of this hypothesis rests on the risk level of cloth quotas vis-à-vis oil quotas. The agricultural yields necessary to produce a certain quota of seed oil depended on ecological factors that could only be helped along so much, whereas cloth production may have depended mainly on the efficiency of the weavers, humans more open to influence than nature. If monopolized cloth production were less risky for the state, the state would have had less of an incentive to contract out bids on its profits and losses.

[426] Françoise de Cenival, *Cautionnements démotiques du début de l'époque ptolémaïque* (Paris: Éditions Klincksieck, 1973), 48-53, 74-75, 189-196.

[427] Demotic letters from Tebtunis dating to Year 22 of Ptolemy III (225 BCE), P. Cairo CG 31161, 31216, and 31246-31248, record cloth dealers' confirmation that they received and paid for certain quantities of cloth. Muhs, et al, "The Papyri of Phanesis Son of Nechthunis"; Brian Muhs, "Addition to: 'The Papyri of Phanesis Son of Nechthunis, Oil-Merchant of Tebtunis, and the Ptolemaic Cloth Monopoly," *Enchoria* 29 (2004-2005), 53-54.

[428] P. Hibeh Greek I 113, 11-12; Muhs, *Tax Receipts*, 79, n. 567.

from several early Ptolemaic tax receipts seems to have represented a sales tax paid by beer dealers who were buying large quantities of beer from brewers.[429] Muhs suggests that, through the parallel to the oil monopoly, the brewers may have themselves bought contracts to brew with barley supplied by the state and/or to sell beer locally.[430] If the state were providing beer-making supplies or supervising beer production, then I would expect the beer supply—and, by extension, beer prices—to remain more stable than that of unsupervised commodities.

There is some evidence from later in the Ptolemaic period that the state regulated the price of aromatics such as myrrh.[431] Bagnall and Derow have suggested that myrrh was usually sold by contractors but could also be sold by state officials, based on P. Tebt. 1 35 (111 BCE).[432] This text records an order given by Apollonios regulating the maximum price of myrrh:[433]

Ἀπολλώνιος [τ]οῖς ἐν τῆι Πολέμωνος μεριδος ἐπιστάταις καὶ τοῖς ἄλλοις τοῖς ἐπὶ χρειῶν τεταγμένοις χαίρειν. τῆς ἀναδεδομένης κατὰ κώμην ζμύρνης μηδένα πλεῖον πρασσεισιν τῆς μνᾶς ἀργυ(ρίου) (δραχμῶν) μ, ἐν χα(λκῶι) (ταλάντων) γ Β, καὶ τούτοις καταγωγίμου τῶι (ταλάντωι) (δραχμῶν) σ, ταῦτα δὲ διαγρ(άφειν) ἕως γ τοῦ Φαρμοῦθι τῶι ἀπεσταλμένωι τουτωι χάριν πράκτορι. τὸ δ' ὑποκείμενον πρόγραμμαἐκτεθήι τῶι καὶ διὰ τῆς τοῦ κωμογραμματέως γνώμης, ὃς κ[α]ὶ μεθ' ὑμῶν ὑπὸ τὴν ἐντολὴν {ε} ὑπογράφει· ἠι ὅτι	Apollonios to the *epistatai* in the division of Polemon and the other officials, greeting. For the myrrh distributed in the villages no one shall exact more than 40 drachmas of silver for a mina-weight, or in bronze 3 talents 2,000 drachmas, and 200 drachmas per talent for transport; this shall be paid not later than Pharmouthi 3 to the collector sent for this purpose. Let the following notice be published according to the judgment of the *komogrammateus*, who shall sign below the order with you. Anyone acting contrary to these orders will render himself liable to accusation.

[429] Muhs, *Tax Receipts,* 79-80.
[430] Ibid. P. Lond. 7 1976, from the Zenon archive, suggests that local publicans contracted to buy quantities of beer from brewers, which they then sold to thirsty locals. Other letters in the Zenon archive show that brewers contracted with Apollonios to produce beer with the grain he sold to them. Therefore, like the oil monopoly, the beer monopoly involved both producers (brewers) and dealers.
[431] This evidence lies outside the temporal scope of the dissertation, and the extent to which similar operations were in place before 186 BCE remains unknown. Nontheless, it may be helpful to keep in mind that the state did not only regulate the supply and price of basic, core commodities, but also some more luxurious goods.
[432] Bagnall and Derow, *The Hellenistic Period*, 197.
[433] Ibid. The Greek here is from Trismegistos <http://www.trismegistos.org/tm/detail.php?tm=78769> (accessed August 31, 2015).

ὁ παρὰ ταῦτα ποιῶν ἑ[α]υτὸν [[ε̣.]] αἰτιάσεται. πεπόμφαμεν δὲ τούτων χάριν καὶ τοὺς μαχαιροφόρους. ἔρρωσθε. (ἔτους) ϛ Φαρμοῦθι β. τοὺς ἐπ̣..( ) παρὰ τῶν κατὰ κώμην ἐπιστατῶν καὶ τῶν ἄλλων ζμύρναν μὴ πλεῖον διαγράφειν τῆς μνᾶς ἀργυ(ρίου) (δραχμῶν) μ, ἐν χα(λκῶι) (ταλάντων) γ (δραχμῶν) Β, καὶ καταγώγιον τῶι (ταλάντωι) (δραχμῶν) σ, ἠι ὅτι παρὰ ταῦτα ποιῶν ἑαυτὸν αἰτιάσεται.	We have therefore also sent the sword-bearers. Farewell. Year 6, Pharmouthi 2. Purchasers of myrrh from the *epistatai* of the various villages and from other (officials) shall not pay more than 40 drachmas of silver for the mina-weight, or in bronze 3 talents 2,000 drachmas, and for transport 200 drachmas per talent; anyone acting contrary to these orders will render himself liable to accusation.

The price of myrrh in this case was not 'fixed,' strictly speaking, but a maximum was given. In this regard, Bagnall and Derow write: "The price is thus fixed, since maximum was no doubt minimum."[434] The text implies that the *epistatai* were selling the myrrh as opposed to the usual private contractors; Bagnall and Derow infer that the contractors were unable to sell the myrrh for some reason. They take the presence of the "sword-bearers" (μαχαιροφόροι) to mean that the epistatai needed armed backup in order to get the required price in what was "some kind of abnormal forced sale."[435] However, since the text later announces that those who bought myrrh for a higher price would also face judgment, which would be unexpected in the case of a forced sale, another interpretation is possible. Perhaps the supply of myrrh was unusually low, and the state was trying to prevent price gouging, even bringing in sword-bearers to enforce a price that was lower than what the market would dictate. While in oil, cloth, and beer, the state attempted to control supply, there is no evidence for similar control over the myrrh supply: this lack of monitoring meant that supply could fluctuate in ways that made the fixed prices difficult to enforce.

[434] Bagnall and Derow, *The Hellenistic Period*, 197.
[435] Ibid.

Through its commodity monopolies, the Ptolemaic state effectively stabilized access to staple commodities.[436] In the case of the oil monopoly, the monopoly for which the most evidence exists, the state held a great deal of control over supply. It set the schedule for how much would be sowed and restricted its movement, even from nome to nome within Egypt. It also had a say in which dealers could buy oil. As discussed above, the Ptolemaic state collected grain through taxes and deposited it into the network of royal granaries, transferring grain among them to ensure a steady supply throughout Egypt. In setting the sowing schedule and restricting the movement of this product, the state also regulated the supply of oil in each nome (although there is no evidence of transfers from place to place). Since the production of oil from nome to nome and region to region was tightly regulated, it is likely that oil prices were similar across space. This, coupled with the state's practice of price fixing, likely meant that oil prices were less volatile than the prices of other, less regulated commodities. I therefore expect to find very little variation in the price of these commodities supervised by the state: namely, oils, cloth, and perhaps beer.

4.4.11 The Organization of Labor

The cost of labor is one component of the ultimate price of a good. Therefore, changes in the cost of labor are generally reflected in change in prices of the products of that labor. Labor costs can change due to differences in the relative quality or quantity of laborers. Qualitatively, for example, skilled labor is generally more expensive than unskilled labor because of its greater

[436] The commodity monopolies also helped the Ptolemies' efforts towards monetization by keeping coins in circulation. These industries were traditionally managed by temples, who would sell the commodities and hoard the coins they received in exchange. But in the new state-managed system, the contractor's payment to the state passed through the royal bank. Profits from the sale to local dealers and retailers manifested as coins back in the pocket of the contractor. These dealers and retailers also received coins from the individuals who bought the goods for consumption. Thus coins ended up going to the royal bank, contractors, dealers, and retailers, all of whom were engaged in plenty of business that would keep those coins in circulation rather than in a stagnant treasury.

utility. Labor can also vary in cost depending on its organizational structure (e.g., the cost of a day's labor from a hired hand might differ from that of a slave). Quantitatively, when labor is scarce, it is usually more expensive—in this sense, the price of labor is theoretically no different from that of any other resource in behaving in accordance with basic supply and demand. Within the context of the present investigation, it is likely that quantitative changes in the labor supply had the greater impact on commodity price fluctuations than did variation in the quality or organization of labor.

From a qualitative perspective, I expect that skilled labor in Ptolemaic Egypt cost more than unskilled. That higher labor cost would have then contributed to the higher cost of goods produced with skilled labor. However, it is unlikely that this basic difference in the cost of skilled vs. unskilled labor would have played a role in commodity price fluctuations. I know of no new technologies, for example, that allowed unskilled labor to replace skilled and drive down costs.[437] There is also no evidence of a rise in education levels, for example, that could have driven down the price of skilled labor.

In Ptolemaic Egypt, there existed a variety of forms of labor organization that qualitatively impacted the nature of the employment. These included direct employment, contracted labor, corvée labor, and slavery: the costs associated with each organizational form differed from each other. At a basic level, a prospective employer could hire individuals himself (i.e., directly) in an arrangement that could be ongoing, bound by time, or bound by the completion of a given project.[438] Direct employment allowed the employer a high degree control over his employees and their work process. For this reason, direct employment was used for work that required a high

[437] P. Lond. 1954, a petition to Apollonios from Egyptian peasants, includes a complaint from the peasants that their agricultural knowledge was being overlooked. However, there is no evidence that they were being replaced by cheaper laborers.
[438] von Reden, *Money in Ptolemaic Egypt*, 144.

degree of trust between employer and employee, such as domestic work and the care of domestic animals, including horses, dogs, and birds.[439] Administrative posts like those of scribes and managers for private estates were usually hired directly. The state likewise used direct employment for its officials, especially police, guards, royal bankers, and overseers of granaries, since these posts needed to be held by individuals who could be trusted.[440] Beyond the trust factor that direct employment allowed, these posts were also generally for more stable, ongoing work. The cost of labor hired directly would likely have been relatively stable, given the long-term nature of the work; therefore goods produced through directly-hired labor may have had more stable prices than goods produced with labor hired on an as-needed basis. However, since directly-hired labor was primarily used for domestic and administrative posts, rather than directly productive work, I do not expect this form of labor organization to have had a significant impact on commodity prices.

An employer could also hire labor indirectly through an employment contractor (ἐργολάβος); this arrangement was commonly used for temporary project-based labor and physical work.[441] The contractor acted as a middleman and guaranteed that the project would be finished in a set period of time with a set budget and a set number of workers, whom he would recruit and whose wages he would pay. He was personally responsible for the supply of labor and

[439] Ibid.
[440] von Reden, *Money in Ptolemaic Egypt*, 148. Concessionary banks, however, operated through contracts with the state and thus are a notable exception to the rule of hiring bankers directly. These banks seem to have been a step towards the development of private banks not supervised by the state.
[441] Contracted employment was particularly common for, as von Reden has listed, "works on the irrigation system, stone-cutting, brick-making, construction work, carpentry, pottery, painting, carpet-making, transport and various kinds of unskilled agricultural work, such as clearing and burning brushwood, planting and pruning." The state itself used employment contractors for its projects; these contracts, like those for the monopolies and tax collection, were sold at auction within villages. See von Reden, *Money in Ptolemaic Egypt*, 145-46, where she cites P. Cairo Zenon II 59247 (252 BCE).

needed, therefore, to prevent workers from abandoning the project early or going on strike.[442] If he was unable to live up to the guarantee of productivity he agreed to in the contract, he, rather than the workers, would be the one to face real consequences.[443] The employer would typically pre-pay an installment for the finished project upfront, and sometimes other installments throughout the work. To ensure that he was not cheated out of those payments, i.e., that the work would actually be completed, employment contracts sometimes included stipulations that the workers' movements be restricted.[444] If the contractor failed to finish the project or to return any tools or other capital the employer had loaned him, the contractor was liable to imprisonment.[445] As a result of these potential consequences for negligence, contractors tended to be more efficient than workers hired directly, even though the employer was not overseeing the work as closely when hiring labor through a contractor, von Reden has argued.[446] As in the case of state-contracted tax collection or commodity monopolies, contracted labor likewise allowed the employer to minimize the risk of the project's not being completed or running into difficulties by fixing the employer's costs upfront. An employer who hired labor through a middleman certainly had to pay more for that labor than he would if he recruited, hired, and managed workers himself (i.e., he had to pay for the labor of the contractor in addition to the laborers). For that reason, working through a middlemen may not have been the most profitable way of organizing labor, but the aim seems to have been predictability—i.e., the minimization of risk--rather than maximizing profits.[447] To balance risk and transaction costs, an employer might mix forms of labor organization, employing

[442] von Reden, *Money in Ptolemaic Egypt*, 147-48.
[443] The contracts could include stipulations that, for example, the contractor would not be able to extend any deadlines, or that an inspector would look closely at the contractor's expenditures on the project along the way. von Reden, *Money in Ptolemaic Egypt*, 145.
[444] von Reden, *Money in Ptolemaic Egypt*, 146.
[445] Ibid.
[446] Ibid., 147-48.
[447] Ibid., 147-50.

some workers directly and others through a contractor.[448] Since the costs and benefits of contracted vs. directly-hired labor were relatively balanced and employers probably used multiple forms of labor organization, I do not expect the difference between these forms of labor organization to have been a major driver of commodity price fluctuations.

Other forms of labor organization in Ptolemaic Egypt were less freely organized; for example, the state maintained a corvée labor requirement, to which almost all men were liable in some form.[449] Men were required to perform compulsory labor on Egypt's infrastructure, mainly working on canals, dykes, dams, and other embankments; with this end, each man was required to move a fixed amount of earth (30 naubia) each year, which probably equated to 10-24 days of work.[450] It was possible for a man to buy his way out of his corvée labor by paying an additional tax (λειτουργικόν, *ḥḏ ꜥrt*), the rate for which seems to have been close to the wages paid to the extra laborers hired to do the same amount of work.[451] Since corvée labor was used for infrastructure rather than the direct production of goods for sale, it probably did not impact fluctuations in commodity prices. However, corvée labor may have impacted broader labor prices. The demand for agricultural labor (perhaps the most common source of demand for labor

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[448] Ibid., 149-50.

[449] An account of compulsory labor from Thebes, UPZ II 157 (c. 242/1 BCE), lists certain categories of men who were exempt, including those who could not physically labor (the elderly, disabled, sick, and deceased), those who were busy on other work for the state (active soldiers and police), and those in privileged positions (certain state officials and tax-Hellenes). Likewise, kleruchs were exempt from corvée work, but to make up for their exemption, they were liable to an extra tax, the dyke tax (χωματικόν). von Reden, *Money in Ptolemaic Egypt*, 137; Muhs, *Tax Receipts*, 59.

[450] Thompson has reasoned that a man could move about three naubia a day, which means his compulsory labor amounted to about ten days, or one Egyptian week, of work per year. Muhs has estimated the time required to complete the corvée service at between ten and 24 days. Dorothy J. Thompson, "Irrigation and Drainage in the Early Ptolemaic Fayyum," in *Agriculture in Egypt: From Pharaonic to Modern Times*, ed. Alan K. Bowman and Eugene Rogan (Oxford: Oxford University Press, 1999), 107-22.
Muhs, *Tax Receipts*, 57-58; von Reden, *Money in Ptolemaic Egypt*, 137.

[451] Over time more men seem to have chosen to pay the tax rather than do the work, and the corvée system was transformed into paid labor as more paid laborers needed to be hired to replace the ones working by compulsion. Muhs, *Tax Receipts*, 57-59. von Reden, *Money in Ptolemaic Egypt*, 136.

in antiquity) was seasonal, and corvée labor existed to ensure the state had access to labor even during periods of peak demand (the harvest and sowing seasons). Therefore corvée could have removed some of the labor supply from the market for use in dam and dyke repair—which likely occurred at times of peak agricultural demand, right before or after the inundation. The corvée requirement could have driven up the price of labor at times when the price of labor would have been high anyway.

Ptolemaic Egypt also included slave labor.[452] Prisoners of war from Syria were imported to Egypt as slaves, and from the reign of Ptolemy II on, slaves were also imported from Ethiopia.[453] In general, these slaves do not seem to have been engaged in large-scale chattel slavery or productive work, but rather made up household staff.[454] Owners of large estates also used slaves for work that required a high degree of trust, such as the work of travelling agents or managers, likely because slaves could reasonably be expected to stay with the household for a long period of time and therefore built strong relationships with their owners.[455] While most slaves worked in their owner's household, in a form of organization similar to directly-hired labor, others were rented out by their owners, who were in that sense similar to employment contractors.[456] The

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[452] Reinhold Scholl, *Sklaverei in den Zenonpapyri: eine Untersuchung zu den Sklaventermini, zum Sklavenerwerb und zur Sklavenflucht* (Trier: Verlag Historische Forschungen, 1983); Reinhold Scholl, *Corpus der Ptolemäischen Sklaventexte*, 3 vols. (Stuttgart, Steiner, 1990).

[453] Izabela Bieżuńska-Małovist, *L'esclavage dans l'Égypte gréco-romaine vol. I: Période ptolemaïque*, trans. Jerzy Wolf and Janina Kasińska (Wrocław: Zakład Narodowy im. Ossińskich, 1974), 54-58; von Reden, *Money in Ptolemaic Egypt*, 132.

[454] Even most households who owned slaves—which in the Fayyum were mainly Greek households—did not own more than one. Within a household, slaves might have worked in maintaining the home, entertaining guests, or wet-nursing infants. von Reden, *Money in Ptolemaic Egypt*, 131.

[455] There is evidence in the Zenon archive of slaves acting as Zenon's agents, lending and borrowing money on his behalf, carrying out other financial business, and even paying the wages of workers. Thus slaves were allowed to handle money, and they were also given grain and clothing allowances, which they could either consume or sell for cash. von Reden, *Money in Ptolemaic Egypt*, 133-36; Scholl, *Corpus der Ptolemäischen Sklaventexte* II, 517.

[456] As in the case of contract employment, this labor could be agricultural in nature, but it also extended into the household. For example, there is evidence of a harp-girl who lived permanently in Apollonios'

impact of the existence of slave labor on commodity price fluctuations was likely insignificant, since this labor was not employed in a dramatically different way or at a larger scale than free labor.

Differences in the qualitative form of labor organization used by employers likely were not major drivers of commodity price variation. However, the existence of this variety of forms is one indicator of potential challenges in the quantitative supply of labor. It was helpful to have a diversified portfolio of labor options in a society that could face shocks to the labor supply. There is textual evidence of employers' having difficulty finding or maintaining an adequate supply of workers. Such challenges could be caused by workers' abandoning efforts before the project was complete, going on strike, or simply not being available.[457] Contractors could help mitigate some of these difficulties by taking on the risk of an inadequate labor supply, but even if the risk were passed down, it must be kept in mind that that risk still existed. The industries most effected by supply shocks were likely project-based, including agriculture and construction, since those industries required high numbers of workers without strong social ties between employer and employee. I expect that times of particular labor shortages or high demand for labor, such as during the harvest and sowing season, as well as at times of war or political instability, commodity prices may have risen to support the likely increased price of labor. Employers who treated their employees poorly may have faced strikes or work-abandonment more frequently than friendlier employers, but the extent to which poor employers could have raised the price of their commodity products would depend on the extent to which those prices were controlled by the market. A

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house, despite her being owned by someone else. The labor of contracted slaves could be compensated through rents (ἀποφοραί) paid directly to their owners or through wages, which may have been paid on similar terms to those of free workers, but a portion of which was paid back to the owner. von Reden, *Money in Ptolemaic Egypt*, 135-36.

[457] See von Reden, *Money in Ptolemaic Egypt*, 147 & n. 81, in addition to 229 for more detailed references.

supplier could only charge a price that the market would support, after all, even if his transaction costs were higher than those of his peers. For this reason, it is necessary to analyze the extent to which individual sellers could set their own prices for commodities and to which commodity prices were controlled by 'the market.'

4.4.12 Markets and 'The Market'

In their recent volume on the history of market performance, van der Spek, van Leeuwen, and van Zanden have adopted Gravelle and Rees' definition of a market: "'a market exists whenever two or more individuals are prepared to enter into an exchange transaction, regardless of time or place.'"[458] Based on that general definition, it is beyond doubt that 'markets' existed in Ptolemaic Egypt. But did these markets shape prices? That is, to what extent could individual actors establish prices individually, and to what extent did they have to accept prices dictated by market forces?[459] The degree of market control of prices depends on two primary factors: (1) the power of individual actors and (2) access to information.

Regarding (1), price-fixing power could come from the legal right to fix prices and/or from the existence of a limited number buyers and/or sellers. That is, powerful buyers and sellers can place artificial restrictions on market processes that prevent prices from reaching

[458] R. J. van der Spek, Bas van Leeuwen, and Jan Luiten van Zanden, "An introduction: markets from Ancient Babylonia to the modern world," in *A History of Market Performance: From ancient Babylonia to the modern world*, ed. R. J. van der Spek, Bas van Leeuwen, and Jan Luiten van Zanden (London: Routledge, 2015), 3, citing Hugh Gravelle and Ray Rees, *Microeconomics*, 2nd ed. (London: Longman, 1992), 3.

[459] Here and throughout, I use "individual actor" to refer both to individual people and to institutions. An "actor" is essentially an economic entity that can make decisions and take actions.

equilibrium.[460] Restrictions on sellers, such as monopolies and import barriers, artificially limit supply and keep prices high, whereas restrictions on buyers, such as collusion by a few large, powerful buying entities, can suppress prices to artificially low levels.[461] In Ptolemaic Egypt, there were clearly official restrictions on sellers for certain commodities that artificially restricted price fluctuations. The state's monopoly on seed oils, as recorded in P. Rev., gave the state the legal right to fix the retail price of those oils, and the state also limited retail sales to sellers specifically chosen by state agents. Aside from the commodity monopolies discussed above, in which the state had control of prices even if the profits went to private contractors, there is currently no evidence of other officially monopolistic entities. That is, there is no evidence of powerful businesses that held legally-mandated monopolies on certain goods.

However, there is still a possibility that, in practice, some goods could only be acquired from a limited number of sellers: sellers in these cases would have greater power to establish prices. In part because of the expense involved in long-distance trade, it is likely that goods that required such distant transportation would only be available locally from a limited number of wealthy sellers. Egypt's high customs duties limited the number of businesses that could have imported into the Ptolemaic kingdom.[462] Imported goods, such as wine, woods, metals, textiles, and spices, were probably sold by a smaller group of relatively powerful sellers and therefore may have faced greater price variability based on the needs and wants of these sellers.[463]

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[460] Isabelle Piot-Lepetit and Robert M'Barek, "Methods to Analyse Agricultural Commodity Price Volatility," in *Methods to Analyse Agricultural Commodity Price Volatility*, eds. Isabelle Piot-Lepetit and Robert M'Barek (New York: Springer, 2011), 1-11, esp. 4.
[461] Ibid., 4.
[462] For a more detailed discussion of Ptolemaic customs duties, see under 4.4.9 "Taxes," above.
[463] For a more detailed discussion of imported goods, see under 4.2.5 "Boundaries of the 'Egyptian' economy," above.

Likewise, the prices of goods that were difficult to transport may have been less subject to market forces. Greater mobility tends to limit spatial price differences, since supply can shift geographically to coincide with demand.[464] In Ptolemaic Egypt, certain bulky commodities were sold to buyers directly at their place of production—which might imply a limited number of sellers to choose from. For example, Muhs has pointed out that beer, as an unwieldy commodity that would have been expensive to transport, was sold at breweries.[465] Likewise, animals like donkeys were probably not transported long distances for sale, so local buyers would have fewer opportunities to price-shop. The fewer the buying options available to buyers, the greater the power sellers would have had to establish their own prices.

On other occasions, the power to establish prices outside of typical market forces lay in the hands of buyers. Sellers may have had limited selling options if they dealt with larger wealthy households. For example, there is evidence that some traveling retail agents had regular contact with their buyers, going directly to their clients' homes, farms, or workshops to make sales.[466] These transactions were likely not anonymous; if buyers and sellers had stickier social ties, it may have been more difficult for buyers to shop around and buy from whomever they wished. However, since clients seem to have consisted of larger households or administrative offices, they could probably have leveraged their scale and relative importance to get good deals (i.e., sellers may have felt pressure to maintain these client accounts).[467]

In cases in which the buyer or the seller faced limited options, the actor with greater power would have been more able to set a price that was advantageous for him. Therefore prices in these situations are less likely to have been shaped by the forces associated with large-scale integrated

[464] Piot-Lepetit and M'Barek, "Methods to Analyse Agricultural Commodity Price Volatility," 4.
[465] Muhs, *Ancient Egyptian Economy*, 260.
[466] von Reden, *Money in Ptolemaic Egypt*, 246-47.
[467] Ibid., 247.

markets. For example, in addition to the power imbalances discussed above, I expect that goods sold in local marketplaces would have less variable prices than those that were less readily transportable. Although there is no archaeological evidence remaining to unequivocally demonstrate their existence, local marketplaces probably existed along the banks of the Nile, adjacent to villages.[468] Larger cities also had markets, with the new Greek-style poleis each having an ἀγορά as a site for local trade. Alexandria, Naukratis, Pelousion, and other cities with active ports each had an ἐμπόριον, a marketplace for commercial activity involving imports and exports.[469] These markets likely had the highest concentration of buyers and sellers. Since the presence of more market actors is generally correlated with a higher degree of price competitiveness, buyers and sellers in these marketplaces would have been more subject to the influence of market forces in determining appropriate prices.[470]

Aside from the power of individual buyers and sellers, the other key factor to shape the level of market control of commodity prices was access to information: i.e., how much knowledge actors had about what others were charging and paying for various commodities. In general, greater transparency in price formation prevents price manipulation and the volatility that it can engender.[471] As was discussed above, access to information was uneven in Ptolemaic Egypt.[472] It is

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[468] Muhs, *Ancient Egyptian Economy*, 259-60. For evidence of local markets from the Old and New Kingdoms that might have been similar, see Mohamed Ibrahim Aly, "The Scenes of the Local Market in Pharaonic Egypt (An Analytic Study)," in *Studies in Honor of Ali Radwan*, Supplément aux Annales du Service des Antiquités de l'Égypte 34, eds. Khaled Daoud, Shafia Bedier, and Sawsan Abd el-Fatah (Cairo: Conseil Suprême des Antiquités de l'Égypte, 2005), 79-100, and references there.

[469] Imports were more plentiful and likely cheaper in such port cities. But cities were also farther away from agriculture, the products of which needed to be transported into town, and urban residents might therefore have paid more for grain and other agricultural produce than those in the countryside. Sitta von Reden in Sitta von Reden and Dominic Rathbone, "Mediterranean grain prices in antiquity," in *A History of Market Performance: From Ancient Babylonia to the modern world*, eds. R. J. van der Spek, Bas van Leeuwen, and Jan Luiten van Zanden (London: Routledge, 2015), 149-235, esp. 165.

[470] Piot-Lepetit and M'Barek, "Methods to Analyse Agricultural Commodity Price Volatility," 4.

[471] Piot-Lepetit and M'Barek, "Methods to Analyse Agricultural Commodity Price Volatility," 4.

reasonable to assume that actors with greater access to information would be better able to establish prices to their advantage in such situations of asymmetric knowledge.

Those agents and other traders who traveled around Egypt had an advantage over the local buyers and sellers they dealt with, since they were more aware of prices in other marketplaces and were more prepared to travel elsewhere to do business if doing so would be more advantageous. For that reason, it is useful to take a moment to explore who "traders" were in this society. There was no clear "merchant class" in the Hellenistic Mediterranean.[473] The boundaries of who we can count as a 'merchant' or 'trader' are hazy at best. For example, the state itself was involved in the manufacture, transport, and sale of commodities like oil, so in a sense, state officials worked as traders. Manning has called kings "the largest merchants" in the Hellenistic world because of the large volumes of grain traded between states.[474] On the other hand, travelling merchants, as 'outsiders,' could at times be conflated with pirates, at least in Diodorus' view.[475] Bresson has stressed that in ancient Greece, "trade was an activity that one was not supposed to perform a whole life, or even that was not supposed to occupy a whole life."[476] This statement applies well to Ptolemaic Egypt, in that 'merchant' was not a clear occupation that signaled anything fixed about a person's social status. Trade can be better understood as an activity (one among many that a given individual might have been engaged in); it was something a person did rather than an occupation that defined his social and economic life.

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[472] For a more detailed analysis of assymetric access to price information in a Ptolemaic context, see 4.3.5 "Access to information," above in this chapter.
[473] Bresson, "Merchants and Politics in Ancient Greece: Social and Economic Aspects."
[474] Manning, "Hellenistic Trade(rs)," 127.
[475] Diodorus XX.82.4-83.1, cited in Manning, "Hellenistic Trade(rs)," 124-25.
[476] Bresson, "Merchants and Politics in Ancient Greece: Social and Economic Aspects," 146.

Perhaps the ἐμπόροι best fit the traditional model of merchants, in that they travelled from port to port buying and selling goods for profit.[477] The activities of the ships the ἐμπόροι travelled on were directed by ναύκληροι (perhaps Demotic *nf.w*), who owned or managed commercial vessels.[478] In many cases, commercial shipping operations would only be possible with the financial backing of δανείζοντες, those who lent money and invested in commercial trade.[479] It was also possible for one person to take on multiple roles in a given operation. The Greek term ἔμπορος, "trader," translates into Coptic as (ϩ)ϣⲱⲧ "merchant," a term which was derived from earlier Egyptian *šwty*.[480] In the Demotic evidence, *šwty* had become *šwṯ*.[481] Although the equivalence of Coptic (ϩ)ϣⲱⲧ with Greek ἔμπορος might seem to imply that in the Ptolemaic period, a *šwṯ* was also was the same as an ἔμπορος, the Greek terminology is more complicated. Römer notes that in two bilingual texts, P. Stras. 1908 and P. Berlin 3116, *šwṯ* corresponds to Greek μεταβολεύς.[482] Clarysse and Thompson write that they "would like to identify this term [*šwṯ*] with Greek κάτηλος, but this is not confirmed by bilingual evidence to date."[483] In Greek, an ἔμπορος was distinct from a κάτηλος, in that the former travelled on ships and imported goods himself, where the latter was a retail merchant.[484] This strict distinction of duties did not apply to the μεταβολεύς, who Liddell and Scott define as "one who exchanges or barters, trafficker, huckster," without regard to the location or scale of the trade activity.[485] As a *šwṯ* in

[477] Bresson, "Merchants and Politics in Ancient Greece: Social and Economic Aspects," 141.
[478] Ibid.; Vinson, *The Nile Boatman at Work*, 30. *CDD*, "N," 04:1 (19 July 2004), 70 and references there.
[479] Bresson, "Merchants and Politics in Ancient Greece: Social and Economic Aspects," 141.
[480] Malte Römer, "Der Handel und die Kaufleute im Alten Ägypten," *Studien zur Altägyptischen Kultur* 19 (1992): 257-84, esp. 268-69.
[481] Römer, "Der Handel und die Kaufleute im Alten Ägypten," 268-69; CDD, *Š* version 10.1 (24 March 2010), 68-71.
[482] Ibid. 269, n. 57.
[483] Clarysse and Thompson, *Counting the People* I, 84, n. to l. 463.
[484] LSJ 548.
[485] LSJ 1110.

Egypt was engaged in a wide range of transactions and was nearly always in the employ of some other individual or institution, von Reden has wisely suggested that a parallel is found in the many men who are described as ὁι παρὰ (τινος) "those from (someone)," i.e., as general "agents" in the employ of someone else.[486]

This "someone" could be almost anyone; there is evidence for agents working on behalf of state officials, owners of large estates, kleruchs, and other sorts of individuals of varying degrees of wealth and power.[487] They could be employed by an individual to help him towards his own ends or employed directly within the state administration, roles which are difficult to untangle and which often overlapped.[488] Von Reden has explained that the role of the agent was "not very typical of the Greek economy," but the *šwty* in Egypt can be traced back at least to the New Kingdom, when, as Kemp describes, "the 'trader'—the commercial agent, the arranger of deals—was a ubiquitous figure," and perhaps even earlier.[489] In the Ptolemaic period, as in the New Kingdom, these traders could often be employed by temples, and they are regularly described as *šwṯ bȝk DN* "trader, servant of DN."[490] These agents carried out the business of their employer that required travel, business which could involve buying and selling goods, collecting rents, and making loans.[491] Agents usually traveled within Egypt, but their employer's business could take them to Syria, Palestine, and Asia Minor.[492] To do this business, they were entrusted with money, sometimes in significant sums. The agents were personally responsible for this money, and any

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[486] von Reden, *Money in Ptolemaic Egypt*, 239.
[487] Ibid., 240.
[488] Ibid., 240-41.
[489] von Reden, *Money in Ptolemaic Egypt*, 239; Barry J. Kemp, *Ancient Egypt: Anatomy of a Civilization* (London: Routledge, 1989), 257.
[490] For examples, see CDD, *Š* version 10.1 (24 March 2010), 71.
[491] von Reden, *Money in Ptolemaic Egypt*, 239.
[492] Ibid., 240.

deficit would be charged against the agent himself.[493] As they carried out their work, agents often borrowed money from their associates and made loans themselves in turn; these transactions could be quite complex.[494] At the heart of an agent's job was his responsibility for providing for his employer's needs and desires. For example, in P. Hibeh I 54 (245 BCE), the police officer Ptolemaios is instructed by his superior, Demophon, to acquire for him particular musicians and fine cheeses.[495] However, the agents' duties were also commercial in nature, as the goods they procured were often intended for sale and the agents themselves usually carried out these sales as they travelled.

Since agents were traveling so widely and carrying out a wide array of transactions, they had a great deal of knowledge about prices charged for various goods in different locations. However, their wealthy employers were perhaps the most knowledgeable of all: they lay at the hub of a network of agents, with information from around Egypt and the wider Mediterranean world passing through them via letters.[496] Actors with more information would have been better able to price shop and obtain more stable prices. Moreover, since most written evidence comes from wealthy or otherwise powerful actors, the extant textual evidence probably displays a higher level of price stability than would have actually existed overall.

Furthermore, even if knowledge of prices were the same for both buyers and sellers, certain transactions might be more visible than others. The larger the geographic scale of the market, the more difficult it would be to obtain information on pricing. That is, in a village marketplace setting, with buying and selling concentrated in space and multiple buyers and sellers all available

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[493] Ibid., 242.
[494] Ibid., 242-50.
[495] Here the overlap between official and private service is also brilliantly evident. Ibid., 241-42.
[496] See, for example, the confused letters written to Apollonios and cited in 4.4.8 "Monetization and the Money Supply," above.

to each other, price information would have flowed quite easily—but information on prices of the same goods in distant regions, or even in the next village over, would not have been accessed as easily.[497] Therefore goods sold readily throughout Egypt are more likely to have market-influenced prices.

Ultimately, while I expect there were price-making markets for those goods that were readily, regularly in circulation throughout Egypt, it is also likely that there were constraints on the power of 'the market' in Ptolemaic Egypt. In particular, power imbalances between buyer and seller existed when either buyers or sellers were in short supply. Moreover, access to information (e.g., knowledge of what constituted a 'fair' price) was concentrated in the hands of those at the core of social networks. These 'nodes' like Apollonios and Zenon, with networks of agents throughout the countryside sending them information, were the most powerful of all and the most likely to be able to set prices in their own favor. The extent to which a price was shaped by 'the market' vs. by individual actors would not necessarily have correlated with the variability of that price, but it still must be kept in mind that the classic market forces of supply and demand were not the only price-making factors in play.[498]

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[497] It is possible that knowledge about prices was the most readily available to all in the case of public auctions. The "auction of pharaoh" (*ʿyš n pr-ʿ*, lit., "proclamation of pharaoh") was derived from Greek practice and was managed by the state; it is attested in Demotic evidence from Upper Egypt primarily in the second century BCE. These auctions provided a venue for the sale of a variety of property, including temple land, graves, houses, and days of service in the temple, as well as contracts for tax farming and the revenues from commodity monopolies. When Manning wrote his brief article on the Demotic evidence for public auctions in 1995, he concluded with the statement that "More work remains to be done on just how extensive was this market and on how prices were determined." Over fifteen years later, the pricing dynamics of auctioned property remain unclear. More research remains to be done on how Ptolemaic prices at auctions differed from those in sales based on other pricing mechanisms. J. G. Manning, "The Auction of Pharaoh," in *Gold of Praise: Studies on Ancient Egypt in Honor of Edward F. Wente*, Studies in Ancient Oriental Civilization 58, eds. Emily Teeter and John A. Larson (Chicago: Oriental Institute, 1999), 277-84, esp. 279, 282-83.

[498] After all, price manipulations in modern contexts sometimes serve to stabilize prices and prevent price gouging (e.g., during a natural disaster), while in other situations, a powerful actor can manipulate prices to extreme levels for his own benefit (e.g., Martin Shkreli raised the price of certain AIDS drugs by over

4.4.13 Conclusion: Institutions

The people of Ptolemaic Egypt lived in a world of great uncertainty. Their economy was based on agriculture, which relied upon the annual inundation of the Nile caused by monsoons further south in Africa. Inundation levels and therefore agricultural output were very difficult to predict. The political history of the Hellenistic period was characterized by ongoing war among the descendants of Alexander's successors, punctuated by brief periods of peace. Within Egypt, the military and the population of Upper Egypt had the potential to revolt and destabilize the economy. Even at times of political instability, the Ptolemies' desire to stimulate the circulation of coinage around Egypt despite the unsatisfactory and uneven supply of metals led to confusion over which coins would be accepted for transactions and which coins were even legal. It is perhaps unsurprising, then, that the institutional structure of Ptolemaic Egypt was largely concerned with mitigating uncertainty, spreading out risk among multiple parties (often, but not always, from the state to profit-seeking contractors), and ensuring that the people's basic needs were provided for.

As the state and its people developed institutions to keep uncertainty at bay and to satisfy their needs, they innovated complex and effective mechanisms of social organization. Since the supply of coins was uncertain, credit developed as their more reliable replacement. Contracting was also a key innovation that, through attempting to maintain stability of supply, simultaneously created avenues for entrepreneurship. While the Hellenistic kingdoms were often at war, they were also more connected than ever before, and this connection allowed their people to engage in long-range integrated trade networks. In general, Ptolemaic institutions were quite flexible, especially in the ways disputes could be adjudicated and the room the state had to transfer resources from place

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5000% when he gained power as the CEO of Turing Pharmaceuticals in 2015). Andrew Pollack, "Drug Goes from $13.50 a Tablet to $750, Overnight," *The New York Times* (September 20, 2015), <https://www.nytimes.com/2015/09/21/business/a-huge-overnight-increase-in-a-drugs-price-raises-protests.html> (accessed January 17, 2018).

to place through its system of granaries and banks. This responsiveness to change likely allowed markets to perform effectively and manage shocks well.

The rapid growth of Alexandria and development of grand institutions like its Museion early in the period, when juxtaposed with the political conflicts of the Ptolemies' later centuries and the ultimate loss of Egypt to the Romans, has often led to a view of much of Ptolemaic history as a time of decline. This understanding led Rostovtzeff to write in 1941: "In my opinion, the responsibility for the decay of Egypt cannot be placed on its rulers alone. … No doubt, it was the masse who were ultimately responsible for the decay. They refused actively or passively to respond to the call of the kings" because they resented "the system of government as applied by the privileged classes: economic oppression, heavy taxation, compulsory work, services of all kinds, requisitions, and above all the unfair and unjust management of the various branches of administration."[499] It is not germane for me to judge whether the structure of Egypt's institutions was "unfair," but in my view, Rostovtzeff's frustration with both the administration and the Egyptian people is largely misplaced. Certainly the state did not always succeed in maintaining the satisfaction and loyalty of its people, as the Great Revolt of the early second century BCE attests. But, in general, that satisfaction does seem to have been the state's aim. The Ptolemies were not focused on maximizing their profits to live lavishly. This was not a "royal economy" that functioned to keep the ruling family fat and happy through overworking and overtaxing the population, but rather a lively blend of economic features that, for the most part, kept the people of Egypt fed and oiled while also allowing room for individual profit-seeking behavior.

[499] Rostovtzeff, *Social and Economic History of the Hellenistic World* 2: 911-13.

4.5 Conclusions

In the introduction to his massive work, *An Ancient Economic History from the Palaeolithic Age to the Migrations of the Germanic, Slavic, and Arabic Nations*, Fritz Heichelheim wrote: "discussing the subject of this book brings with it the danger of losing one's way in the infinite. For there is hardly a sphere of human activity which is not connected in some way with economics, or which has not been related to it by economic and sociological research."[500] While my project is more strictly bounded in history and geography than Heichelheim's, in attempting to provide an overview of the features of social life that may have impacted prices even in one society, I have risked getting lost in the infinite. Almost all aspects of social life have the potential to influence prices, and North's three categories of factors that impact economic change (demographics, the scope of human knowledge, and institutions) overlap a great deal. In addition, one economic change can impact another. This chapter has not even begun to comment on this cumulative aspect of pricing. Still, some general hypotheses are possible regarding how the context of the Ptolemaic economy may have shaped prices.

North's first two factors that lead to economic change—shifts in the quantity and quality of human beings or in the stock of human knowledge as it relates to technology—are less likely to have driven price fluctuations in Ptolemaic Egypt. While there was an increase in immigration to Egypt from Greek-speaking regions of the Mediterranean, this immigration was still small relative to the broader Egyptian population and was unlikely to have had a massive impact on prices, with the one exception being the rise in preference for wheat as the staple grain. Likewise, science in Ptolemaic Egypt was quite advanced, but most science did not lead to directly practical

[500] Fritz M. Heichelheim, *An Ancient Economic History from the Palaeolitic Age to the Migrations of the Germanic, Slavic, and Arabic Nations*, vol. 1 (Leiden: A. W. Sijthoff's Uitgeversmaatschappij N.V., 1958), 3.

technological innovations. Technology is unlikely to have caused significant changes in Ptolemaic prices. However, individuals' access to information certainly did impact their view of fair prices. Such access to information was constricted by language, literacy, extent of travel, and social networks. In general, better-connected people likely knew more about what price levels would be fair and where they could find better deals.

North's third factor—the institutional 'rules of the game'—was likely the most significant shaper of Ptolemaic prices. In particular, the early Ptolemies were involved in many wars with other successor kingdoms, and these wars may have impacted prices. The extent of the 'Egyptian' economy could have expanded or contracted as Ptolemaic territory expanded and contracted. Likewise, when men were sent away to fight in wars, the price of labor in Egypt likely rose as a result. State spending on the many wars of the period may also have spurred economic growth. Moreover, the Ptolemaic kings regularly faced the threat of domestic revolts. They may have been especially concerned with maintaining economic stability (including price stability) to contain the desire for rebellion.

Ptolemaic economic institutions were dynamic and may also have caused prices to shift. For example, the Ptolemies instituted a coined monetary system to Egypt for the first time. They continually faced shortages of silver and changed the size and metallic content of the coins to fit their current needs. The result was likely confusion over which money would be accepted in what context and over the value of various types of coins. The state also instituted a number of revenue-generating initiatives employing private contractors. These initiatives included tax collection and guaranteeing the revenues generated by staple commodities 'monopolized' by the state. I hypothesize that the more control the state held over certain commodities, the more fixed their prices would have been.

This was a society that was constantly in flux. Its population and territory grew rapidly early in the period, followed by a time of contraction, followed by stability. I expect that prices would have generally been more stable when Ptolemaic institutions were functioning effectively at their primary goal: risk minimization. That is, I hypothesize that, in general, prices would have been stable through about the 250s BCE, followed by greater volatility – with the most volatility of all occurring during the Great Revolt of c. 210-186 BCE, when Upper Egypt cut itself off from the state in the north. Nonetheless, Ptolemaic institutions were usually flexible and adaptable to change.

CHAPTER FIVE

The Language of Prices: Terminology and Translation

5.1 Introduction

This chapter considers the units of value measurement that were in use in Ptolemaic Egypt in the Greek and Demotic languages. Prices certainly could represent amounts of actual, tangible money or goods that changed hands in exchange. The units of value measurement used in such cases were media of exchange as well as units of account. But much of the extant evidence records prices that were not necessarily paid in exchange; for example, many prices simply record assessments of the value of things without reference to whether or in what form those values would be paid. The units discussed below thus could be used as physical media of exchange, abstract units of account, or both.

In investigating ancient prices and the terms used to express them, I am not only investigating the history of objects but rather the interplay between the history of those objects and the history of accounting standards. Some words for prices derived from and in turn influenced terms related to weights of metals and for coinage, but there is no direct mapping of the terminology from one other system of quantification, such as the measurement of weights or the counting of coins, onto accounting systems.

To complicate matters, multiple languages were in play in Ptolemaic accounting, the most prominent being Greek and Demotic. The majority of the population probably spoke Egyptian (i.e., Demotic, the phase of the language in use at this time), but a significant minority were Greek-speaking immigrants from Greece and Macedonia or their descendants. Small minorities

speaking Aramaic and other languages also existed. These languages all had their own histories before they came together in Egypt, and each language had its own evolution in terms of the words it used to express prices. Likewise, this dissertation is of course dependent on written records, so I am analyzing the terms as they were expressed in written form. But it is reasonable to expect that prices expressed in speech may have been different. For example, medieval and early modern English accounts expressed prices in terms of l., s., and d. (from the Latin *libra*, *solidus*, and *denarius*), but the spoken terms were pound, shilling, and pence. At this time, it is unclear which (if any) different terms were used in spoken Greek, Egyptian, and other languages in Ptolemaic Egypt, but written prices do imply a certain level of formality above what would be expressed orally, a formality that should not be forgotten.

In any case, since Greek and Demotic are the languages used in the vast majority of the extant documentation, prices expressed in both these languages are the focus of this dissertation. This chapter thus represents an analysis of the terminology used to express prices in both languages, as well as an exploration of how to compare prices collected from texts written in these different languages and thus expressed using different accounting systems. I begin with the most common units of account, which were related to the values of precious metals, then move on to discuss common means of payment, which often consisted of agricultural commodity goods. One of the key features of valuation in the Ptolemaic period is the constant attempt to establish understood value equations between different units of account. For that reason, this chapter discusses not only the units themselves but how their values were related.

5.2 Metallic Systems of Value

5.2.1 Introduction

The Greek and Demotic units of account from Ptolemaic Egypt were primarily based on metals. In their long histories before the period in question, these units developed out of the use of metals in exchange. *Hacksilber*—scraps or cuttings of metals used as media of exchange—was employed in Egypt and the rest of the eastern Mediterranean world for hundreds of years before Alexander's conquest. Since the Old Kingdom, Egyptians had quantified the value of pieces of metal based on their weights and in turn developed a system of value based on weights of metals. The Greeks used some metallic weights early on in the Minoan and Mycenaean periods. After the Bronze Age, however, the Greek metallic system of value centered on numbers of metal objects rather than weights; this system of drachmas and obols rapidly came to represent coins. Both languages had also incorporated a system of primarily Near Eastern weight units that were used for metals and eventually coins. Thus there were three systems—initially separate—that found their way into Ptolemaic metallic valuation: (1) the Egyptian system of deben and qite, (2) the system of talents and minas, and (3) the Aegean system of staters, drachmas, and obols. In this section I will discuss each of these valuation systems in turn and explain how they were brought together into one system.

5.2.2 The Egyptian System of Deben and Qite

The primary unit of Egyptian weight measurement was the deben (Egyptian *dbn* ), which was first attested in the 4th Dynasty (ca. 2613-2494 BCE) and remained in use through the

Roman period.[1] Initially, the deben weighed about 13.6 grams, but by the reign of Thutmose III (ca. 1479-1425 BCE), the unit had grown to about 91 grams and maintained this weight for the rest of its history.[2]

The deben was complemented by smaller weight units. The first of these smaller units, the shat (*šꜥ.t*, also spelled *šnꜥ.t*, *šnꜥ.ty*, *šnꜥ*, and *šꜥ.ty*), is also attested beginning in the 4th Dynasty (ca. 2613-2494 BCE).[3] The shat weighed approximately 6.8 grams (½ early deben, or 1/12 new

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[1] Edward W. Castle, "A Structural Study of Bronze Age Systems of Weight" (PhD diss., University of Chicago, 2000), 43, 46. Helck assigned a weight of approximately 13.6 grams to this early deben. See Wolfgang Helck, "Masse und Gewichte," *Lexicon der Ägyptologie* 3: 1202. For more discussion of the early deben, see Castle, *Structural Study*, 43-67; Edward W. Castle, "Shipping and Trade in Ramesside Egypt," *Journal of the Economic and Social History of the Orient* 35, no. 3 (1992): 239-77, esp. 263-64; Thomas Garnet Henry James, *The Ḥeḳanakhte Papers, and Other Early Middle Kingdom Documents* (New York: Metropolitan Museum of Art, 1962) 44, n. 57; Anna Michailidou, "On the Minoan economy: a tribute to 'Minoan weights and mediums of currency' by Arthur Evans," *British School at Athens Studies* 12 (2004): 314 (inc. figs. 26.3 and 26.4); Sir Flinders Petrie, *Ancient Weights and Measures* (London: University College, 1926), 3; Jean Vercoutter, "Les poids de Mirgissa et le 'standard-cuivre' au Moyen Empire," in *Ägypten und Kusch* (Fs. Frintz Hintze), ed. Erika Endesfelder et al. (Berlin: Akademie-Verlag, 1977), 437-45.

[2] This heavier deben was referred to in an inscription of Thutmose III (ca. 1479-1425 BCE) as *dbn mj*, literally the "new deben." The old, lighter deben did not necessarily disappear upon the introduction of the new deben. A balance weight inscribed with the name of Amunhotep I (ca. 1504-1492 BCE) is also inscribed with the sign for gold and the numeral 5. It weighs 67.2 grams, so one of the five indicated units would equal a weight of 13.44 grams, right in line with the weight of the old deben. Granted, this weight dates to at least a few decades before Thutmose III's reference to the "new deben," but a lighter weight unit would be more useful for measuring the weight of gold than the heavier 91-gram deben, and it is possible that there was overlap in the use of the two deben standards. For more discussion of the development of the deben, see Castle, *Structural Study*, 43-44; Michaelidou, "On the Minoan Economy," 314. For the weight of the deben in the Ptolemaic period, see Brian P. Muhs, *Tax Receipts, Taxpayers, and Taxes in Early Ptolemaic Egypt*, Oriental Institute Publications 126 (Chicago: Oriental Institute, 2005), 24.

[3] For more information on the shat, see especially Castle, *Structural Study*, 68-86. For earlier interpretations and even more information, see Mohamed Ibrahim Aly, "The Scenes of the Local Market in Pharaonic Egypt (An Analytic Study)," in *Studies in Honor of Ali Radwan*, ed. Khaled Daoud et al. Supplément aux Annales du Service des Antiquités de l'Égypte 34 (Cairo: Supreme Council of Antiquities, 2005), 83; Oleg Berlev, Палестинский Сборник 15 (1966): 5ff, as cited in Janssen, *Commodity Prices*, 104, n. 19; Wolfgang Helck, *Altägyptische Aktenkunde des 3. und 2. Jahrtausends v. Chr.* (Munich: Deutscher Kunstverlag, 1974), 139-141; A. Moussa and H. Altenmüller, *Das Grab des Nianchchnum und Chnumhotep* (Mainz am Rhein, P. v. Zabern, 1977), 84-85, Tafel 24; Petrie, *Ancient Weights and Measures*, 17-19; Kurt Sethe, *Ägyptische Inschrift auf den Kauf eines Hauses aus dem alten Reich* (Leipzig: Teubner, 1911); Edward F. Wente, "A Note on 'The Eloquent Peasant,' B I, 13-15," *Journal of Near Eastern Studies* 24, no. 1/2 (1965): 107.

deben).[4] It has been suggested that *šꜥ.t* derives from *šꜥ* "to cut" and that its determinative represents "a metal offcut," so it is likely that this unit was related in some way to Hacksilber.[5]

The shat fell out of use sometime in the 18th or 19th Dynasty—around the same time as the introduction of the heavier deben—and developed into a new unit, the seniu (Egyptian *snỉw* ).[6] The seniu may have been a weight unit (of the same weight as the shat) used to measure the weight of Hacksilber, and it appears quite commonly as a value measurement in Janssen's corpus of Ramessid prices from Deir el-Medina.[7] While 1 seniu was equal in weight to 1/12 deben, the value equation between seniu and deben was not fixed. Janssen noted that, since the deben usually referred to a weight of copper, and the seniu was nearly always used in reference to a weight of silver, the value ratio between the two value units shifted based on fluctuations in the prices of those metals as commodities.[8] The last attested use of the seniu dates to year 14 of Ramses III in the 20th Dynasty (ca. 1170 BCE).[9]

The seniu had overlapped in use with an alternative small unit, the qite (Egyptian *qd.t* ). The qite weighed about 9.1 grams, or 1/10 of a deben, and could be used on its own or

[4] Castle, *Structural Study*, 69, 77-79; Petrie, *Ancient Weights and Measures*, 17-19.
[5] Ibid.,77-79.
[6] Alan H. Gardiner, "Four papyri of the 18th Dynasty from Kahun," *Zeitschrift für Ägyptische Sprache und Altertumskunde* 43 (1906): 45; Castle, "Structural Study," 103. For earlier interpretations and even more information on the seniu, see Jaroslav Černý, "Prices and Wages in Egypt in the Ramesside Period," *Cahiers d'Histoire Mondiale* 1.4 (1954): 912; Janssen, *Commodity Prices*, 102-108; Thomas Eric Peet, "The Unit of Value *šꜥty* in Papyrus Bulaq 11," in vol. 1 of *Mélanges Maspero* (Cairo: IFAO, 1934-1935), 185.
[7] Janssen, *Commodity Prices*, 105-108.
[8] Ibid.
[9] Ibid., 105-106.

function as the deben's decimal unit.[10] It was introduced in the 18th Dynasty (ca. 1550-1295 BCE) and remained in use through the Roman period.[11]

Thus, in the Ptolemaic period, there existed two Egyptian units for weighing metals: the deben (91 grams) and the qite (9.1 grams). The equation between the two weight units was fixed at 1 deben = 10 qite. The challenge in using deben and qite—ultimately, weight units—as *value* units, lay in establishing rates of conversion between the value of weights of different metals and in clearly expressing which metal's value was implied.

When the Ptolemaic period began, the metal in question was clearly silver, since the primary standard of value throughout the eastern Mediterranean world was silver. Silver had circulated in bullion form in Egypt since at least the 18th Dynasty (ca. 1550-1295 BCE); the first securely dated silver Hacksilber hoard is attested in the 14th century BCE.[12] From at least the 26th Dynasty rule of the Saites (664-525 BCE) on, silver had become an increasingly common medium of exchange, and weights of silver had become the basic measure of value. It is likely that people continued to use silver Hacksilber as a form of money in Egypt even after the introduction of coinage. Hoards of silver Hacksilber have been found dating well into the Late Period (664-332 BCE) and perhaps into the Ptolemaic period.[13] These hoards include both those of uncoined silver

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[10] For a Ramessid example of the qite used in conjunction with the deben as its decimal unit, see P. Turin 1999+2009, line 4: *ꜥš ḫt-ṯw n mḥ 38 ỉr.n ḥḏ dbn 3 qt.t 8* "cedar: mast of 38 cubits, which made 3 deben and 8 qite of silver." Essentially, the cedar mast was worth 3.8 deben of silver. Giuseppe Botti and T. Eric Peet, *Il Giornale della Necropoli di Tebe* (Torino: Fratelli Bocca, 1928), #13, 8-13, pl. 3. This example is also discussed in Janssen, *Commodity Prices*, 377.

[11] Michailidou, "On the Minoan Economy," 314.

[12] Henry Preator Colburn, *The Archaeology of Achaemenid Rule in Egypt* (PhD diss., University of Michigan, 2014), 354-55; Péter Vargyas, "The Amarna Treasure and the Thief," in *From Elephantine to Babylon: Selected Studies of Péter Vargyas on Ancient Near Eastern Economy*, ed. Zoltán Csabai (Budapest: L'Harmattan, 2010), 147-64.

[13] John H. Kroll, "A Small Find of Silver Bullion from Egypt," *American Journal of Numismatics, Second Series* 13 (2001): 1-20; Peter G. van Alfen, "Herodotus' 'Aryandic' Silver and Bullion Use in Persian-Period Egypt," *American Journal of Numismatics, Second Series* 16/17 (2004-05): 7-46, esp. 16-28; Péter Vargyas, "The Alleged Silver Bars of the Temple of Ptah: Traditional Money Use in Achaemenid,

alone and those of a mix of coins and Hacksilber—which suggests that Hacksilber was employed alongside coins.[14] The hoard evidence indicates that Hacksilber was still considered useful as a store of wealth, but it is unclear to what extent and for how long such silver bullion was employed as a regular means of payment or exchange. In any case, in the early Ptolemaic period, silver was the primary metal used to understand and quantify value.

For that reason, when the Ptolemies came to power, the deben and the qite, as value units, represented the value of silver in fixed weights (91 grams and 9.1 grams, respectively). The Demotic words for "deben" and "qite" were *tbn,*  , and *qt(.t),*  .[15] It was possible to quantify value using the expression *ḥḏ tbn X*, or "silver: X deben." However, since the deben-weight of silver was so deeply established as the primary Egyptian value unit, this expression was commonly abbreviated. In the vast majority of cases, the word *tbn* "deben" was dropped, and "X (deben of) silver" could be expressed with simply *ḥḏ X.*[16] The Demotic word for silver, *ḥḏ*  , thus quickly became the understood abbreviation for the deben as a value unit.[17]

Ptolemaic and Roman Egypt," in *From Elephantine to Babylon: Selected Studies of Péter Vargyas on Ancient Near Eastern Economy*, ed. Zoltán Csabai (Budapest: L'Harmattan, 2010), 168-69.

[14] Vargyas, "The Alleged Silver Bars of the Temple of Ptah," 168-69.

[15] For more on *tbn*, including many more writings, see *CDD*, "T," 12.1, 148-150; Erichsen, *Glossar*, 624. For more on *qt(.t)*, see *CDD*, "Q," 04.1, 96; Erichsen, *Glossar*, 552, but note that Erichsen conflated *ḏbꜥt* "obol" with *qt(.t).*

[16] Expressions with *ḥḏ* followed by a number were misread for decades. Literally, a phrase like *ḥḏ 10* translates to English as "10 silvers," which seems not to make sense, since silver as a substance is not countable in the absence of a unit of measurement. The usual translation given for such an expression (in too many publications to list here) was "10 silver pieces" or, in German, "10 Silberlinge," which avoids the problem of the omitted unit but implies that these might be silver coins and fails to provide any concrete unit with which to make sense of the quantity. Although publications continued to use this poor translation into at least the 1960s, Miriam Lichtehim wrote that the reading of *ḥḏ* as a deben of silver had "long been recognized" by the time of her writing in 1957. Miriam Lichtheim, *Demotic Ostraca from Medinet Habu,* Oriental Institute Publications 80 (Chicago: University of Chicago Press, 1957), 1.

[17] *Ḥḏ* was still also used in reference to the deben as a weight unit—and not only for weights of silver. Since the deben weight was still used to measure the weights of all metals, *ḥḏ* could be paired with the words for other metals to quantify weights of those metals. For example, *ḥḏ (n) ḥmt*—literally, "silver (of) bronze"—

Silver was the primary—but not exclusive—metallic standard of value in the early Ptolemaic period. Secondary to silver was bronze, an alloy of copper and tin. Since Egypt did not contain any natural silver resources of its own, already by 312/11 BCE, Ptolemy I had begun to mint bronze coins to serve as fractions of his silver coins; it is clear at least from this time that bronze served as a medium of exchange.[18] As an Egyptian unit of account, bronze, too, was quantified in deben and qite. In Demotic, the word used in such contexts was *ḥmt*, which literally meant "copper" but was commonly used for money that is known to have been bronze, such as bronze coins (the literal word for "bronze" was *ḥsmn*, but was not commonly used in a monetary context). Traditionally, silver was 60 times more valuable than bronze in ancient Egypt, but the ratio of the values of the silver and bronze debens (as *accounting* units rather than actual weighed metals) shifted during the changes in accounting in the Ptolemaic period.

As discussed in Chapters 3 and 4, around 210 BCE, Ptolemy IV changed the official accounting standard from silver to bronze.[19] If Maresch's explanation is correct, when Ptolemy IV introduced the bronze standard, he was severing the previously fixed conversion rate between silver and bronze coins in response to the 3rd century BCE financial crisis.[20] In so doing, he created a division between two independent metallic accounting systems. The units of the bronze standard (for example, so-called bronze drachmas) were "nominal" in that they had no relation to coins.[21]

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was used to mean "deben of bronze." For more on *ḥḏ*, including many variant writings and many examples of its use, see *CDD*, "Ḥ," 09.1, 328-341; Erichsen, *Glossar*, 335 (cf. *ḥt*).

[18] von Reden, *Money in Ptolemaic Egypt*, 58.

[19] T. Reekmans, "Monetary History and the Dating of Ptolemaic Papyri," in Studia Hellenistica 5, ed. L. Cerfaux and W. Peremans, (Louvain: Bibliotheca Universitatis Lovanii, 1948), 15-43; T. Reekmans, "The Ptolemaic Copper Inflation," in *Ptolemaica* (Studia Hellenistica 7), eds. E. Van't Dack and T. Reekmans (Louvain: Publications Universitaires de Louvain, 1951), 61-118.

[20] Klaus Maresch, *Bronze und Silber: Papyrologische Beiträge zur Geschichte des Währung im ptolemäischen und römischen Ägypten bis zum 2. Jahrhundert n. Chr.* (Cologne: Westdeutscher Verlag, 1996), 1-18.

[21] Maresch calls these "nominelle Silberdrachmen." Maresch, *Bronze und Silber,* 1-18.

Within the Egyptian system, of course, the deben and the qite had never been coins. Originally their value as accounting units had been linked to the value of 91 g- and 9.1 g-weights, respectively, of silver. As will be discussed in more detail later in this chapter, by the mid-4th century BCE, fixed equations had developed between the value of the qite and the stater (i.e., tetradrachm), at the rate of 1 stater = 2 qite, and therefore 1 deben = 5 staters.[22] Perhaps as soon as that equation was fixed, and certainly once the Ptolemies introduced their system of coinage in Egypt, the value of the deben and qite as accounting units became linked to the value of Ptolemaic coins and not the value of silver as a raw material. After the shift to the bronze standard, the equation between the deben/qite system and the Greek accounting system remained unchanged. By 210 BCE, all these accounting units—in both Egyptian and Greek—had become nominal rather than physical. New phrases appeared in Demotic to resolve possible ambiguities in expressing the difference between accounting units and physical metals. These phrases are relevant to the last decades of the chronological scope of this dissertation (210-186 BCE). Many examples cited below date to years after 186 BCE and are themselves outside this scope, but they are representative of phenomena within the 210-186 BCE range and are thus germane and worth including in this chapter.

After 210 BCE, the primary accounting unit was the bronze deben (rather than the silver deben, as before), but in Demotic texts, the accounting unit appeared unchanged: prices continued to be expressed in terms of *ḥḏ*. For that reason, prices appear to rise dramatically after the change in standard, and this appearance is one cause of the debates about Ptolemaic inflation discussed in Chapter 3. It is now clear that, after 210 BCE, *ḥḏ* was used to mean "bronze

[22] Vleeming, *Gooseherds of Hou*, 88, n. 73.

deben."[23] Since *ḥḏ* was used as an abbreviation for the deben unit generally, and *ḥḏ (n) ḥmt* meant "deben of bronze" before the change to the bronze standard, after the change, the *ḥmt*, "bronze," in that phrase was dropped, and *ḥḏ* became understood as "bronze deben."

Once *ḥḏ* (which literally meant "silver") was used for the bronze deben, it became necessary to introduce a new expression to specify "silver" as a material. This phrase was *ḥḏ (n) ḥḏ*, literally "silver (as) silver," also commonly expressed as *ḥḏ sp 2*, literally "twice silver," or "silver (as) silver."[24] Examples of references to the silver deben still exist, but now they were expressed in a new way: *ḥḏ sp 2 ḥḏ X* "silver: X deben," which could also be translated "X deben

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[23] This interpretation was first introduced in 1930 by Heichelheim, who noted obliquely that the Demotic word then translated into German as "Silberlinge" (i.e., Demotic *ḥḏ*) actually referenced value on the bronze standard. It was not until 1957 that Lichtheim formally introduced this reading of *ḥḏ* as "bronze deben" into Demotic studies. See Fr. Heichelheim, *Wirtschaftliche Schwankungen der Zeit von Alexander bis Augustus* (Jena: Verlag von Gustav Fischer, 1930), 84, esp. n. 3; Miriam Lichtheim, *Demotic Ostraca from Medinet Habu,* Oriental Institute Publications 80 (Chicago: University of Chicago Press, 1957), 1-2.

[24] It was not until 1972 that Pestman was able to interpret the phrases *ḥḏ sp 2* and *ḥḏ (n) ḥḏ* as referencing physical "silver," and misreadings thus abound in earlier publications. In 1891, Brugsch had read the phrase as *ḥḏ dbn* "deben silver." Griffith rejected this reading in 1909 and suggested instead that the second word might be *wṯḥ* "refined(?) silver," "or some word for 'metal.'" Griffith's reading was widely adopted by scholars including Spiegelberg, Sethe, Thompson, Botti, and Erichsen. The next major re-reading came in 1945 from Mattha, who suggested reading *ḥḏ sp 2.* Mattha stated that *ḥḏ sp 2* was equivalent to *ḥḏ ḥḏ* and that both should be translated as "silver money," "with the first *ḥt* meaning 'money' and the second *ḥt* as adjective meaning 'silver.'" Mattha's reading was widely adopted (for example, by Lüddeckens, Pestman, Parker, Botti, Erichsen, and Lichtheim) until 1967, when Malinine argued that the second sign must be "un qualicatif ayant trait à la valeur des espèces visées," a view which led him to call for a return to Griffith's reading as *ḥḏ wṯḥ* "cast silver". Zauzich rejected Malinine's proposal in 1971. In 1972, Pestman finally demonstrated the correct reading. See especially P. W. Pestman, "A note concerning the reading *ḥḏ sp-2*," *Enchoria* 2 (1972): 33-36. For these earlier readings, see H. Brugsch, "Die demotischen Formen zur Bezeichnung der alten Gewichtseinheiten," *Zeitschrift der Ägyptische Sprache und Alterthumskunde* 29 (1891): 65-72, esp. 65; F. Ll. Griffith, *Catalogue of the Demotic Papyri in the John Rylands Library, Manchester III: Key-List, Translations, Commentaries and Indices* (Manchester: University Press, London, 1909), 270 n. 4; Girgis Mattha, *Demotic Ostraka from the Collections at Oxford, Paris, Berlin, Vienna and Cairo* (Le Caire: Imprimerie de l'Institut Français d'Archéologie Orientale, 1945), 79, n. to l. 4 of Text 10; Michel Malinine, "Partage testamentaire d'une proprieété familiale (Pap. Moscou no. 123)," *Revue d'Égyptologie* 19 (1967): 67-85, esp. 83-84, n. t; Karl-Theodor Zauzich, "Korrekturvorschläge zur Publikation des demotischen Archivs von Deir el-Medineh," *Enchoria* 1 (1971): 43-56, esp. 49, Urk. 5, l. 4.

of silver," or even "X silver deben." In this example, the initial *ḥḏ sp 2* specified the material, "silver," and the second *ḥḏ* referred to the deben unit. The same idea could also be expressed as *ḥḏ sp 2 tbn X* "X silver deben," using the older word for the deben (*tbn*).

Just as the unit *tbn* had quickly dropped off the old expression *ḥḏ tbn X* "X silver deben" in the early Ptolemaic period, after 210 BCE, the abbreviation for the deben unit was sometimes omitted from the phrases *ḥḏ sp 2 ḥḏ X* and *ḥḏ sp 2 tbn X* "X silver deben." Thus in some examples, *ḥḏ sp 2 X* is used on its own to mean "X silver deben" and thus quantify prices on the silver standard as opposed to the bronze. For example, in P. Brooklyn 37.1803 (ca. 109/8 BCE), the following phrase is found on line 19: *ḥḏ sp 2 tbn [2 r] ḥḏ sttr(.t) 10.t r ḥḏ sp 2 tbn 2 ꜥn* "[2] silver deben, [equaling] 10 silver staters, equaling 2 silver deben again." The first time the value is given, the word *tbn* is explicitly expressed, but in the third writing of the value, the *tbn* has been allowed to drop off. It is possible that it in this example, the *tbn* was simply understood in the last value, with *ḥḏ sp 2* still meaning just "silver" rather than "silver deben." However, *ḥḏ sp 2* itself certainly was used as an abbreviation for "silver deben" (as opposed to bronze deben) by the Roman period. In O. Medinet Habu 140, from year 2 of the reign of Claudius I (49 A.D.), we see the following phrase on line 3: *ḥḏ sp 2 1 r (ỉ pš.t) sttr(.t) 2.t qt(.t) 1.t r ḥḏ sp 2 1 ꜥn* "1 silver deben, (the half) equaling 2 staters and 1 silver qite [i.e., 2.5 staters], equaling 1 silver deben again." Because of the conflations in meaning of material and unit of value measurement, new phrases were thus introduced in order to distinguish between these sometimes ambiguous expressions.

Analogous phrases were also introduced to distinguish bronze as a material from the bronze deben as a value unit and bronze as a general term for money. While *ḥḏ sp 2* came to be used for "silver" as a material after the change to the bronze accounting standard, the phrase *ḥmt sp 2*, "bronze twice," or "bronze (as) bronze," was introduced to specify the meaning "bronze" as

an actual metal.[25] On its own, *ḥmt* was used to mean "bronze money" or "bronze (obol)," so when a different use of "bronze," as a physical material rather than an abstract accounting unit, was warranted, *ḥmt sp 2* could be used, with *ḥḏ* or *tbn* quantifying the number of deben intended. For example, P. Turin 6076, l. 4 (152 BCE) includes the phrase *ḥmt sp 2 ḥḏ X* "X bronze deben." Similarly, Studi classici e orientali (SCO) 22 (1973), p. 214 no. 6 (c. 146-132? BCE) has *ḥmt sp 2 tbn 1* "1 bronze deben." There existed slight variations in this phrasing; for example, O. Bodleian 1228, l. 5 (95 BCE) includes: *ḥḏ 200 n ḥmt sp 2* "X deben of bronze."

The fact that the terminology changed when the reference to metal in accounting standards changed indicates that the Demotic terms *ḥḏ* and *qt.t* functioned primarily as abstract units of account. Changes in the weight and composition of coins did not affect the words, but changes in accounting practices did. When P. W. Pestman wrote about the terms *ḥḏ sp 2* "silver deben" and *ḥmt sp 2* "bronze deben," he argued that the *sp 2* specification was added to indicate that the price actually had to be paid in silver or bronze coins.[26] While this stipulation may have been intended in some contexts, the term *ḥḏ sp 2* itself did not carry such an implication. The main example that Pestman uses to argue his point about *ḥḏ sp 2* and *ḥmt sp 2* as specifying the required medium of exchange is P. BM Andrews 21 (124 BCE), where, as Pestman himself points out, the term *ḏbʿ* is added to indicate that the money must be paid in "coined" form. The context is the penalty clause of a contract dividing an inheritance: *ḥḏ ḥḏ ỉw=f ḏbʿ 5 r (ḥḏ) 2 qt(.t) 5(.t) r ḥḏ ḥḏ 5 ʿn*, "5 silver deben, it being coined, equaling 2 (deben) and 5 qite, equaling 5 silver deben again." In this case, the word *ḏbʿ* does specify that the penalty must be paid in coins. However, *ḥḏ ḥḏ* has nothing to do with the means of payment; it merely specifies that the *value* of those coins

[25] P. W. Pestman, "A note concerning the reading *ḥḏ sp-2*," *Enchoria* 2 (1972): 34-36.
[26] Pestman, "A note concerning the reading *ḥḏ sp-2*," 35.

must be worth 5 silver deben as opposed to 5 bronze deben. *Ḥḏ ḥḏ* itself specifies the accounting standard to be used to quantify that value. While accounting and exchange were related, the terms discussed above are first and foremost units of account rather than exchange.

One further complication introduced at this time is that *ḥḏ* now could be used not only for the deben unit, but also the qite, in certain circumstances.[27] When *ḥḏ* was followed by a whole number, it means that number of deben units, as usual. However, when it is followed by a fraction, it refers to that fractional number of qite. Thus, *ḥḏ* + whole number A = A deben, whereas *ḥḏ* + fraction B = B qite. While *ḥḏ* could thus be used for qite when counted in terms of a fraction, the use of the term *qt.t* for qite was still maintained too. There was flexibility in the use of the Demotic terminology. *Qt.t* could also be combined with *ḥḏ* to specify the material silver: *ḥḏ qt.t* + whole number B = B silver qite. Sometimes, a scribe would want to use both deben and qite units in one valuation, in which case *ḥḏ* could do double duty. So *ḥḏ* + whole number A + fraction B = A deben and B qite.

Additional phrases existed in order to further specify the value intended. When precious metals were used in exchange or to make payments, especially as Hacksilber, two factors were of central concern: the purity of the metal and the precision of the weight measurement. Phrases dating at least as far back as the Third Intermediate Period attest to the involvement of temple treasuries in certifying silver for exchange—such phrases survive into the Ptolemaic period in certain documents. This responsibility was held by the Treasuries of the gods Harsaphes (25th Dynasty and earlier), also known as the Treasury of Thebes (26th Dynasty), but it shifted to the Treasury of Ptah in Memphis in the 27th Dynasty (525-404 BCE), after the Persians conquered

[27] Didier Devauchelle, "*ḤḎ*: deben ou kite?" *Enchoria* 14 (1986): 157-58.

Egypt.[28] The grammar of the early evidence—written in Abnormal Hieratic—seems to highlight that initially, the treasuries were certifying the silver itself, i.e., the purity of the metal, rather than its weight.[29] In the usual phrase, "deben X of the silver of the Treasury of Harsaphes," the word order indicates that it is the "silver" (not the "deben") that is described as being "of the Treasury."[30] An example can be found in P. Louvre E 3228e, l. 5 (705 BCE): *ḥḏ n Pr-ḥḏ Ḥry-šfy tbn 2 qt.t 2(.t)* "Silver of the Treasury of Harsaphes: 2 deben & 2 qite." This expression was echoed in P. Turin 246, l. 17 (635 BCE)--*ḥḏ n Pr-ḥḏ Ḥry-šf qt.t 3(.t)* "Silver of the Treasury of Harsaphes: 3 qite"—and in P. Turin 247, l. 15 (620 BCE)--*ḥḏ Pr-ḥḏ Ḥry-šf tbn 5* "Silver of the Treasury of Harsaphes: 5 deben."[31] These examples establish the "silver of the Treasury of Harsaphes" as a known category, and it is likely that this silver was understood as silver whose purity had been so certified. Thus Vleeming argued that initially, the treasuries would press their mark into bars or loaf-shaped ingots of silver to certify the purity of the metal they contained, and these bars were what was indicated by "silver of the Treasury of Harsaphes/Thebes/Ptah."[32] Alternatively, based on comparisons to practices in Mesopotamia and Syria-Palestine, Vargyas proposed that the treasuries did not produce stamped bars, but rather evaluated and weighed small bits of silver, then placed them in sealed, pre-weighed cloth bags.[33]

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[28] Griffith, *Catalogue of the Demotic Papyri*, 76; Michel Malinine, *Choix de Textes Juridiques en Hiératique "Anormal" et en Démotique (XXVe-XXVIIe Dynasties)* I (Paris: Librairie Ancienne Honoré Champion, 1953), 25-26; Erich Lüddeckens, *Ägyptische Eheverträge* (Wiesbaden: Otto Harrassowitz, 1960), 316-17; S. P. Vleeming, *The Gooseherds of Hou (Pap. Hou): A Dossier Relating to Various Agricultural Affairs from Provincial Egypt of the Early Fifth Century B.C.* Studia Demotica 3 (Leuven: Peeters, 1991), 87-89, n. uu.

[29] Vleeming, *Gooseherds of Hou*, 87-88, n. uu.

[30] The earliest example of this phrase that I am aware of can be found in P. Berlin 3048 vo. B (ca. 827 BCE). Some of the latest examples are P. Turin 246 (635 BCE) and P. Turin 247 (620 BCE). See Vleeming, *Gooseherds of Hou*, 87, n. uu & n. 67.

[31] Vleeming, *Gooseherds of Hou*, 87, n. uu & n. 67.

[32] Ibid., 87-89, n. uu.

[33] Vargyas, "The Alleged Silver Bars of the Temple of Ptah," 165-76.

In any case, the word order of these references changed in the early Demotic evidence, and this change seems to indicate a shift towards certifying the precision of the silver's weight rather than its purity. For example, in P. BM 10113, l. 2 & 3 (570 BCE), the expression is *ḥḏ tbn 1 Pr-ḥḏ Nỉw.t* "Silver: 1 deben of the Treasury of Thebes."[34] The known category is now the "deben of the Treasury" as opposed to "silver of the Treasury." Vleeming reasoned that the emphasis of the Treasury's efforts had shifted from establishing the purity of the silver to certifying the precision of the deben weight.[35] He argued that by the late Saite period, the Treasury was no longer checking the purity of the silver. Instead, Demotic mentions of the "deben of the Treasury of Ptah" are references to actual standard balance weights that were held in the Treasury of Ptah. A payment due of, say, "silver: 5 deben of the Treasury of Ptah," would have been weighed using weights that were calibrated against those at the Treasury.[36] Thus before the start of the Ptolemaic period, the role of the Treasury had shifted away from certifying and issuing pure silver to maintaining standard weights.

Another Demotic qualification,  , *wtḥ* "melted," might have been used to specify the purity of the silver metal.[37] As Robert Ritner has noted, the Demotic term derives from the earlier  , *wdḥ*, meaning "to melt or pour," and the later Coptic phase of the language

[34] For more examples, see Vleeming, *Gooseherds of Hou*, 88, n. 68.
[35] Ibid., 87-88, n. uu.
[36] Vleeming discusses the Aramaic evidence for this claim in much more detail in *Gooseherds of Hou*, 88-89, and notes there. Vleeming also notes that Sethe was the first to come up with this idea, but that it was "formulated too tersely to be generally recognized." See Kurt Sethe, *Demotische Urkunden zum ägyptischen Bürgschaftsrechte vorzüglich der Ptolemäerzeit* (Leipzig: B. G. Teubner, 1920), p. 237, §44a.
[37] Vleeming, *Gooseherds of Hou*, 89. For more on *wtḥ*, including variant writings, see Erichsen, *Glossar*, 107; *CDD*, "W," 09.1, 204-205.

renders it as ⲟⲩⲧⲱϩ, meaning "to cast" metal in a mold.[38] For silver to be refined, it must first have been melted, so this reference to silver that has been "melted" could really be a reference to silver that has been "refined."[39] Melting was also used to evaluate the purity of Hacksilber.[40] Greek authors had observed that when melted, silver that is ca. 97-100% pure bubbles in a distinctive way.[41] Recent studies of Saite and Persian period coin and Hacksilber hoards in Egypt have shown that they often contain bullion or loaf-ingots of melted silver as well as imported Greek coins that have been partially melted or deeply cut.[42] In the Saite and Persian periods, then, when Hacksilber was common in exchange, the Demotic qualifier *wtḥ* could be used to specify silver that had been melted—either to refine it or to assay its quality—and was therefore known to be pure.

These Hacksilber-oriented phrases, i.e., the references to the Treasury of Ptah and to silver that is *wtḥ*, are attested throughout the Ptolemaic period. The continued existence of the phrases has led some, such as Vargyas, to suggest that Hacksilber remained central to exchange in Egypt and that the Temple of Ptah continued to influence the monetary system until at least the early Roman period.[43] But the context of these textual reference must be carefully considered; these phrases are more commonly found in annuity contracts than in other sorts of documents. Annuity contracts often contained anachronisms, such as descriptions of payments to be made in emmer

[38] Robert Ritner, "A Property Transfer from the Erbstreit Archives," in *Grammata Demotika: Festschrift für Erich Lüddeckens zum 15. Juni 1983*, ed. Heinz-J. Thissen and Karl-Th. Zauzich (Wurzburg: Gisela Zauzich Verlag, 1984), 180-181, n. 20.
[39] van Alfen, "Herodotus' 'Aryandic' Silver and Bullion Use in Persian-Period Egypt," 22.
[40] Ibid.
[41] Theognis 499-500; Aristotle, *Problemata* 936b. Cited and discussed by van Alfen, "Herodotus' 'Aryandic' Silver and Bullion Use in Persian-Period Egypt," 27.
[42] van Alfen, "Herodotus' 'Aryandic' Silver and Bullion Use in Persian-Period Egypt," 7-46.
[43] Vargyas, "The Alleged Silver Bars of the Temple of Ptah," 175.

(*bd.t*) long after emmer had been almost entirely replaced by wheat. It is likely, then, that the references to the Treasury of Ptah in annuity contracts should also be taken to be archaisms.

Still, it is possible that in some cases, even in annuity contracts, *wtḥ* may have been used to specify actual cast silver as a material. As discussed above, Demotic *ḥḏ* could be used to mean "silver" or, very commonly, as an abbreviation for the deben as a generic value unit. The phrase *ḥḏ wtḥ* could would therefore mean "cast silver." The phrase appears in texts that include valuations of things made of silver; presumably, their value may have been equal to the value of their silver content, since, relatively speaking, the labor put into working the silver was dramatically cheaper than the silver itself. An example can be found in P. Adler 14, which dates to Year 18 of Ptolemy X (97 BCE) and which inventories a number of items of jewelry, clothing, and vessels belonging to the woman. One such item is *gl̆ gswr r ḥḏ wtḥ qt(.t) 1(.t)* "finger-ring, equaling 1 qite of cast silver."[44] A similar example can be found in P. Adler Dem. 21 (92 BCE): *gl̆ gswr sttr(.t) 1.t r ḥḏ wtḥ tbn 1* "finger-ring: 1 stater, equaling 1 deben cast silver."[45] Both texts price most other items, including other types of metal jewelry, in simple deben (*ḥḏ*). Perhaps this type of ring derived most of its value from its silver content and was not heavily worked, not requiring much labor with which value could have been added to the value of the raw materials used to produce it. The matter is further complicated in the latter example, which explicitly equates "1 deben of cast silver" with "1 stater," even though the standard equivalence formula between deben and staters equates 1 deben with 5 staters. This deviation from the norm implies that this "deben of cast silver" may have been worth 1/5 the value of a standard generic deben, or, perhaps more likely, that the stater referenced here was an actual stater coin, rather than a mere stand-in as a second unit, as in the usual equivalence formulas. It is therefore possible that

[44] P. Adler 14, 7.
[45] P. Adler 21, 7.

the term *wṯḥ*, specifying "bullion" or "cast" metal, was not always a mere archaism but rather did retain some usefulness in quantifying value.

The early Hacksilber-oriented phrases may have also become useful later in the Ptolemaic period, at times when the value of coinage was becoming less trustworthy. One example can be found in lines 8-9 of P. OI 10551, a land transfer from 161 BCE:[46]

mtw=f tỉ ḥḏ sp-2 ḏnf 20 n nỉ tny.wt n pr-ḥḏ n Ptḥ n wṯḥ r ḥḏ 19 qt(.t) 9 5/6 1/10 1/30 1/60 1/60 r ḥḏ sp-2 ḏnf 20 n nỉ tny.wt n pr-ḥḏ n Ptḥ n wṯḥ ꜥn	Let him give silver, valued at 20 (deben) from the shares of the treasury of Ptah in bullion, equaling 19 deben, 9 5/6 1/10 1/30 1/60 1/60 qite, equaling silver, valued at 20 (deben) from the shares of the treasury of Ptah in bullion again.

The excerpt above is contained within a penalty clause; if any descendent of the seller ever claims ownership of the land in question and causes any problems for the buyer or his descendants, this troublesome party will have to pay the penalty described above. This penalty clause is describing payment, not the valuation of other goods. Because of this context, the clause may have employed more specific terminology in its reference to the physical means of payment. Ritner translated *n wṯḥ* as "in bullion" and used the etymology of *wṯḥ* to argue that the phrase is a direct reference to cast metal bullion.[47] If this penalty ever came to be due, the guilty party would need to pay a 20-deben weight of physical silver bullion. He could not simply pay the *value* of 20 deben of silver in any physical form convenient to him. At this time, in 161 BCE, the metallic content of coins was being devalued rather rapidly, so bullion would have been much more secure in its value, especially since the penalty would be due at some unknown later date, when the currency presumably would have been even less valuable. Ultimately, while Ptolemaic references to

[46] Ritner, "A Property Transfer from the Erbstreit Archives."
[47] Ritner, "Property Transfer," 180-181, n. 20.

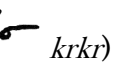
Hacksilber and the temple treasuries' certifications of the purity of such silver were likely mainly anachronistic, Hacksilber itself (and the Demotic phrases that reference it) could have had some use in periods of monetary uncertainty.

In the early Ptolemaic period, the Egyptian weight units, the deben and the qite, were used to quantify value based on weights of silver. After Ptolemy IV's introduction of the bronze accounting standard around 210 BCE, these units' uses as accounting units and as weight units became split from each other: the value of accounting units was able to be more fluid than the value of weights of precious metals. Although the deben and qite units were at the core of valuation in the Egyptian language, the Greek-speakers living in Egypt at the time never adopted or adapted them into Greek.

5.2.3 The System of Talents and Minas

A second, parallel system of weight measurements for precious metals existed in the eastern Mediterranean world in the centuries up to and including the Ptolemaic period. This system was based on two core units: the talent and mina These units may have had their roots in measurements that came from Babylonia by way of the Levant, but they had a long history in both Greece and Egypt—and all made their way into both the Greek and Egyptian languages—before Alexander's conquest.[48]

[48] It is perhaps worth noting that the earliest unit of weight measurement used in Greece—commonly referenced in the scholarship as the "Minoan unit" or the "Aegean unit" was native to Greece but had fallen out of use long before the Ptolemaic period. The Minoan unit is known from stone balance weights found at Knossos on Crete, dating to the time of the Minoan civilization (ca. 1900-1600 BCE). Evans, Warren, and Michailidou have suggested that the Minoan unit was fit into the Egyptian weight system (at the rate of 1 Minoan unit = 5 old deben of gold), since Egypt and Crete were actively trading in this period. For more information, see: Arthur Evans, "Minoan weights and mediums of currency, from Crete, Mycenae, and Cyprus," in *Corolla Numismatica: Numismatic Essays in Honour of Barclay V. Head*

The largest unit in this system of weights was the talent (Greek τάλαντον, Demotic  *krkr*).[49] The talent is first attested in Semitic languages as *kkr*, which was expressed as כִּכָּר, *kikkār* in Biblical Hebrew*,* and it appears frequently in the Old Testament.[50] The Egyptians adopted this unit from their Semitic-speaking trading partners. In Late Egyptian hieroglyphs, the talent was written as  *krkr*; Erman and Grapow date the first appearance of the Egyptian word to the New Kingdom (ca. 1550-1069 BCE). [51] Around the same time—in the Mycenaean period of Greek history (ca. 1600-1100 BCE)—the talent also appeared in Greece, where it was expressed in Linear B texts using a balance sign:  (an ideogram typically transcribed today as L).[52] This L-unit could also be written out as a full word, *tarasija*.[53] It is quite clear that the Egyptian *krkr* was a loan word from Semitic predecessors, but the Greek τάλαντον seems to have developed out of Linear B *tarasija.* The earliest history of the Linear B L-unit and *tarasija* is unknown. It is possible that the Mycenaeans developed their own word for a unit they learned from Near Eastern trading partners, but it is also possible that the Mycenaeans developed the unit independently and later mapped it onto the Semitic system.

(London: Oxford University Press, 1906), 336-367; Karl M. Petruso, *Ayia Irini: The Balance Weights: An Analysis of Weight Measurement in Prehistoric Crete and the Cycladic Islands,* Keos 8 (Mainz on Rhine: P. von Zabern, 1992); P. M. Warren, "Minoan Crete and Pharaonic Egypt," in *Egypt, the Aegean, and the Levant: Interconnections in the Second Millennium B.C.*, ed. W. V. Davies and L. Schofield (London: British Museum Press, 1995), 1-2, 6; Anna Michailidou, "On the Minoan economy: a tribute to 'Minoan weights and mediums of currency' by Arthur Evans," *British School at Athens Studies* 12 (2004): 315.

[49] LSJ 1753b-1754a; Erichsen, *Glossar*, 566; *CDD*, "K," 01.1, 33-35.

[50] Jacob Hoftijzer and K. Jongeling, *Dictionary of the North-West Semitic Inscriptons* (Leiden: Brill, 1995), 500; F. Brown, S. Driver, and C. Briggs, *A Hebrew and English Lexicon of the Old Testament* (Oxford: Oxford University Press, 1974), 503; Günter Vittman, "Semitisches Sprachgut im Demotischen," *Wiener Zeitschrift für die Kunde des Morgenlandes* 86 (1996): 444.

[51] Erman and Grapow, *Wörterbuch*, vol. 5, 136.

[52] John Chadwick, *The Mycenaean World* (Cambridge: Cambridge University Press, 1976), 102.

[53] John Chadwick and Lydia Baumbach, "The Mycenaean Greek Vocabulary," *Glotta* 41 (1963): 47; Pierre Chantraine, *Dictionnaire étymologique de la langue grecque: Histoire des mots* (Paris: Editions Klincksieck, 1968), 1089.

In Ptolemaic Egypt, one talent was subdivided into 60 minas (Greek μνᾶ, Demotic  *mn*).[54] Like the talent, the mina seems to have originated in the Semitic languages of the Near East, where it was known in Biblical Hebrew as הַמָּנֶ, Biblical Aramaic as כְּוּנָא, Syriac as *manyā*, and Akkadian as *manû*.[55] In Egyptian, the mina first appeared in Dynasty 19 or 20 (1295-1069 BCE), when it was written *mnnw*.[56] Hoch has reasoned that *mnnw* was a loan word from these Semitic terms.[57] In Greece, a version of the mina is attested since the Mycenaean period (ca. 1600-1100 BCE) and may have developed independently. One Mycenaean talent (L-unit) was divided into 30 smaller units represented by two curved lines:  , usually transcribed M.[58] The very writing of this world indicates its dual nature, and perhaps this logogram represents a unit known as a double-mina, or διμναῖον, which is known from the Near East and was essentially twice the weight of the mina. While this equation seems likely, the absence of phonetic writings of this M-unit makes its exact meaning or equation with the double-mina impossible to prove.[59]

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[54] LSJ 1138b; CDD, "M" 10:1 (July 13, 2010), 104.
[55] James E. Hoch, *Semitic Words in Egyptian Texts of the New Kingdom and Third Intermediate Period* (Princeton: Princeton University Press, 1994), 127; Chadwick, *Mycenaean World*, 103.
[56] Hoch, *Semitic Words*, 127 #162.
[57] Hoch, *Semitic Words*, 127 #162.
[58] Chadwick, *Mycenaean World*, 102.
[59] The Mycenaean weight system also included other smaller units unattested in the other civilizations of the eastern Mediterranean. The Mycenaean double-mina (M-unit) was divided into quarters (= 1/2-mina each). This small unit was written with a hash sign-- # --and is transcribed as N. The Mycenaeans also used even smaller weight units to quantify the weights of very light and/or precious goods like gold and saffron, but these units did not fit neatly into the L/M/N system.

The exact history of the transmission of these Near Eastern units to Greece is rather opaque. It is impossible to ascertain exactly whether the Mycenaeans had already developed the L/M/N system independently and then adapted this system to the Near Eastern talent and mina or they were without weight measurements and adopted the Near Eastern system. However, the fact that the Linear B word *tarasija* does not seem to have derived from the Hebrew *kikkār* hints that the former scenario may be more likely. Another clue is the relative weights within the system. In Linear B, 1 L = 30 M = 120 N. The double-mina was divided into quarters to create the smallest unit, N, whereas Near Eastern standards were

While talents and minas were in place around the eastern Mediterranean long before the Hellenistic period, they had always displayed a great deal of regional variation in terms of their precise weights and relative values. For example, in archaic Greece (7th and 6th centuries BCE), four weight standards existed in Euboea, Corinth, Athens, and Aegina: each city's minas weighed a slightly different amount.[60] A few centuries later, when the Persians demanded tribute from the cities they conquered, it was crucial to establish a sense of clarity over exactly how much tribute was expected. Herodotus records that Darius therefore specified that cities paying tribute in silver should measure it on the Babylonian talent, whereas those paying in gold should use the Euboic talent.[61] Over time, the most widely used weight standards in the most extensive trade networks tended to be adopted by the major political and economic powers. While Athens had had its own standard in archaic times, that standard did not spread widely, since Athens was not heavily involved in shipping or colonization before the 6th century. In contrast, Euboea, a very large island off the eastern coast of mainland Greece, had a prominent presence in the development of long-distance integrated trade networks with the Near East as early as the 8th century BCE, and Euboea also had founded colonies from Sicily and to the Chalkidike in northern Greece. It is unsurprising, perhaps, that the talent unit used by the people of this island and their colonies was widely influential, and when Athens started minting coins in the 6th century, the Athenians adopted the

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largely sexigesimal. Moreover, a single mina unit is unknown in Linear B; the Mycenaeans used the double-mina, whose sign,  , very clearly shows that it is dual. While weight standards in this period showed a great deal of regional variation, it is possible that the fact that the Mycenaean L/M/N did display these differences from Near Eastern weight systems could perhaps be evidence that the Mycenaeans were trying to assimilate their own indigenous system into that of the traders from Near East arriving on their shores. In any case, the relationship between weight systems at this time was incredibly complex. For more information, see Chadwick, *Mycenaean World*, 102-103.

[60] Kroll, "Observations on Monetary Instruments," 80-81. The number of staters per mina likewise varied.

[61] Herodotus, *Histories* 3.89.

Euboic standard of weight measurements for their coins.[62] The Euboic standard was the one used in Ptolemaic Egypt.

Like the Egyptian system of the deben and qite, the system of talents and minas was primarily a system of weight measurements. Since these units were used to measure weights of metals used in exchange as Hacksilber, over time they developed a use as units of account. Herodotus (5th century BCE) used the talent to quantify the weights of a wide variety of goods: gold,[63] silver,[64] stone,[65] frankincense,[66] cables of flax,[67] and even the presumably diverse cargo of a ship.[68] The talent thus functioned as a unit of weight, generally, rather than of value; however, the weights Herodotus recorded were often necessary because of their context of exchange. Talents were useful to measure weights of metals used for large payments. For example, Herodotus records the system of tribute paid to Darius in terms of payments of talents of silver and gold: τοῖσι μὲν αὐτῶν ἀργύριον ἀπαγινέουσι εἴρητο Βαβυλώνιον σταθμὸν τάλαντον ἀπαγινέειν, τοῖσι δὲ χρυσίον ἀπαγινέουσι Εὐβοϊκόν, "those of them who were paying silver were told to pay on the Babylonian talent standard, while those who were paying gold (were told to use) the Euboic."[69] As silver came to dominate the exchange landscape of the eastern Mediterranean in the classical and Hellenistic worlds, silver came to be the metal implied when value was expressed in generic talents and minas.[70]

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[62] Kroll, "Observations on Monetary Instruments," 81.
[63] Herodotus, *Histories* 1.14, 1.50, 5.46.
[64] Ibid., 5.17.
[65] Ibid., 2.96.
[66] Ibid., 1.183, 6.97.
[67] Ibid., 7.36.
[68] Ibid., 1.194.
[69] Ibid., 3.89.
[70] Of Herodotus' mentions of talents as a means of payment, 60% do not specify a metal, 28% specify silver, 8% specify gold, and 4% specify frankincense. There is no way to be certain with regards to the presumably commonly understood material in the instances in which the material is not specified, but of the instances in which a material is mentioned, silver is the most common (250% more common than

At least before the Ptolemaic period, talents and minas were used much less commonly in Egypt than in Greek-speaking regions. While the talent had its origins in the Egyptian language in the New Kingdom, it is unclear when and how it came to be used in accounting. Janssen notes no examples of prices given in talents in his compendium of Ramessid prices from Deir el-Medina. A talent of silver would have had a very high value, though, so the fact that it was not used within Janssen's corpus does not necessarily mean that it was never used, only that it was not useful in this context. The mina, likewise, does not appear in Janssen's corpus. Hoch only cites one example of the mina, *mnnỉw*, in line 7 of Černý and Gardiner's hieratic ostracon 88 (O. BM 5631), and this is also the only example cited in Lesko's dictionary of Late Egyptian.[71] While it is certainly possible that other examples exist, it is also clear that the talent and mina were used only very rarely in pharaonic Egypt. In Ptolemaic Demotic texts, *krkr* commonly appears in larger prices, often in conjunction with the deben and other smaller units. However, *mnỉ* was only used very rarely (only one example is attested in the corpus of the Chicago Demotic Dictionary), and generally functioned as a weight measurement rather than as an abstract unit of account. In general, the Egyptians did not have as much need for the talent and mina because they already had their own weight system of the deben and qite.

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gold), so it is likely that silver was the implied material. The talent was a weight measurement that could also be used to quantify the weight of metal to be used to make a payment, but once the metal involved came to be commonly understood and the name of the metal could drop out of the text, the shift from a unit of weight to a unit of account was beginning. A unit of account as such must have a commonly understood, socially accepted value. Talents of precious goods could certainly be a means of payment, but for a talent itself to be a unit of account, the actual material changing hands must have become less important to mention explicitly, as is the case in 60% of the examples in Herodotus. For examples in which the material is omitted/implied, see: Herodotus, *Histories* 2.58, 2.134, 2.180, 3.91, 3.94, 3.131, 4.152, 5.49, 5.51, 5.92, 6.133, 6.136, 8.4, 9.81, 9.120.

[71] Leonard H. Lesko, *A Dictionary of Late Egyptian*, 2nd ed. (Providence: B.C. Scribe Publications, 2002) vol. 1, 187. For a transcription of this text, see Jaroslav Černý and Alan H. Gardiner, *Hieratic Ostraca* vol. 1 (Oxford: Oxford University Press, 1957), 24 & pl. 88; for a transcription and translation, see Adolf Erman, "Aus dem Volksleben des neuen Reiches," *ZÄS* 42 (1905): 102-106.

To sum up, by the start of the Ptolemaic period, there were two parallel systems of weight measurement used in Egypt (the deben and qite) and in the wider eastern Mediterranean (the talent and mina). By the mid-4th century, equations had been developed that linked the two systems together as expressed in Table 1; the link between the two systems was the stater, a term related to Greek coinage, which is the topic of the following section.

Table 5.1. Relative Values of Metallic Weight Units in Ptolemaic Egypt.

	talent	mina	stater	deben	qite
Demotic	*krkr*	*mnꜣ*	*sttr(.t)*	*ḥḏ* or *tbn*	*qt(.t)*
Greek	τάλαντον	μνᾶ	στατήρ	-	-
Relative value (in deben)*	7500	125	5	1	10

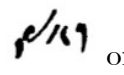
*Expressed differently, 1 talent = 60 minas, 1 mina = 25 staters, 1 stater = 2 qite, 1 deben = 5 staters, 1 deben = 10 qite.

5.2.4 The Greek System of Staters, Drachmas, and Obols

The Ptolemaic system of metallic value units incorporated one further metallic valuation system: the Greek units known as the stater (Greek στατήρ, Demotic  or  *sttr(.t)*), drachma (Greek δραχμή), and obol (Greek ὀβολός, Demotic  *ḏbꜥ.t*).[72] First attested in Greek around the 7th-6th centuries BCE, the drachma and obol were based on the value of physical objects rather than on weight measurements. All three units were smaller value units than the talent and mina and were thus more useful in quantifying the value of even very cheap things (or very small quantities of things). In the Ptolemaic period, 1 drachma was ¼ the value of a

[72] LSJ 449a, 1196a, 1634b; Erichsen, *Demotisches Glossar*, 552; *CDD*, "Ḏ," 1.1, 31; *CDD,* "S" 13.1, 517.

stater. One drachma was divided into 6 obols. By the Ptolemaic period, the stater, drachma,obol were coins, although their earliest history is more complicated.

In Ptolemaic Egypt, one mina was subdivided into 25 staters (Greek στατήρ, Demotic  or  *sttr(.t)*).[73] The stater did not appear in Egypt until the reign of the Persian king Darius I (ca. 410-400 BCE)—about a thousand years after the talent and the mina—when they are attested in a collection of Demotic ostraca from Manâwir, south of the Kharga oasis.[74] The Egyptian term *sttr.t* derived from the Greek στατήρ.[75] Greek στατήρ may have had some relationship to the older Semitic term "shekel," since both could mean "weight" in a general sense and as a precise unit of measurement.[76] Aegean staters may have had some relationship with shekels (~8-9 g) in the 7th and 6th centuries BCE, but this relationship is still speculative and disputed. In any case, by the late 5th century BCE, the term "stater" had acquired the meaning "standard" and was applied to Athenian tetradrachms (~17 g)—by that point, Athenian staters/tetradrachms had become "standard (coins)." As a result, Persian and Ptolemaic period documents in Egypt equate the stater/tetradrachm with two shekels/qite (themselves sometimes treated as equivalents).

The Greek words ὀβολός and δραχμή were eventually applied to coins as well, although they seem to have derived from iron spits used for roasting sacrificial meat. The Greek term for

[73] LSJ 1634b; *CDD,* "S" 13.1, 517.
[74] M. Chauveau, "La première mention du statère d'argent en Égypte," *Transeuphratène* 20 (2000): 137-143.
[75] *CDD,* "S" 13.1, 517.
[76] John H. Kroll, "Observations on Monetary Instruments in Pre-Coinage Greece," in *Hacksilber to Coinage: New Insights into the Monetary History of the Near East and Greece*, ed. Miriam S. Balmuth (New York: American Numismatic Society, 2001), 80.

obol, ὀβολός, derived from the word ὀβελός, which referred to such a spit.[77] Likewise, a drachma literally meant a "handful" of such spits; in fact, the primary definition of δραχμή is "as much as one could hold in the hand."[78] Many authors, both modern and ancient, have suggested that the spits originally must have circulated as currency themselves until the introduction of coinage, but the evidence for such a direct connection between iron spits and currency is essentially nonexistent.[79] It is much more likely that the iron spits were considered valuable because of their significance in ritual feasts, where they were used to roast sacrificial meat. Over time, individuals came to dedicate the meatless spits themselves at sanctuaries and tombs. Most famously, a collection of approximately one hundred such spits, along with one unusually large iron bar—perhaps an oversize spit—were discovered at the temple of Hera in Argos, dating to roughly between 690 and 550 BCE.[80] But in order for them to be worth dedicating at the sanctuary, they must have been understood as having some value in and of themselves. Otherwise, simply the meat that was roasted upon them could have been dedicated and the spits reused for future feasts. So by the early 6th century, obols as spits were likely considered valuable. Perhaps their use in religious circumstances could have even facilitated their acceptance as a standard of value by imbuing them with an air of significance that may have been absent if they were used as mere household items. Only after obol spits had thus gained value themselves did the terms ὀβολός and δραχμή come to be used as units of account and come to represent coins.

The first coins in the Mediterranean world were developed in Lydia (Asia Minor) in the 7th century BCE. These coins were made out of electrum, an alloy of gold and silver, that was

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[77] Richard Seaford, *Money and the Early Greek Mind: Homer, Philosophy, Tragedy* (Cambridge: Cambridge University Press, 2004), 102-103.
[78] LSJ 449.
[79] Kroll, "Observations on Monetary Instruments," 84-87.
[80] Seaford, *Money and the Early Greek Mind*, 102-103; Kroll, "Observations on Monetary Instruments," 86.

produced artificially by adding silver either to natural electrum or to gold.[81] Alain Bresson has reasoned that electrum coinage, as a monometallic system, prevented the difficulties associated with exchanging coins of gold and silver based on their fluctuating values, including speculation and payments of exchange fees.[82] Rulers were able to manipulate the ratio of gold to silver in the artificial electrum coinage, and users of coins began to notice the variations among the monometallic coins. In the mid-6th century, the Lydians became the first to mint coins of pure gold and pure silver. The idea of coinage as a useful medium of exchange quickly spread to Greece, and by the end of the 6th century, there were over a hundred mints producing coins in Greece.[83] Between 550-480 BCE, coinage spread throughout Greece, with systems now based on silver alone.[84] Each city's coinage had its own history, but the first coins of Athens included many small denominations, which probably indicates that these coins were intended for common use.

Coins were thought to derive their value from the weight of the metal they contained, so it is unsurprising that systems of coinage were closely related to standards of weight measurement used for such metals. Systems of classifying the relative weights of coins varied regionally within Greece. The early coinage of Euboea and its colonies was based on the stater, which was then

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[81] François de Callataÿ, "White Gold: An Enigmatic Start to Greek Coinage," *American Numismatic Society* 2 (2013): 7-17, esp. 9; A. Ramage and P. T. Craddock, *King Croesus' gold: excavations at Sardis and the history of gold refining* (London: British Museum, 2000); Maryse Blet-Lemarquand and Frédérique Duyrat, "Elemental analysis of the Lydo-Milesian electrum coins of the Bibliothèque nationale de France using LA-ICP-MS" (lecture, "White Gold: Revealing the World's Earliest Coins" International Congress, Israel Museum, Jerusalem, June 25, 2012).

[82] Alain Bresson, "The Choice for Electrum Monometallism: When and Why," in *White Gold*, eds. U. Wartenberg and P. van Alfen (New York: in press); Alain Bresson, "Coinage: The Greek Way of Handling Money" (lecture in the series, "Money Matters: The Development of Money through the Ancient World," Oriental Institute, Chicago, IL, October, 1, 2014), https://www.youtube.com/watch?v=N0muWKVW1yg (accessed November 11, 2015); Alain Bresson, "Electrum Coins, Currency Exchange and Transaction Costs in Archaic and Classical Greece." *Revue Belge de Numismatique et de Sigillographie* 140, 2009: 71–80.

[83] David M. Schaps, *The Invention of Coinage and the Monetization of Ancient Greece* (Ann Arbor: University of Michigan Press, 2004), 104.

[84] Bresson, "Coinage: The Greek Way of Handling Money."

subdivided into sixth and twelfth fractions, reflecting Near Eastern systems based on sixths.[85] Samos and Thasos had similar systems; in fact, much of northern and eastern Greece focused its coinage on the stater, as well as its sixths and twelfths, ignoring the Greek units of drachmas and obols, into the 4th century.[86] In Athens, Corinth, and Aegina, however, the stater was divided into subunits called drachmas and obols. Kroll has emphasized that this hybridization of the two weight systems was originally exceptional and restricted to only these three coinage systems. Still, in these three cities, the terms δραχμή and ὀβολός referred to coins by the beginning of the 5th century. The coinage of Athens went on to become the most influential system of coins in Greece, and this influence led to the spread of drachmas and obols as both coins and accounting units around the Greek-speaking world.

As discussed above, the weights of these various units varied regionally, so bringing two already varied systems together was far from simple. In his *Life of Solon*, Plutarch explains that before Solon's reforms, the mina was equivalent to 73 drachmas, whereas pseudo-Aristotle's *Ath. Pol.* sets the old equation at 70 drachmas to the mina.[87] Whatever the exact rate, these texts imply that the Athenians were using the Euboic weight standard for the mina and the Aeginetan weight standard for the drachma.[88] Both Plutarch and Aristotle state that Solon changed the standard for the drachma to the Euboic, resulting in a fixed equation of one 100 drachmas to the mina. The accuracy of any history of the semi-mythical figure of Solon cannot be taken at face value, however, and Thomas Figueira, for one, has argued that this story is a later fiction.[89] Still, John

[85] C. M. Kraay, *Archaic and Classical Greek Coins* (Berkeley: University of California Press, 1976), 89, 133, 206, 330; Kroll, "Observations on Monetary Instruments," 83.
[86] Kroll, "Observations on Monetary Instruments," 83.
[87] Plutarch, *Life of Solon* 15; pseudo-Aristotle, *Ath. Pol.* 10.3.
[88] Kroll, "Observations on Monetary Instruments," 82.
[89] Thomas Figueira, *Excursions in Epichoric History: Aiginetan Essays* (Lanham, Maryland: Rowman and Littlefield, 1993).

Kroll reasons that the context of the shift to a 100-drachma mina within a setting of monetary reform, as Plutarch describes Solon's aim to reduce interest on debts, is logical.[90] It can never be clear whether Solon was the actual reformer, Kroll allows, but the scenario Plutarch describes is largely plausible and should not be rejected outright. In any case, by the classical period, Athens had developed a system of coinage in which a drachma was worth 1/100 of a mina.

As a technological innovation, coins were becoming more economically and politically significant around the same time that Athens was itself rising to prominence politically following it and its allies' repulsion of the Persian empire. Around 483 BCE, the Athenians felicitously uncovered a major source of silver within their territory at Laureion, and they minted large issues of heavy tetradrachm coins with this silver so that they could easily use their new wealth for long-distance trade. Before long, the Athenian silver tetradrachm was the most significant coin in the eastern Mediterranean.[91] Athenian coins were trusted because of their ubiquity; they were essentially an international currency, so well-known around the Mediterranean that their value was largely undisputed. These coins were accepted because they were a known brand; a vendor accepting an Athenian "owl" tetradrachm knew that other vendors were very familiar with the coin and would readily accept it in turn. The coin maintained the same imagery—Athena on the obverse, the owl with the letters AΘE on the reverse—over a very long period of time, the consistency of which certainly contributed to their familiarity. Different cities continued to mint their own coins on their standard of choice, but the coins of Athens were hugely influential around the Mediterranean world by the time Alexander rose to power in Macedonia and the Hellenistic period began.

[90] Kroll, "Observations on Monetary Instruments," 84.
[91] Schaps, *Invention of Coinage*, 105.

The first coins to appear in Egypt were Athenian. As discussed previously, by 400 BCE, the term "stater" had made its way into Demotic as *sttr(.t)*, likely as a reference to the Athenian tetradrachm, or stater, coin, but the Egyptians never developed their own term or adopted the Greek for the drachma. The drachma might not have entered the Egyptian language, but the Egyptians did introduce a Demotic term for the obol: Demotic  , *ḏbʿ.t*).[92] In Egyptian, this term clearly derives not from the Greek ὀβολός, but from the Egyptian  *ḏbʿ.t,* which can be traced back to the Old Kingdom with the meaning "seal."[93] This etymology might illustrate the obol's connection to authority and to its tangible coin form within Egyptian systems of meaning.

Like staters, obols were quickly integrated into the Demotic system of value units. In accounting, 1 qite was considered equivalent to 12 obols. Descriptions of prices in Demotic often consist of relatively long lists of numbers in order to express fractional amounts. These lists began with the number of deben (the largest accounting unit), followed by the number of qite (1/10 deben), followed by the number of obols (1/12 qite), including as many of these units as necessary to express the price precisely. It is quite clear from these lists that the obol was integrated into the same accounting system as the deben and the qite: it was merely the smallest unit of the three, not an equivalent value from a parallel accounting system. The order of the units in the lists was so well established that it was common for the terms for units themselves to be omitted. For example, the tax receipt O. OI 19309, line 3 (231-230 BCE) includes the following expression: *ḥḏ (qt.t) 1/3 (ḏbʿ.t) 1.t ¼ [ḥḏ] ḥm³ ḥḏ ỉn-šn(?)*, "1/3 qite & 1 ¼ (obol) (for) the salt tax and the wool(?) tax."[94]

[92] Erichsen, *Demotisches Glossar*, 552; *CDD*, "D," 1.1, 31; Den Brinker, Muhs, and Vleeming, *Berichtigungsliste* B, 841-842, §65.
[93] *CDD*, "D," 1.1, 31; Erman and Grapow, *Wörterbuch*, vol. 5, 566.
[94] Muhs, *Tax Receipts*, 149.

The total payment here amounts to 5 ¼ obols.[95] This payment was tabulated using both the qite and the obol units, which demonstrates that the two were integrated into one accounting system.

After the move to the bronze accounting standard circa 210 BCE, Demotic texts put greater emphasis on a standard equation of obols and qite to indicate whether a payment was made in silver or in bronze. Payments in silver were preferable, since the silver coinage was more trustworthy than bronze in this period of monetary crisis.[96] For that reason, if a person made a payment in bronze, he had to pay an extra fee known as an agio (Greek ἀλλαγή or ἐπαλλαγή) of 10% in addition to the assessed price. Demotic texts include ratios of obols and qite to indicate whether this fee was pertinent: payments without the agio mention an obol:qite ratio of 24:2 (i.e., 12:1), whereas payments with an agio have a ratio of 26.5:2 (i.e., 13.25:1).[97] If the payment were made in silver and no agio were necessary, the equation was written *ḏbʿ(.t) 24(.t) r qt(.t) 2(.t)* "24 obols to 2 qite."

However, if the payment were made in bronze and required an additional agio, the equation was *ḏbʿ(.t) 26(.t) ½ r qt(.t) 2(.t)* "26 ½ obols to 2 qite."[98] After the accounting change of 210 BCE, obols were used within these phrases regarding the agio, but after this date obols as value units on their own seem to drop out of use..

Thus Greek-speakers brought with them to Egypt their own system of valuation that was more closely tied to coins than to metallic weights. This system was based on the stater, drachma

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[95] 1/3 qite x 12 obols/qite = 4 obols, plus 1 ¼ obols = 5 ¼ obols.
[96] Sitta von Reden, "Money and Prices in the Papyri, Ptolemaic Period," in the Oxford Handbooks Online, published April 2016, http://www.oxfordhandbooks.com/view/10.1093/oxfordhb/9780199935390.001.0001/oxfordhb-9780199935390-e-71 (accessed June 10, 2016).
[97] The agio surcharge existed before 210 BCE; the Ptolemies seem to have always privileged silver over bronze, whether the accounting standard was silver or bronze.
[98] Hazzard, *Ptolemaic Coins*, 78-79. Brian Muhs, personal communication (Comments on Chapter 5, Draft 2 v2), April 2, 2015.

and obol. There were many more terms used for different sorts of coins that could appear in the price data; these terms are too numerous and their numismatic background is too complex to discuss here. In any case, the drachma and the obol, in particular, were the most common units used for prices in Greek texts in Ptolemaic Egypt. The obol was also useful in Demotic texts, especially to clarify whether payments were calculated in silver or in bronze. However, just as the deben was never adapted into the Greek language, there was no Demotic word for drachma.

5.2.5 Conclusion: Interpreting Greek and Demotic Metallic Prices in the Ptolemaic Period

The units used to quantify prices in Ptolemaic Egypt derived from three systems of valuation that were initially distinct. The Egyptian system of the deben and qite as well as the system of the talent and mina were originally systems of weights used for metals, and the Greek system of the stater, drachma, and obol referenced coins from early in its history. In the Ptolemaic period, these three systems were integrated with each other based on fixed ratios (Table 5.2, below). For these fixed ratios to be possible, at least some separation between the use of the units as weights of metals or as physical coins and their use as nominal accounting units was necessary.

Table 5.2. Relative Values of Metallic Value Units in Ptolemaic Egypt.

	talent	mina	deben	stater	qite	drachma	obol
Greek	τάλαντον	μνᾶ	-	στατήρ	-	δραχμή	ὀβολός
Demotic	*krkr*	*mnꜣ*	*ḥḏ* or *tbn*	*sttr(.t)*	*qt(.t)*	-	*ḏbꜥ(.t)*
Relative Value (in staters)	1500	25	5	1	1/2	1/4	1/24

At the end of the 5th century BCE, the three systems were mapped onto each other based on the equation of 1 deben with 5 silver staters. This equation is apparent already in the first

mentions of *sttr.t* in Demotic—the Manâwir ostraca from the reign of Darius I (410-400 BCE).[99] One such contract (O. Manâwir 661) includes a penalty clause: if the terms of the contract were broken, a penalty would be due of 5 staters, which are explicitly equated with 1 silver deben. The payment is thus described two ways: in terms of both staters and deben. This practice of expressing one value two or three times in one text was extremely common in the Demotic texts of the period, most likely as a way to ensure that the price was read properly and to avoid either fraud or problems generated by handwriting that may have been difficult to read. This equivalence formula generally reads: *ḥḏ X r sttr(.t) 5X(.t) r ḥḏ X ꜥn* "X deben, equaling 5X staters, equaling X deben again."[100] Since at least the mid-4th century BCE, the qite (1/10 deben) was also used in equivalence formulas with staters, at the rate of 2 qite = 1 stater.[101] For example, in P. Berlin 15830, 4, dating to 364/363 B.C., 1 ¼ stater is equated with 2 ½ qite.[102] These ratios were fixed and did not fluctuate based on the weight or metallic content of coins.

These exchange rates (1 deben = 5 staters and 1 stater = 2 qite) remained constant for several centuries, despite many changes to the coinage. They were noted, nominal equations in accounting and valuation but had nothing to do with physical means of payment. By the New Kingdom, one deben weighed about 91.5 g.[103] The first Athenian silver staters in Egypt, dating to the fifth century BCE, also the time of the first attestation of the equation of 1 deben with 5 staters

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[99] M. Chauveau, "La première mention du statère d'argent en Égypte," *Transeuphratène* 20 (2000): 137-143.

[100] Examples of essentially the same formula also exist that use *tbn* in place of *ḥḏ* (for example, P. BM 10425, 8-9), also equating one *tbn* with 5 staters, so the equation of *tbn* with *ḥḏ*, both of which should be translated "deben" is quite certain. *CDD*, "S," 13.1, 524.

[101] Vleeming, *Gooseherds of Hou*, 88 n. 73. For more on Demotic *qt(.t)*, see *CDD*, "Q," 04.1, 96; Erichsen, *Glossar*, 552, but note that Erichsen conflated *qt(.t)* with *ḏbꜥ(.t)* "obol," so his entry should be used with caution.

[102] Lüddeckens, *Eheverträge*, 20-21.

[103] Mark Depauw, *A Companion to Demotic Studies*, Papyrologica Bruxellensia 28 (Brussels: Fondation Égyptologique Reine Élisabeth, 1997), 167.

in the Manâwir ostraca, weighed 17.2 g.[104] Five staters would therefore weigh 5 x 17.2 g = 86 g—not exactly 91.5 g, but as close as possible without including the remainder. The equation of 1 deben with 5 staters was maintained even as the actual weight of stater coins declined over the course of the Ptolemaic period, first when Ptolemy I reduced the weight of the stater coin to 15.7 g (5 x 15.7 g = 78.5 g), then to 14.9 g (5 x 14.9 g = 74.5 g), and then again to 14.2 g (5 x 14.2 g = 71 g).[105] Already by the first devaluations of coinage under Ptolemy I, 1 deben was actually closer to 6 staters than 5 in its weight, and yet the standardized ratio of deben : staters used in expressing value never deviated from 1:5. For this reason, it is best to understand the deben's value as no longer based directly on the weight of precious metals; in the Ptolemaic period, it was an abstract unit of account.

While the system of value units in Table 5.2 was consistent across the two languages, it is perhaps interesting that the most frequently used units (in Greek, the drachma, and in Demotic, the deben) were not adapted by those writing in the other language. The key to connecting and comparing the Greek and Demotic terminology is the stater, which was common to both languages. In Greek, one stater was equivalent to one tetradrachm (4 drachmas). The stater was also compared to Demotic units based on the fixed equation of 1 deben with 5 staters. Thus one deben was equivalent to 20 drachmas.

The stater used in Table 5.2 is an abstract accounting unit and should not be confused or conflated with the stater coin (i.e., tetradrachm). Since the deben was a unit of metallic weight measurement in addition to value measurement, if it were used as a weight measurement here and if the stater were a reference to the coin, we would expect the deben : stater ratio to fluctuate

[104] Muhs, *Tax Receipts*, 24.
[105] Ibid.

based on the weight of the silver in the tetrachrachm coins and based on fluctuations in the value of silver as a commodity. The stability of the value ratios in Table 5.2 indicates that these were proportions of abstractions rather than of weights of silver and bronze. The terminology of prices in both Demotic and Greek texts was centered on relative value, an abstraction that was able to survive in an otherwise chaotic monetary environment.

5.3 Commodity-Based Prices and Conversion Rates

5.3.1 Introduction

While metallic units were used to quantify the value of other things, specific quantities of agricultural produce are also abundant in Ptolemaic pricing. These quantities were not value units, exactly, since they did not serve as relative units, but they are attested very frequently as descriptions of payments.

Valuation in terms of agricultural units was not new to the Greek- and Egyptian-speaking worlds. In the *Iliad*, Homer famously used oxen as the standard of value to compare the value of the armor of Glaukos and Diomedes:

ἔνθ' αὖτε Γλαύκῳ Κρονίδης φρένας ἐξέλετο Ζεύς, ὃς πρὸς Τυδεΐδην Διομήδεα τεύχε' ἄμειβε χρύσεα χαλκείων, ἑκατόμβοι' ἐννεαβοίων.[106]	But Zeus the son of Kronos took away Glaukos' sense. He gave in exchange with Diomedes son of Tydeios his gold armor for bronze, (the worth of) a hundred oxen for nine.

[106] Homer, *Iliad* 6.234-36. For more examples of oxen in valuation, see the descriptions of the prizes Achilles gives to the victors at Patroclus' funeral games in Book 23.

Likewise, cloth is attested as a measure of value in Egypt from the Old Kingdom through the Third Intermediate Period. For example, in the Oracular Property Settlement of Menkheperre, the *rd-* "shawl" - ppears in descriptions of value alongside deben of silver, deben of copper, oipe of emmer, and sacks of emmer.[107] The text establishes rates of conversion between these various units.

In Ptolemaic Egypt, agricultural commodities, especially grain, were a very common form of payment—in particular, for paying rents on agricultural land and wages for agricultural labor. As long as the buyer and seller agreed to it, virtually any payment could be made in grain. Payments in kind were possible in part because the types of commodity used were commodities whose value seems to have been dependent only on volume, not quality or other more particular characteristics. Thus, as in the metallic system of value units, there also developed other systems of fixed ratios of relative value for certain goods in kind.

5.3.2 Units of Volume Measurement

Agricultural commodities such as grains and oils were quantified in terms of their volume, so in order to understand their ratios of relative value, we must first clarify the volume units used for these commodities. In this section, I will discuss volume units used for dry goods first, followed by those used for liquids. I will also explain how it is possible to convert between units: a crucial step in the calculation of unit prices for comparative purposes in Chapter 7.

[107] Robert Ritner, *The Libyan Anarchy: Inscriptions from Egypt's Third Intermediate Period* (Atlanta: Society of Biblical Literature, 2009), 130-35.

In the Ptolemaic period, the primary volume unit used to quantify amounts of dry goods in both Greek and Demotic was the artaba (Greek ἀρτάβη, Demotic  , *rtb*).[108] The artaba could be used to measure the volume of many different dry goods, including grains, legumes, and seeds.[109] This unit was Persian in origin and had been introduced to Egypt in the 5th century BCE, during the Persians' rule of Egypt. Despite the artaba's ubiquity in the Ptolemaic period, it did not have one fixed volume. Rather, there were many different artabas in play, with variation based on region, the intended purpose of the measurement, or even the individual doing the measuring.[110] The most common artabas had volumes of 30 and 40 liters.[111]

In Greek texts, the artaba was further subdivided into choinikes (the singular is Greek χοῖνιξ), each representing a volume of about .98 liters.[112] The volume of the choinix seems to have remained relatively stable, but the choinix : artaba ratio shifted depending on the size of the artaba. Most often, 30 or 40 choinikes made up 1 artaba, but there are also attestations of larger and smaller artabas, with volumes of 28, 29, or 42 choinikes.[113]

While Greek texts subdivided the artaba into choinikes, texts in Demotic continued to use two smaller volume units--the hin and the oipe—that were both in use in Egypt long before the

[108] Muhs, *Tax Receipts*, 26; LSJ 248a; *CDD*, "R," 1.1, 82.
[109] Pestman, *New Papyrological Primer*, 49.
[110] For a comprehensive list of these various artabas, see R. P. Duncan-Jones, "Variation in Egyptian Grain-measure," *Chiron* 9 (1979): 369-72. For discussion, see Sven Vleeming, "The Artaba, and Egyptian Grain-Measures," in *Proceedings of the Sixteenth International Congress of Papyrology, New York, 24-31 July 1980*, ed. Roger S. Bagnall et al. (Chico: Scholars Press, 1980), 537-545; Pestman, *New Papyrological Primer,* 49.
[111] Vleeming, "The Artaba, and Egyptian Grain-Measures," 537; Pestman, *New Papyrological Primer,* 49.
[112] Pestman, *New Papyrological Primer*, 49: LSJ 1996a.
[113] Duncan-Jones, "Variation in Egyptian Grain-measure," 369-72; Sven Vleeming, "Maße und Gewichte," in *Lexikon der Ägyptologie*, ed. Wolfgang Helck and Wolfgang Westendorf (Wiesbaden: Otto Harrassowitz, 1980), vol. 3, 1210b; Pestman, *New Papyrological Primer*, 49.

Ptolemaic period.[114] Some Demotic texts also maintained the use of the *ḥꜥr,* "sack," which in this period was similar to the artaba in capacity. The *ḥꜥr* had been the primary volume unit in Egypt before the introduction of the artaba, but at that time its capacity was roughly 80 liters.[115] One *ḥꜥr* had been divided into 4 oipe (Demotic *ỉpy.t*), each about 20 liters in capacity. The oipe had been further subdivided into 40 hin (Demotic *hn*). When the artaba was introduced, during the Persian period, the *ḥꜥr* was not eliminated, but its capacity was reduced by 50%, to about 40 liters.[116] The volume of the oipe remained unchanged (roughly 20 liters) and was usually equivalent to 40 hin, i.e., 2/3 or ½ artaba, depending on the hin : artaba ratio.[117] The hin (Demotic  or  , *hn*; Greek ἴν) maintained its capacity of about .48 liters, and 60 or 80 hin constituted 1 artaba.[118] In Demotic texts, the hin was used for measuring the volume of liquids in addition to the volume of dry goods.

In Greek, however, the volume of liquids, such as wine and oil, was quantified in terms of different volume units from those used for dry goods. The primary unit of liquid volume was the metretes (Greek μετρητής), which was usually equivalent in volume to a jar known as a keramion (Greek κεράμιον).[119] The subdivision of the metretes was the chous (Greek χοῦς) of about 2.9 liters.[120] One metretes was often equivalent to 12 choes, in which case its capacity would be 34.8

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[114] The hin is attested in texts as early as the Pyramid Texts of the Old Kingdom. Erman and Grapow, *Woerterbuch*, 493; Janssen, *Commodity Prices*, 108.
[115] Depauw, *A Companion to Demotic Studies*, 166-167; Muhs, *Tax Receipts*, 26.
[116] Depauw, *Companion,* 166-167.
[117] *CDD*, "'I," 11.1 (2011), 101-102.
[118] Erichsen, *Glossar*, 277; *CDD*, "H," 1.1, 62-65; LSJ 830a; Muhs, *Tax Recipts*, 26.
[119] P. W. Pestman, *The New Papyrological Primer* (Leiden: Brill, 1990), 49; von Reden, *Money in Ptolemaic Egypt*, xiii; D. Brent Sandy, *The Production and Use of Vegetable Oils in Ptolemaic Egypt,* Bulletin of the American Society of Papyrologists Supplement 6 (Atlanta: Scholars Press, 1989), 9-10; Maresch, *Bronze und Silber*, 187.
[120] Pestman, *New Papyrological Primer*, 49.

liters, but variation in the metretes:chous ratio was relatively common.[121] Sandy, following Wilcken, noted that in Ptolemaic Egypt a metretes of oil could have a volume of 12 or 6 choes.[122] When used to measure the volume of wines, the metretes could be equivalent to 8 or 6 choes, according to Maresch.[123] In either case, 1 chous was further subdivided into 12 kotylai (Greek κοτύλαι).[124] One other common unit for liquid volumes in Greek was the hemikadion (Greek ἡμικάδιον); this word was sometimes used in reference to a jar of unspecified volume, but in many cases it does seem to have functioned as volume unit.[125] Sandy argued that when the hemikadion was used as a standard of measurement, it was equivalent to ½ metretes, or about 3 choes.[126] However, Bresson has calculated that a hemikadion may have had 1/3 the value—and, by extension, the volume—of a keramion.[127] If one keramion was indeed equivalent in volume to a metretes, then Bresson's calculation would imply a hemikadion equivalent to 1/3 metretes. In the case of wine, even more descriptions of volumes existed, based on the particular type of wine jar holding the wine. For example, some of the wine prices discussed in Chapter 7 are based on volumes of Chian or Rhodian jars. At present, I am still unable to calculate the exact volumes of these jars—if they even had standard volumes at all.

Thus there was a great deal of variation in the capacities of Ptolemaic volume units; even the most common units could have different volumes depending on the context. Despite the ubiquity of these units of measurement, they were by no means standardized within the Ptolemaic kingdom. There were local variations in the exact capacities of the units. Certain measurements

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[121] Ibid.
[122] Sandy, *Production and Use of Vegetable Oils*, 10, and refs. there.
[123] Maresch, *Bronze und Silber*, 187.
[124] Sandy, *Production and Use of Vegetable Oils*, 10, and refs. there; Maresch, *Bronze und Silber*, 187.
[125] Sandy, *Production and Use of Vegetable Oils*, 10, n. 46.
[126] Ibid., 10.
[127] Bresson, "Wine, oil, and delicacies at the Pelousion customs," 86-87.

might have been certified by temples in a fashion similar to the "deben of the Treasury of Ptah" discussed above. There exist attestations, for example, of the *ỉpy.t (n) ḫfṯḥ (n) ʾInp nt wḏ͗* "correct oipe of the dromos of Anubis," which seems to have been an oipe measure established and certified at the dromos of Anubis.[128] The precise capacity of volume units could also vary based on the individuals using them or the purpose they were being used for.[129]

Despite this admitted imprecision and variation, in order to compare prices for things measured by volume, I must make some attempt at conversion rates. Tables 5.1 and 5.2 list the volume units used in Greek and Demotic, along with their relative capacities and approximate capacities in liters, where previously studied. Note especially the variation in the volume units used for liquids, based primarily on the use of different numbers of choes per metretes. While the volume of one chous seems to have been relatively stable, the rate of choes per metretes did vary, as indicated in Table 2. In the tables of prices to come in Chapter 7, I include both original prices (using the terms included in the original text) as well as unit prices I have calculated based on these tables. Some texts did indicate the number of choes intended per metretes, but where not mentioned, I provide all the possible conversions, as I also have in Tables 1 and 2, below. Unfortunately the variability of these units is a serious factor impeding the comparability of the price data and must be taken into account throughout the rest of this dissertation.

[128] P. Brooklyn 37.1802, 18-19; P. Brooklyn 37.1803, 14-15. Listed in *CDD*, "ʾI" 11.1 (April 2011), 102.
[129] Pestman, *New Papyrological Primer,* 49.

Table 5.3. Units of Volume Measurement for Dry Goods.

Volume Unit	artaba	*ḥꜥr*-sack	oipe	choinix	hin
Greek	ἀρτάβη			χοῖνιξ	ἵν
Demotic	*rtb*	*ḥꜥr*	*ỉpy.t*		*hn*
Approximate Relative Capacity (per artaba)	1	about 1	about 1.5 or 2	30 or 40	60 or 80
Approximate Capacity (in liters)	30 or 40	40	20	.98	.48

Table 5.4. Units of Volume Measurement for Liquids.

Volume Unit	metretes	keramion	hemikadion	chous	hin	kotyla
Greek	μετρητής	κεράμιον	ἡμικάδιον	χοῦς	ἵν	κοτύλα
Demotic					*hn*	
Approximate Relative Capacity (per metretes)	1	about 1	2 or 3?	6, 8, or 12	36, 48, or 72	72, 96, or 144
Approximate Capacity (in liters)	39.39 (12 choes) or 29.55 (6 choes)[130]			2.9		

5.3.3 The Relative Value of Commodities

Ptolemaic texts record payments that were made (or at least were reckoned) in terms of multiple types of grain. The most commonly attested grains were wheat (Greek πυρός, Demotic *sw*), barley (Greek κριθή, Demotic *ỉt*), emmer (Greek ὄλυρα, Demotic *bt*), and vetch (Greek

[130] Sandy, *Production and Use of Vegetable Oils*, 10.

ἄρακος, Demotic *wrỉ*?).[131] Together, these grains formed a single system of value, since payments reckoned in one grain could be converted into quantities of another of these grains based on known rates of conversion.[132]

In the Ptolemaic period, wheat was introduced to Egypt on a massive scale.[133] Since wheat was considered preferable to other grains, such as barley and emmer—themselves staples of the Egyptian diet for millennia—texts that record grain payments often include extra notations that if payment were made in a grain other than wheat, the volume of the grain paid would need to be higher. There therefore existed conventional conversion rates between grains. There are examples in both Demotic and Greek papyri that establish the ratio of the amounts of payments made in barley to wheat at rates of 3:2, 5:3, and even 2:1; the ratio of emmer to wheat was 5:2 or 4:9; and vetch to wheat was 5:3.[134] For example, a payment due of 2 artabas of wheat could also be paid in the form of 3 artabas of barley, 5 artabas of emmer, or 3 1/3 artabas of vetch. Expressed differently, barley held 50-67% the value of wheat, emmer held 40-44%, and vetch held 60%.

Recently, Damien Agut-Labordère has published a convincing argument that in certain ostraca of the Persian period, this system of relative values extended beyond grain to include other commodities.[135] His primary example comes from O. Manâwir 5469 (360 BCE), which describes a rent agreement between a certain Nesinhor and Imhotep. Nesinhor begins by stating that he will

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[131] LSJ 1558a; *CDD,* "S" 13.1 (15 November 2013), 61-65; LSJ 995b, cf. κριθαία; *CDD*, "'I" 11.1 (18 April 2011), 235; LSJ 1220a; *CDD,* "B" 2.1 (23 August 2002), 93; LSJ 233b; *CDD*, "W" 9.1 (7 August 2009), 115-117.

[132] Vetch is actually a legume—not a proper grain—but it was still included in this one system.

[133] For an in-depth discussion of this development, see Section 4.3.3 on technological developments related to agriculture.

[134] Muhs, *Taxes, Taxpayers, and Tax Receipts* (2005), 25; Sven P. Vleeming, "Some Notes on the Artabe in Pathyris," *Enchoria* 9 (1979): 93-100, esp. 97-98; Michel Malinine, "Un prêt de céréals à l'époque de Darius I," *Kêmi* 11 (1950): 1-23, esp.14.

[135] Damien Agut-Labordère, "De l'amidonnier contre de l'orge: le sens de la conversion des quantités dans les ostraca démotiques de 'Ayn Manâwir (Oasis de Kharga, Égypte)," *Comptabilités* 8 (2016), 3 (posted online June 20, 2016; accessed July 2, 2016).

pay a rent of 16 measures of *ỉt nfr* "good barley" each year for the next ten years. The rent payment is then described in alternate terms:

ỉby 2 wꜥb ỉrp 4.t tgm 8 bt 24	2 (measures of) honey, (=) 4 (measures of) pure wine, (=) 8 (measures of) castor oil, (=) 24 (measures of) emmer

The 16 measures of barley were thus equivalent to 2 measures of honey, 4 of wine, 8 of castor oil, or 24 of emmer. Expressed differently, 1 measure of honey = 2 measures of wine = 4 measures of castor oil = 8 measures of barley = 12 measures of emmer. Liquids and grains were included in the same equation without any specification regarding the units of measurement. Liquids (honey, wine, and oil) were normally measured in hin, whereas the volume of grains (barley, emmer) was normally quantified in artabas. Here, no units are given. It is likely, though, that the units were not particularly crucial because the payment would not actually be made in the form of some other commodity.[136] Vleeming proposed that such descriptions of payments in terms of alternate units were included in the contracts to prevent falsifications by making the numbers more difficult to tamper with.[137] The use in this text of these many alternate commodities in expressing the payment amount is not typical.

In Chapter 7, I will consider the extent to which the relative value ratios of these commodities were fixed versus whether they were allowed to fluctuate based on other factors. The price tables listed in Chapter 7 therefore include prices expressed both in terms of money and in

[136] Malinine argued in 1950 that in these descriptions, the renter or debtor was able to choose the form of his payment. See Michel Malinine, "Un prêt de céréals à l'époque de Darius I," *Kêmi* 11 (1950): 1-23, esp. 5.

[137] Vleeming, *Gooseherds of Hou*, 185, n. 11.

terms of wheat. Prices in terms of wheat tended to be much more stable, and perhaps traditional, than prices in terms of money.

5.3.4 Conclusion

It is clear that while many prices could be quantified in terms of metallic value units, payments that were to be made in kind were typically expressed in texts in terms of the volume of commodities. The existence of these value ratios of different grains, and even more varied commodities, indicates a degree of flexibility in the form of payments. A payment tabulated in terms of artabas of wheat usually could be paid in barley, for example. But this flexibility was not total: those who paid in less desirable commodities (like barley) had to pay a premium to compensate for their lack of desirability – analogous to the agio surcharge on payments made in less desirable metals like bronze.. In Chapter 7, I will consider the extent to which these ratios impacted the choice of which grain to farm. Since the same volume of wheat could have twice the purchasing power of the same volume of barley, farmers had a clear incentive to focus their efforts on the higher-value commodity.

5.4 Conclusion

The prices collected in the data set for this dissertation were not expressed uniformly. Included are texts written in two languages, with values and payments expressed both in terms of kind and in terms of metallic units. The system of metallic valuation units alone comprised units from three different systems that significantly antedate the Ptolemaic period and, historically whose values could vary from region to region or city to city around the eastern Mediterranean.

As Egyptian- and Greek-speakers came together in Ptolemaic Egypt, they developed two clear systems of prices: one of abstract units that derived from metals and one of tangible commodity grains.

An analysis of price fluctuations in this period must take into account variation in the units used in the texts. In order to compare prices, it is necessary first to express them in a common unit. For prices in the metallic system, previous studies of prices have used the drachma as this common unit, since these studies were focused on Greek texts. Likewise, payments quantified in commodities may be able to be translated into artabas of wheat. These conversions are not simple and are not always possible, however. For that reason, each example will need to be considered separately. Once the prices have been converted into a common unit, they might also need to be adjusted for inflation so that fluctuations in the real prices of various things can be analyzed. This question of adjustments for inflation and/or deflation is the topic of Chapter 6.

CHAPTER SIX

Inflation in Ptolemaic Egypt

6.1 Introduction

This chapter represents an attempt to identify and understand the potential causes behind the apparent general increases in prices known in Egypt between 332 and 186 BCE. For the purposes of this dissertation, inflation is particularly important to understand and quantify. Chapter 7 will discuss the causes of price fluctuations within particular sets of goods. I must first understand and explain possible inflationary forces acting on prices before before it will be possible to narrow in on certain commodity types and to investigate real changes in their particular supply or demand that could have affected their value. Essentially, I must control for factors affecting the entire economy before I can make sense of changes in the price in certain commodities individually.

Inflation can be defined as any sustained, general rise in the price of goods and services. It has been clear since Reekmans's 1948 article, "Monetary History and the Dating of Ptolemaic Papyri," that prices rose in Egypt during the reign of the Ptolemaic dynasty, so the question of the *existence* of apparent inflation in the Ptolemaic period has already been answered in the affirmative.[1] However, the simple definition of inflation as a sustained, general price rise does not account for the *cause* of that price rise, and economists have further subdivided inflation into types based on these different causes: monetary inflation, demand-pull inflation, and cost-push

[1] T. Reekmans, "Monetary History and the Dating of Ptolemaic Papyri," in *Studia Hellenistica* 5, ed. L. Cerfaux and W. Peremans, (Louvain: Bibliotheca Universitatis Lovanii, 1948), 15-43. See also Chapter 3, section 3.3.2, for a more detailed discussion of previous investigations of the Ptolemaic inflation.

inflation.[2] The question of the precise causes of the seeming inflation in this period has not yet been satisfactorily answered and is thus the subject of this chapter.

The first type of inflation is *monetary* and is a result of changes in monetary policy. Within this type, there are three primary potential drivers of monetary inflation: an expansionist fiscal policy, an expansionist monetary policy, or changes in the value of domestic currency relative to foreign currencies. Under an expansionist fiscal policy—the first driver—the state produces more currency. The supply of money increases, and the value of each unit of currency declines as a result. There is strong evidence for an expansionist fiscal policy under the Ptolemies, as Ptolemies I and II minted massive quantities of silver and gold coins, while Ptolemy III and the later kings issued huge amounts of bronze coins.[3]

Alternatively, under an expansionist monetary policy—the second of the drivers of monetary inflation—the state (specifically, the Federal Reserve, in the contemporary United States) lowers interest rates, making credit more readily available. In this case, more 'money' exists even though no excess of physical currency is produced. Ptolemaic Egypt was still in the early stages of the development of credit institutions and lacked such a regulatory system. Still, there is

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[2] See John Black, Nigar Hashimzade, and Gareth Myles. "Demand Inflation," in *A Dictionary of Economics* (New York: Oxford University Press, 2012). http://www.oxfordreference.com/view/10.1093/acref/9780199696321.001.0001/acref-9780199696321-e-767 (accessed May 1, 2017); John Black, Nigar Hashimzade, and Gareth Myles. "Cost Inflation," in *A Dictionary of Economics* (New York: Oxford University Press, 2012). http://www.oxfordreference.com/view/10.1093/acref/9780199696321.001.0001/acref-9780199696321-e-616. (accessed May 1, 2017).

[3] For a more detailed discussion of coinage in Ptolemaic Egypt, see Chapter 4, section 4.4.9, "Monetization and the Money Supply."

evidence that the Ptolemies increased the availability of credit, so an expansionist monetary policy cannot be excluded from the present analysis.[4]

In the third driver of monetary inflation, foreign currencies have a higher value than the local currency (for a variety of possible reasons).[5] In this situation, the price of imports is therefore driven up. Monetary inflation is thus driven by changes in the supply of currency rather than in the supply or demand of goods and services. There is evidence that the Ptolemies maintained a protectionist fiscal policy, keeping the value of Egyptian currency artificially low to prevent coins from leaving Egypt.[6] It is thus certainly plausible that Ptolemaic monetary inflation could have been driven by this difference in the relative value of domestic and foreign currencies.

The second type of inflation, called *demand-pull inflation*, is a rise in prices caused by an increase in demand for goods and/or services.[7] Demand-pull inflation can come about within a growing economy. If people are more confident and are earning more money, they are able and willing to spend more of that money. This increase in consumer confidence can be the result of a number of factors. The state can play a role, either by spending more money (and therefore distributing it to the people) or by decreasing taxes (so people can spend that money on other things). In any case, people want to spend more, so demand rises, and prices rise in turn.

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[4] Sitta von Reden, *Money in Ptolemaic Egypt* (Cambridge: Cambridge University Press, 2007), 181-204. For a more detailed discussion of the use of credit in Ptolemaic Egypt, see Chapter 4, section 4.4.8, "Granaries and Banks."

[5] John Black, Nigar Hashimzade, and Gareth Myles. "imported inflation." In *A Dictionary of Economics*. : Oxford University Press, 2012.

[6] von Reden, *Money in Ptolemaic Egypt*, 43-48. For a more detailed discussion of Ptolemaic monetary policy, see Chapter 4, section 4.4.9, "Monetization and the Money Supply."

[7] John Black, Nigar Hashimzade, and Gareth Myles. "Demand Inflation," in *A Dictionary of Economics* (New York: Oxford University Press, 2012). http://www.oxfordreference.com/view/10.1093/acref/9780199696321.001.0001/acref-9780199696321-e-767 (accessed May 1, 2017).

The final type of inflation, called *cost-push inflation*, operates at the other end of the supply-demand equation: it is a result of a decrease in the supply of goods and/or services.[8] This decrease in supply could have many reasons; for example, a shortage of labor, a depletion of natural resources, a natural disaster, war, monopolies or other attempts at controlled supply, or state regulation or taxation of certain industries can all lead to a decrease in supply. A decrease in the supply of one commodity can trigger inflation across an entire economy if that commodity is necessary for a variety of industries. Probably the most prominent example of cost-push inflation in recent decades was the oil crisis of the 1970s, when the Organization of Petroleum Exporting Countries imposed an embargo that led to oil shortages in the United States.[9] The price of oil rose, and since oil fueled most of American industries, the rise in the price of oil was pushed onto consumers as the price of most other goods and services rose in turn. In a time of cost-push inflation, the low supply of one or more goods or services leads to high prices for those goods or services, and those high prices spread throughout the economy.[10]

To these three modern understandings of the causes of inflation we must add one caveat that is more specific to the Ptolemaic economy: changes in accounting practices.[11] Prices reckoned in bronze units will, in absolute terms, appear higher than prices counted in silver units. As discussed in Chapters 3 and 5, Ptolemaic texts often do not clearly specify which units are

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[8] John Black, Nigar Hashimzade, and Gareth Myles. "Cost Inflation," in *A Dictionary of Economics* (New York: Oxford University Press, 2012). http://www.oxfordreference.com/view/10.1093/acref/9780199696321.001.0001/acref-9780199696321-e-616. (accessed May 1, 2017).

[9] Ibid.

[10] Ibid.

[11] For a more detailed discussion of the many previous studies of Ptolemaic prices that focused on accounting changes, along with references, see Chapter 3, section 3.3.2, "Review of Literature on Ptolemaic Prices."

intended.[12] To use a modern example, let's say an apple typically costs $1 and could be labeled with a price of 1 dollar or 4 quarters; those prices are equivalent. If at a certain point in time, stores begin to label all their prices in quarters, their apples will cost "4," without the quarter unit immediately present. For that reason, it might seem as if apples now cost four times as much as apples at other stores: this might *seem* to be inflation. But since the price could still be reckoned as $1, the price of apples has not actually increased. Thus accounting changes are not signs of inflation and must be distinguished from the three forms of inflation discussed previously, in which prices are actually rising.

This chapter will investigate Ptolemaic inflation first through lens of these three major causes of inflation--monetary, demand-pull, and cost-push—then through the distinction between real inflation—changes in actual prices—and mere changes in accounting practices. Naturally, these three types of inflation, as well as accounting changes, are not mutually exclusive, and it is possible that a combination of factors were in play. The key goals of this chapter are to define any periods of inflation between 332-186 BCE and to analyze the likely causes of this inflation historically.

The data reveal a doubling in the price of wheat circa 220-215 BCE, followed by a dramatic increase in prices more generally roughly around 211-195 BCE. Most scholars have reasoned that these increases were caused by changes in accounting practice, with the exception of Cadell and Le Rider, who argued for real inflation at this time (both demand-pull and cost-push).[13] The fragmentary and inconclusive nature of the data, particularly the imprecise dating of ancient texts, means that the precise cause and extent of the price increases cannot be tabulated in

[12] This lack of specificity in units is particularly common in Demotic. Cf. 5.2.2 "The Egyptian System of Deben and Qite."
[13] Hélène Cadell and Georges Le Rider, *Prix du blé et numéraire dans l'Égypte Lagide de 305 à 173,* Papyrologica Bruxellensia 30 (Brussels: Fondation Égyptologique Reine Élisabeth, 1997), esp. 73-76.

a way that is anywhere near as accurate as in modern economic calculations. However, a more specific approach to understanding inflation, dividing it into its component types, allows a more nuanced perspective in making sense of this messy data. In the end, I will argue that accounting changes were likely the primary driver of the price increases starting in 211 BCE, but that it is also possible that cost-push inflation, caused by the loss of Ptolemaic territories in the Fifth Syrian War (202-195 BCE) and the Great Revolt in Upper Egypt (206-186 BCE), may have been a contributing factor.

6.2 Indicators of Inflation

6.2.1 Introduction

The primary difficulty in studying Ptolemaic inflation is simply the nature of the data: they are incomplete, often unclear, and not a representative sample of all prices of the time (most of which would never have been recorded). If the goal of the present study were to calculate inflation rates precisely on an annual basis, the study would be bound to fail. It might be possible, however, to attempt to see how prices moved relative to each other, to identify those moments when prices of certain goods moved differently from those of other goods. Thus it might be possible to understand how the pricing dynamics of different commodities compared to each other, *in relative terms.* The goal of the present chapter is to come up with a baseline understanding of inflationary price fluctuatations that can be filtered out of the analysis of real price variability in Chapter 7.

As discussed in Chapter 3, the Ptolemaic inflation has been studied previously by Reekmans (1948 and 1951), Gara (1984), Hazzard (1995), Maresch (1996), Cadell and Le Rider

(1997), and von Reden (2015).[14] These scholars approached the problem by first pinpointing those time periods in which major rises in prices occurred, namely 221-216, 211-210, and 183-182 BCE. They then attempted to explain the price rises as the result of changes in either accounting practices or real inflation (or some combination of the two). First, Reekmans attributed the price rises to nominal changes in the value of bronze coins (221-216), the switch from the silver to the bronze accounting standard (211-210) and a second devaluation in the nominal value of bronze coins (183-182).[15] Then Gara thought the price rises were not based on changes in the value of coins themselves but rather experimentation in accounting practices.[16] Hazzard likewise explained the rise in prices as a result of accounting changes, namely a desire to simplify calculations and eliminate the need for unwieldy obols in accounts.[17] Maresch based his explanation on the development of distinctions between units of account and the changing relationship between those units of account and actual coins.[18] Cadell and Le Rider were the first to make the case for actual inflation.[19] They noted that the price increases were not as clearly demarcated as previous scholars had thought, and that the more complex, nuanced price increases

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[14] See Chapter 3, section 3.3.2, "Review of Literature on Ptolemaic Prices." Reekmans, "Monetary History and the Dating of Ptolemaic Papyri"; T. Reekmans, "The Ptolemaic Copper Inflation," in *Ptolemaica* (Studia Hellenistica 7), ed. E. Van't Dack and T. Reekmans (Louvain: Publications Universitaires de Louvain, 1951), 61-118; Alessandra Gara, "Limiti strutturali dell'economia nell'Egitto tardo-tolemaico," *Studi Ellenistici* 48 (1984): 107-134; R.A. Hazzard, *Ptolemaic Coins: An Introduction for Collectors* (Toronto: Kirk & Bentley, 1995), 83-84; Klaus Maresch, *Bronze und Silber: Papyrologische Beiträge zur Geschichte des Währung im ptolemäischen und römischen Ägypten bis zum 2. Jahrhundert n. Chr.* (Cologne: Westdeutscher Verlag, 1996), 1-18 ; Cadell and Le Rider, *Prix du blé et numéraire dans l'Égypte Lagide de 305 à 173*; Sitta von Reden, "Grain prices in the eastern Mediterranean (c. 420-30 BC)," in Dominic Rathbone and Sitta von Reden, "Mediterranean grain prices in classical antiquity," in *A History of Market Performance: From Ancient Babylonia to the Modern World*, ed. R. J. van der Spek, Bas van Leeuwen, and Jan Luiten van Zanden (London: Routledge, 2015), 156-170.

[15] Reekmans, "Monetary History and the Dating of Ptolemaic Papyri"; Reekmans, "The Ptolemaic Copper Inflation."

[16] Gara, "Limiti strutturali dell'economia nell'Egitto tardo-tolemaico."

[17] Hazzard, *Ptolemaic Coins*, 83-84.

[18] Maresch, *Bronze und Silber: Papyrologische Beiträge zur Geschichte des Währung im ptolemäischen und römischen Ägypten bis zum 2. Jahrhundert n. Chr.*

[19] Cadell and Le Rider, *Prix du blé et numéraire dans l'Égypte Lagide de 305 à 173.*

occurred in 221-216 and the years leading up to 199, with annual inflation rates of about 15% and 30%, respectively. They justified their claims regarding inflation based on their plausibility, i.e., that there are modern examples of inflation at these rates and that there were historical developments that could explain them. Von Reden noted the flaws in the logic of Cadell and Le Rider, most importantly their lack of explanation for the increase of prices in recognizable steps. Ultimately, von Reden took the most pessimistic perspective on the possibility of making sense of the Ptolemaic inflation, writing: "while we cannot exclude the possibility that changes of volumes of money in circulation were major factors for changes in price levels, both temporarily and in the long term, we are lacking the data to prove that link empirically."[20]

When economists calculate inflation rates today, they do so by means of such standards of comparison, known as economic indicators. The most widely-used of these indicators is the Consumer Price Index (CPI), which is calculated monthly by the Bureau of Labor Statistics, under the aegis of the United States Department of Labor. The CPI is the estimated price of a hypothetical basket of those goods and services that a typical consumer household would purchase in a given month, or at least a representative sample of those goods and services.[21] The Bureau of Labor Statistics divides consumer expenditures into major groups--food and beverages, housing, apparel, transportation, healthcare, recreation, education, and communications—and publishes additional indices for each of these major groups.[22] The annual rate of inflation is the percentage change in the hypothetical household's basket from year to year.

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[20] Sitta von Reden, "Grain prices in the eastern Mediterrnaean (c. 420-30 BC)."
[21] Bureau of Labor Statistics, "The Consumer Price Index (Updated 06/2015)," in *BLS Handbook of Methods* (Washington, D.C.: U.S. Bureau of Labor Statistics Division of Information Services, 2015, Ch. 17. https://www.bls.gov/opub/hom/pdf/homch17.pdf (Accessed May 15, 2017).
[22] Bureau of Labor Statistics, "Consumer Price Index," https://www.bls.gov/cpi/cpiovrvw.htm#item2. (accessed January 4, 2017).

Certain of the major groups of expenditures used by the Bureau of Labor Statistics are not nearly as relevant in an investigation of inflation in an ancient context. Modern expenditures in categories such as healthcare, recreation, and education have expanded dramatically since antiquity, since modern families have disposable incomes beyond subsistence—a luxury not shared by the vast majority of ancient families. Since most Ptolemaic families likely lived at or near subsistence levels, they probably directly their spending primarily to food, shelter, and clothing, and only secondarily to investments in the future (such as healthcare and education). Consequently, spending on categories beyond subsistence is likely to have played a much smaller role for the non-elites of antiquity than for modern families. Moreover, ancient historians do not have access to nearly as much data as do modern economists. The data we do have is limited to certain commodities and is spotty in its spread over time and space. Many texts likewise cannot be dated precisely.

It is my assertion, however, that such problematic data simply means that we must consider that data in multiple ways, from multiple angles. No one calculation can accurately represent Ptolemaic inflationary trends, and no one economic indicator can be precisely calculated for each year within the period in question. For that reason, I am approaching the inflation question using multiple indicators that, in aggregate, can serve as a meaningful standard of comparison. If these approaches all yield similar results, then I can be reasonably certain of my understanding of the nature of the Ptolemaic inflation. If one approach yields aberrant results, then it must be considered more closely. It is possible that divergence from the usual price increases will provide insight into the nuances of the Ptolemaic inflation: not just how much prices rose and when, but also why they rose in the first place. This methodology, slicing the data in

different ways and comparing the results to each other, will allow for the necessary nuance in interpretation.

The following analysis of inflationary trends is based on five Ptolemaic economic indicators that I have devised: (1) prices of common Ptolemaic staple commodities, (2) fixed values from Demotic annuity contracts, (3) the cost of labor, (4) non-proportional taxes, and (5) standard social payments. A category of quantitative economic data can be an indicator--that is, a useful standard of comparison for prices—if that category represents something relatively standard. For example, the amount of food a person needs to survive in a day would not be expected to change much over time. Although the cost of that subsistence might change, I assume that the subsistence itself would be more stable. For that reason, I am including two indicators related to the cost of living: a Ptolemaic price index based on the price of wheat, wine, and castor oil, as well as the value of support allowances men gave to women in Demotic annuity contracts. The state of the extant data prevents the creation of a true CPI based on a complete cross-section of consumer costs, so this index is conditioned by the availability of suitable data and excludes major subsistence costs like housing. However, these meager attempts at a price index can still provide a yardstick by which to measure inflation. Likewise, in the absence of the introduction of new technology, the value of a day's unskilled labor is relatively constant, so the cost of that day of unskilled labor can serve as a third indicator of inflation. In the Ptolemaic period, there were other standard, fixed payments whose price can be tracked over time (namely, taxes, fees, fines, and penalties). Since what was being paid for did not change, the change in the price of such payments can be compared to the changes in prices of commodities and can serve as a standard with which to measure inflation. In the following pages, I will explain my approach to calculating each of

these indicators. I will also outline the pricing trends highlighted by each indictor within the early Ptolemaic period.

6.2.2 Indicator 1. Indices of Common Ptolemaic Staple Commodity Prices

The most obvious starting place in the search for indicators of inflation would be to follow the lead of modern economists and to build an index of prices that could quantify the general cost of living in Ptolemaic Egypt. The modern CPI of the Bureau of Labor Statistics takes into account the value of the value of many different sorts of goods and services. The modern CPI includes the cost of food, beverages, clothing, housing, transportation, healthcare, education, and recreation: it provides a holistic picture of the true cost of living.[23]

Unfortunately, it is not possible to build a similarly complete index of the cost of living in Ptolemaic Egypt. The Ptolemaic data do not include much, if any, information on the typical costs of things like healthcare, education, and recreation—presumably this gap is a result of the fact that most people were living at or near a subsistence level and did not spend money on such things. Some data do exist for clothing, housing, and transportation, but those data are particularly spotty and tend to reflect the prices of more unique items rather than standard commodities. For example, there are some extant house prices, but there is no way to determine how representative those prices are (i.e., how expensive those houses were relative to the average house price). In ancient Egypt, houses were regularly passed down through generations within a family, so even if reliable data on real estate existed, prices would need to be amortized over generations.[24] Likewise, the costs of renovations and expansions to homes over those generations

[23] Ibid.
[24] Brian Muhs, "The Girls Next Door: Marriage Patterns among the Mortuary Priests in Early Ptolemaic Thebes," *Journal of Juristic Papyrology* 35 (2005): 169-194, esp. 188-192; Brian Muhs, "Fractions of

would need to be included.[25] Unfortunately, none of these calculations are possible. Housing is certainly necessary for life, and a true cost of living index would include housing costs. Clearly, it is not possible to calculate a true CPI based on extant data from Ptolemaic Egypt.

Instead, it is possible to build an understanding of fluctuations in some of the most commonly attested prices in the Ptolemaic data, which reflect the cost of a sample of common consumer staples. Plenty of data exists on the price of staple grains, wine, and oil—all of which were so frequently mentioned in Greek texts that they likely formed key elements in the regular spending of the Greek-speaking residents of Ptolemaic Egypt. Wine, especially, was popular in Greek texts from the Fayyum and in state rations, but it is possible that beer was a more common beverage for most of the Egyptian population.[26] For that reason, I attempted to prepare a second index to better reflect the goods consumed by the majority of the populace. The index of commonly attested goods in Greek texts includes wheat, wine, and castor oil; that of the common Egyptian staples includes barley and beer.

Initially, I attempted to build two 'indices' of common Egyptian consumer staples: one including wheat, wine, and castor oil (staples most commonly attested in Greek texts) and another with barley and beer (to better represent the approximate preferences of the Egyptian-speaking population). I noted that the indices of these staples must be weighted appropriately based on

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Houses in Ptolemaic Hawara," in S. Lippert and M. Schentuleit, eds., *Graeco-Roman Fayum: Texts and Archaeology, Proceedings of the Third International Fayum Symposium, Freudenstadt, May 29 – June 1, 2007* (Wiesbaden: Otto Harrassowitz, 2008), 187-197, esp. 188-190.

[25] Brian Muhs, personal communication, January 22, 2017.

[26] Willy Clarysse, "Use and Abuse of Beer and Wine in Graeco-Roman Egypt," in Klaus Geus and Klaus Zimmerman, eds., *Punica – Libyca – Ptolemaica: Festschrift für Werner Huß, zum 65. Geburtstag dargebracht von Schülern, Freunden und Kollegen*, Orientalia Lovaniensia Analecta 104, Studia Phoenicia 16 (Leuven: Peeters, 2001), 159-166, esp. 159-160; Peter van Minnen, "Dietary Hellenization or Ecological Transformation? Beer, Wine, and Oil in Later Roman Egypt," in Isabella Andorlini, et al., eds., *Atti del XXII Congresso Internazionale di Papirologia. Firenze, 23-29 agosto 1998*, vol. 2 (Firenze: Instituto papirologico G. Vitelli, 2001), 1265-1280.

consumption patterns. Without weighting--for example, if the unit prices were just averaged--changes in the price of more expensive goods will have a disproportionate effect on the index. I acknowledged that it might not be possible, and is generally not necessary, to calculate such consumption figures with exact, perfect precision, since consumption amounts do not matter in absolute terms. Since it is necessary to weight the average appropriately, all that really concerned me was the *relative* amounts of the staples consumed on an annual basis. Ultimately, I began with the first index, for which I attempted to calculate roughly how much of each staple an average adult man would use in a year and arrived at an estimate of 9 artabas of wheat,[27] 1 chous of wine,[28] and 0.5 chous of castor oil.[29] Next, I set out to identify those years in which securely dated

[27] Previous scholars estimated average wheat consumption, and I used their calculations to determine how much wheat should go in the index. Pestman noted that "a person could live on about 10 artabas of wheat a year," although he did not specify the reasoning behind that number. Based on estimates of agricultural yields and calculations of the amount of arable land in Kerkosiris in the late second century, Crawford (Thompson) estimated the average consumption of wheat per family per year at 22.6 artabas. Then she used a hypothetical family of four to divide that consumption estimate per family into a per-person estimate; she reasons that an adult male would consume about 8.2 artabas of wheat annually. Since her estimate was rough, Crawford (Thompson) compared its caloric content to that of other ancient diets and found that the people of Kerkeosiris "take their place among the lesser fed of the ancient world"; her number is feasible but still relatively low. In response, Monson estimated 8-10 artabas of wheat per adult male per year "as a very rough standard for comparison." It seems fair, if admittedly speculative, to use 9 artabas as a rough but functional estimate of typical wheat consumption. My Greek staple index therefore included 9 artabas of wheat. P. W. Pestman, *The New Papyrological Primer* (Leiden: Brill, 1990), 49; Dorothy J. Crawford (Thompson), *Kerkeosiris: An Egyptian Village in the Ptolemaic Period* (Cambridge: Cambridge University Press, 1971), 129-30; Andrew Monson, "The Ethics and Economics of Ptolemaic Religious Associations," *Ancient Society* 36 (2006): 221-238, esp. 224-25.

[28] It is difficult to estimate the average amount of wine consumed by an adult male annually, both because of the incomplete nature of the data as well as the variation we might assume in wine consumption patterns. Still, a rough calculation was possible based on the proportionate volumes of wheat and wine in mentions of daily expenses. For example, in P. Cairo Zen. 3 59522, Zenon's employee is given a daily allowance of 1.5 artabas of wheat and 2 kotylai of wine. This allowance must have been intended for multiple people, since the amounts are so high, but there is no direct mention of how many men participated in that allowance. Nonetheless, the text does indicate that 1 1/3 kotylai of wine were provided per artaba of wheat. To return to the Greek staple index—which already contains 9 artabas of wheat—I then added about 12 kotylai (or 1 chous) of wine, based on this very rough proportional estimate. For a discussion of the difficulty of estimating the average consumption of alcoholic beverages, see Clarysse, "Use and Abuse of Beer and Wine," 161-162.

[29] Similar proportional calculations based on lists of daily expenses in the Zenon archive allow a very rough estimate of castor oil use patterns. Unlike wheat and wine, castor oil was almost certainly not imbibed or

texts recording prices for all three commodities (wheat, wine, and castor oil) could all be found, so that prices per 'basket' of all three could be calculated for those years. The limited data made such an annual calculation impossible. Even if I expanded the range of dates allowed per 'basket' to five years, only two such baskets would be possible within the entire period. If I were to expand the range of dates for each basket further, say, to ten years, then the calculation would have had so little meaning as to be unusable, since the periods of known price rises fell within periods less than ten years in length. Thus it was not possible to add these three commodities together to form one true staple index. Before even calculating further consumption patterns, I quickly ran into a similar problem for my proposed 'barley and beer' index, since I was only able to identify one beer price out of my entire corpus. Thus my initial approach to inflation, building indices of common consumer staples, was not possible.

However, it was possible to collect a set of price data for four out of the five commodities I initially proposed. These data do indicate a general increase in price levels over the course of period in question (332-186 BCE). While we cannot pull the data together into one or two cohesive staple indices, we can still examine these increases in more detail individually. In order to better understand the nuances of these increases, let us consider each of these three commodities in turn.

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used in cooking; rather, it was used for lighting and perhaps also for bathing, and use patterns would likely vary based on individual needs. Nevertheless, it is possible to calculate roughly how much castor oil was used relative to how much wine and wheat were consumed by Apollonios' employees within the Zenon archive. For example, P. Cairo Zen. 4 59704 (which dates to roughly 263-229, during the reigns of Ptolemy II or III), includes an allowance of 3 obols per day for wine and 4 obols per day for castor oil. Based on the fixed prices in P. Rev.—admittedly, not an unproblematic estimate—4 obols per day would equate to 60 choes per year of castor oil, and 3 obols per day would allow for 120 choes of wine per year. This estimate of wine consumption is far higher than that of P. Cairo Zen. 3 59522 and is perhaps unreliable due to its dependence on P. Rev. But it does tell us that, by volume, half as much castor oil was consumed as wine. So if we return to the estimate of 1 choes of wine per adult male per year, we can now add .5 chous (or 6 kotylai) of castor oil annually per adult man. D. Brent Sandy, *The Production and Use of Vegetable Oils in Ptolemaic* Egypt, Bulletin of the American Society of Papyrologists Supplment 6 (Atlanta: Scholars Press, 1989), 53; also Brian Muhs, personal communication, January 22, 2017.

With the influence of Greek palettes in the Ptolemaic period, wheat surpassed other grains as the preferred basic grain staple.[30] Wheat must be considered in our analysis because of its ubiquity in the papyri, especially the Greek texts—in addition to the fact that this is the commodity whose prices increases have received the most scholarly attention to date.[31] Prices of wheat were commonly penalty clauses of Greek contracts, with the ostensible understanding that, if the penalty were due, it could be paid in kind or in cash. These penalty prices are the prices that received most of the focus of Cadell and Le Rider, and I will assess them separately from wheat prices that reflected actual payments paid. The 'penalty prices' of wheat are listed in Table 6.1.[32]

Table 6.1: Wheat Prices from Penalty Clauses

Date	*Location*	*Commodity*	*Unit Price (per artaba of wheat)*	*Source Text*
305, Tybi	Hermopolis (Upper Egypt)	*sw*	4 dr.*	P. Loeb 3, 16-19
286/5 or 266/5 or 228/7	Takona? (Upper Egypt)	πυρὸς	4 dr.	BGU 6 1267, 12-13
285/4, Dios	Peroe (Upper Egypt)	πυρὸς	4 dr.	P. Hibeh 1 84a, 8-9
(about 265), Hathyr 4	Egypt	(πυρὸς)	4 dr.	P. Hibeh 1 65
259, Choiak	Oxyrynchites (Upper Egypt)	(πυρὸς)	4 dr.	BGU 6 1226
258, Thoth	Oxyrynchites (Upper Egypt)	(πυρὸς)	4 dr.	BGU 6 1228

[30] For a further discussion of this phenomenon and more references, see Chapter 4, section 4.3.3 "Agriculture." See especially Dorothy J. Crawford (Thompson), "Food: Tradition and Change in Hellenistic Egypt," *World Archaeology* 11.2 (1979): 136-146.
[31] E.g., Cadell and Le Rider, *Prix du blé*; von Reden, "Grain prices in the eastern Mediterrnaean (c. 420-30 BC)."
[32] For comparison, see especially von Reden, "Grain prices in the eastern Mediterrnaean (c. 420-30 BC)," Table A8.9.

Table 6.1: Wheat Prices from Penalty Clauses (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of wheat)*	*Source Text*
230/29, Xandikos	Phebichis (Upper Egypt)	πυρός	4 dr.	Kraft [http://ccat.sas.upenn.edu/rak/courses/735/Papyri/ptolemyIIItranscription.html] , 19
222, Choiak 13	Hiera Nesos (Fayyum)	πυρὸς	4 dr.	P. Enteux. 55, 16-17
222, Gorpaios	Tholthis (Upper Egypt)	πυρὸς	5 dr.	P. Hibeh 1 90, 15
216/5	Oxyrynchites (Upper Egypt)	πυρὸς	10 dr.	BGU 6 1262, 12
215/4, Audnaios	Tholthis (Upper Egypt)	πυρὸς	[10] dr.	BGU 10 1943, 12
215/4, Audnaios	Tholthis (Upper Egypt)	πυρὸς	10 dr.	BGU 10 1943, 14
215/4	Tholthis (Upper Egypt)	[πυ]ρὸς	10 dr.	BGU 10 1959
215/4, Xandikos	Tholthis (Upper Egypt)	πυρὸς	10 dr.	BGU 10 1969, 8
215/4	Tholthis (Upper Egypt)	πυρὸς	[10 dr.]	BGU 14 2383, 12
215/4	Tholthis (Upper Egypt)	πυρὸς	10 dr.	BGU 14 2384, 10-11
215/4, Peritos	Tholthis (Upper Egypt)	πυρὸς	10 dr.	BGU 6 1263
215/4, Peritos	Tholthis (Upper Egypt)	πυρὸς	10 dr.	BGU 6 1264, 22-23
215/4, Peritos	Tholthis (Upper Egypt)	πυρὸς	10 dr.	P. Frankf. 2, 26
214/3	Tholthis? (Upper Egypt)	πυρὸς	10 dr.	BGU 10 1944, 12
214/3, Hyperberetaios	Tholthis (Upper Egypt)	πυρὸς	1[2] dr. bronze	BGU 14 2397, 10-11
214/3, Hyperberetaios	Tholthis (Upper Egypt)	πυρὸς	12 dr. bronze	BGU 14 2397, 29

Table 6.1: Wheat Prices from Penalty Clauses (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of wheat)*	*Source Text*
214/3	Tholthis (Upper Egypt)	πυρὸς	10 dr.	BGU 6 1265, 20
213, Panemos	Tholthis (Upper Egypt)	πυρὸς	10 dr.	P. Frankf. 1, 23-24
213, Panemos	Tholthis (Upper Egypt)	πυρὸς	10 dr.	P. Frankf. 1, 75-76
213/2, Gorpaios	Tholthis (Upper Egypt)	πυρὸς	10 dr. bronze	BGU 10 1946, 12

* P. Loeb 3 records 1 deben for 5 artabas.

These penalty prices demonstrate increases according to clear steps. One artaba of wheat was equated to 4 drachmas from at least 305 until 222 BCE, at which point the price rose 150% to 10 drachmas, a rate that lasted until at least 213/2 BCE. Two examples of an even higher price, 12 drachmas (a 20% increase) are also known from around the end of this phase, in 214/3 BCE. Thus we see a clear, dramatic 150% increase in wheat prices that occurred around 222-216 BCE, with a potential second increase around 214/3 BCE. The increase noted in 222-216 was the one that received the most attention from Cadell and Le Rider and which they argue was inflationary.[33]

However, before we draw any conclusions, we must also consider the wheat prices noted from non-penalty contexts; these prices might be considered more accurate reflections of prices charged 'on the ground,' as opposed to potentially traditional prices listed in legal contracts. The non-penalty prices of wheat are listed in Table 6.2, below.

[33] Cadell and Le Rider, *Prix du blé*, 77-79.

Table 6.2: Prices of Wheat outside of Penalty Clauses

Date	*Location*	*Commodity*	*Unit Price (per artaba of wheat)*	*Original Price*	*Source Text*
(4th cent.)	Herakleopolites (Upper Egypt)	*sw*	1.1667 dr.	400 (art.?) = 23.3333 deben	Enchoria 14 (1986), p. 21-22, 1/11
(Ptolemaic)	Thebes (Upper Egypt)	*sw*	30 dr.	1 art. = 1.5 deben	O. Leiden Dem. 139, x+3
(Ptolemaic)	Thebes (Upper Egypt)	*sw*	2640 dr.	1/6 art. = 22 deben	O. Leiden Dem. 139, x+6
(Ptolemaic)	Thebes (Upper Egypt)	*sw*	2400 dr.	1/12 art. = 10 deben	O. Leiden Dem. 139, x+7
(Ptolemaic)	Thebes (Upper Egypt)	*sw*	2640 dr.	1/24 art. = 5.5 deben	O. Leiden Dem. 139, x+8
(Ptolemaic)	Thebes (Upper Egypt)	*sw*	2400 dr.	1/24 art. = 5 deben	O. Leiden Dem. 139, x+9
(Ptolemaic)	Thebes (Upper Egypt)	*sw*	10 dr.	50(?) art. = 25 deben	O. Leiden Dem. 148, x+9
305, Tybi	Hermopolis (Upper Egypt)	*sw*		price of 6 artabas of wheat = 4 silver qite (ḥḏ qt(.t) 4(.t))	P. Loeb 18, 8
302, Thoth	Djeme, Thebes west (Upper Egypt)	*sw*	.00416667 deben/art.	Its provision for 12 days: 4 artabas of wheat per day, making a total of 48 artabas = 2 silver qite	P. Phila. Dem. 30, 1/5
302, Thoth	Djeme, Thebes west (Upper Egypt)	*sw*	.00416667 deben/art.	Their food for 8 days: at the rate of 4 artabas of wheat per day, making a total of 32 (artabas of wheat) = 1 1/3 silver qite	P. Phila. Dem. 30, 2/13
(3rd cent.)	El-Lahun? (Fayyum)	πυρὸς	2 dr.	1405 art. = 2811 dr. .75 ob.	P. Petrie 3 80 a, 2/16
(3rd cent.)	El-Lahun? (Fayyum)	πυρὸς	2 dr.	185.5 art. = 371 dr.	P. Petrie 3 80 a, 2/22
(271-246)	Herakleopolites (Upper Egypt)	(πυρὸς)	2 dr.	20 art. = 40 dr.	P. Hibeh 1 110 ro.
(271-246)	Herakleopolites (Upper Egypt)	πυρὸς	4.8333 dr.	294 art. = 1421 dr.	P. Hibeh 1 110 ro., 11
271, Daisios 20	Upper Egypt	πυρὸς	2.1667 dr.	70 art. = 151 dr. 4 ob.	P. Hibeh 1 99, 13-15
267, Phaophi 11	Egypt	(πυρὸς)	2 dr.	6 art. = 12 dr.	P. Hibeh 1 100, 6
(263-229)	Fayyum?	(πυρὸς)	4.3333 dr.	900 art. at 4 dr. 2 ob. per art.	P. Cairo Zen. 4 59753

Table 6.2: Prices of Wheat outside of Penalty Clauses (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of wheat)*	*Original Price*	*Source Text*
(260-258)	Fayyum?	πυρὸς	1.5 dr.	6 art. = 9 dr.	P. Cairo Zen. 4 59698, 5
(260-236)	Fayyum	πυρὸς	1.5 dr.	15 art. = 22 dr. 2 ob.	P. Petrie 3 47 a, 3
(about 256, Epeiph 10?)	Philadelphia? (Fayyum)	[πυρὸς]	1.3333 dr. bronze	1 dr. 2 ob. bronze per artaba	P. Iand. Zen. 1, 4
256, Mecheir 5	Aphroditopolis (Upper Egypt)	πυρὸς	2.8571 dr.	241 art. at .1428 chrysous/art.	P. Mich. Zen. 28, 11
255/4, Mecheir 18 - Hathyr 4	Philadelphia? (Fayyum)	Θηβ(αίου) πυ(ροῦ)	1.5 dr.	10 art. = 15 dr.	P. Cairo Zen. 4 59745, 33
255/4, Mecheir 18 - Hathyr 4	Philadelphia? (Fayyum)	Συρ(ίου) πυ(ροῦ)	1.5 dr.	10 art. = 15 dr.	P. Cairo Zen. 4 59745, 39-40
255/4, Mecheir 18 - Hathyr 4	Philadelphia? (Fayyum)	Συρ(ίου) πυ(ροῦ)	1.5 dr.	10 art. = 15 dr.	P. Cairo Zen. 4 59745, 52
255/4, Mecheir 18 - Hathyr 4	Philadelphia? (Fayyum)	Συρ(ίου) πυ(ροῦ)	1.3333 dr.	9 art. = 12 dr.	P. Cairo Zen. 4 59745, 56-57
255/4, Mecheir 18 - Hathyr 4	Philadelphia? (Fayyum)	Θηβ(αίου) πυ(ροῦ)	1.5 dr.	20 art. = 30 dr.	P. Cairo Zen. 4 59745, 68
254, Hathyr 30	Fayyum?	πυρὸς	1.5 dr.	20 art. = 30 dr.	P. Cairo Zen. 3 59499, 3-4
254, Choiak 28	Fayyum?	πυρὸς	1.5 dr.	20 art. = 30 dr.	P. Cairo Zen. 3 59499, 5
254, Tybi 25	Fayyum?	πυρὸς	1.3333 dr.	22.5 art. = 30 dr.	P. Cairo Zen. 3 59499, 7
254, Tybi 25	Fayyum?	πυρὸς	1.3333 dr.	51 art. = 68 dr.	P. Cairo Zen. 3 59499, 9
254	Philadelphia? (Fayyum)	πυρὸς	1.1667 dr.	5 art. = 5 dr. 5 ob.	P. Lond. 7 1974 + PSI inv. 3038 Ro ined., 37-38
252	Philadelphia (Fayyum)	(πυρὸς?)	5.3333 dr.	1 art. = 5 dr. 2 ob.	P. Cairo Zen. 3 59320
252	Philadelphia (Fayyum)	(πυρὸς?)	5.2780 dr.	90.5 art. 5 chous = 477 dr. 4 ob.	P. Cairo Zen. 3 59320
252, Pharmouthi 2	Fayyum?	πυρὸς	1.0417 dr.	60 art. at 1.0417 dr./art.	P. Cairo Zen. 5 59825, 6

Table 6.2: Prices of Wheat outside of Penalty Clauses (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of wheat)*	*Original Price*	*Source Text*
252/1	Fayyum?	πυρός	2 dr. bronze	wheat: 1.5 artabas = 3 dr. bronze	PSI 6 571, 16
250, Xandikos	Philadelphia? (Fayyum)	πυρὸς	1.3333 dr. bronze	1 art. = 1 dr. 2 ob. bronze	P. Col. Zen. 1 54, 1/16
250, Xandikos	Philadelphia? (Fayyum)	πυρὸς	1.3333 dr. bronze	1 art. = 1 dr. 2 ob. bronze	P. Col. Zen. 1 54, 2/33
250	Fayyum?	πυρὸς	3 dr.	135.25 art. = 405 dr. 4.5 ob.	P. Lond. 7 1996, 41
250	Fayyum?	πυρὸς	2 dr.	4.0833 art. = 8 ob.	P. Lond. 7 1996, 71
(249)	Fayyum?	πυρὸς	.5714 dr.	7 art. = 4 dr.	P. Cairo Zen. 3 59325, 1/18
(249)	Fayyum?	πυρὸς	.5714 dr.	7 art. = 4 dr.	P. Cairo Zen. 3 59325, 1/24
(249)	Fayyum?	πυρὸς	.5833 dr.	2 art. = 1 dr. 1 ob.	P. Cairo Zen. 3 59325, 2/34
(249)	Fayyum?	πυρὸς	.5729 dr.	8 art. = 4 dr. 3.5 ob.	P. Cairo Zen. 3 59325, 2/38
(249)	Fayyum?	πυρὸς	.5555 dr.	1.5 art. = 5 ob.	P. Cairo Zen. 3 59325, 2/44
(249-247)	Fayyum?	πυρὸς	2.8571 dr. silver	7 art. = 20 dr. silver	P. Cairo Zen. 3 59326 + P. Lond. 7 2002 + P. Cairo Zen. 3 59326 bis, 28
(237/6?)	Dios Polis (Upper Egypt)?	*sw*	5.5 qite/art.	1 artaba of wheat, 5 1/2 qite, 1 1/4 (obols), the tr 1 1/4 qite	Dodson e.a. (ed.), A good scribe and an exceedingly wise man. Studies W. J. Tait p. 25-56, 1/10
234, Thoth 9	Oxyryncha (Fayyum)	πυρὸς	6 dr.	500 art. = 3000 dr.	P. Heid. Gr. 6 383, 8, 20
222/3, Gorpaios 21	Themistou Meris (Fayyum)	πυρὸς	4 dr. silver	each artaba = 4 silver dr.	P. Tebt. 3 815, fr. 3, 14-15
212 or 195, Pachons 6	Memphis (Lower Egypt)	πυροῦ λευκοῦ	170 dr.	[x artabas] sold at a rate of 170 dr.	P. Köln 5 217, 5-6
212 or 195, Pachons 6	Memphis (Lower Egypt)	πυροῦ λευκοῦ	180 dr.	frequently the same wheat sells in the agora at a rate of 180 dr.	P. Köln 5 217, 6
212 or 195, Pachons 7	Memphis (Lower Egypt)	πυροῦ λευκοῦ	170 dr.	[x artabas] of the same wheat sold at a rate of 170 dr.	P. Köln 5 217, 7
212 or 195, Pachons 7	Memphis (Lower Egypt)	πυροῦ λευκοῦ	180 dr.	frequently the same wheat sells at a rate of 180 dr.	P. Köln 5 217, 8

Table 6.2: Prices of Wheat outside of Penalty Clauses (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of wheat)*	*Original Price*	*Source Text*
212 or 195, Pachons 8	Memphis (Lower Egypt)	πυροῦ λευκοῦ	170 dr.	52 artabas of the same wheat at a rate of 170 dr.	P. Köln 5 217, 8
212 or 195, Pachons 8	Memphis (Lower Egypt)	πυροῦ λευκοῦ	180 dr.	frequently the same sells at a rate of 180 dr.	P. Köln 5 217, 9
212 or 195, Pachons 9	Memphis (Lower Egypt)	πυροῦ λευκοῦ	170 dr.	[x artabas of the same] at a rate of 170 dr.	P. Köln 5 217, 10
212 or 195, Pachons 9	Memphis (Lower Egypt)	πυροῦ λευκοῦ	180 dr.	frequently the same sells for [1]80 dr.	P. Köln 5 217, 10
212 or 195, Pachons 10	Memphis (Lower Egypt)	πυροῦ λευκοῦ	170 dr.	6 artabas of the same wheat at a rate of 170 dr.	P. Köln 5 217, 11
212 or 195, Pachons 10	Memphis (Lower Egypt)	πυροῦ λευκοῦ	180 dr.	frequently [the same wheat sells for 180 dr.]	P. Köln 5 217, 11
(210-204?) or (193-187?)	Philadelphia (Fayyum)	πυρὸς	166.6 dr.	100 art.? = 1666 dr.	BGU 7 1532, 11
(210-204?) or (193-187?)	Philadelphia (Fayyum)	πυρὸς	155 dr.	308 art. = 7 talents, 3740 dr.	BGU 7 1532, 12
(210-204?) or (193-187?)	Philadelphia (Fayyum)	πυρὸς	180 dr.	259 art. = 15 talents, 2740 dr.	BGU 7 1532, 13
(210-204?) or (193-187?)	Philadelphia (Fayyum)	(πυρὸς?)	160 dr.	35 art. at 160 dr. per art.	BGU 7 1536
(210-183)	Thebes (Upper Egypt)	(πυρὸς?)	180 dr.	47.5 art. = 427.5 deben	O. Leiden Dem. 100
206 or 189, Tybi	Philadelphia (Fayyum)	πυρὸς	87.7063 dr. bronze	117.5 art. = 1 talent, 4305 dr., 3 ob.	BGU 7 1505, 3
(about 205)	Elephantine (Upper Egypt)	*sw*	4.5 qite/art.	But do not let an end come to some little grain while its price is 4.5 qite per artaba of wheat here.	Depauw, The Demotic letter p. 348-350 vo., 6-7
(200?) or (176?)	Herakleopolites (Upper Egypt)	πυρὸς	100 dr.	517 art. at 100 dr./art.	BGU 20 2840, 16
(early 2nd cent.)	Hermopolites (Upper Egypt)	σῖτος	2 dr. bronze per art.	10,000 art. wheat at a rate per artaba of 2 dr. of bronze = 10 talents, 1615 dr. (but this math doesn't seem to work out!)	SB 18 13619, 14-15

Table 6.2: Prices of Wheat outside of Penalty Clauses (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of wheat)*	*Original Price*	*Source Text*
190/89	Herakleopolis (Upper Egypt)	πυρός	300 dr./art.	10,800 bronze drachmas as penalty price for 36 artabas of wheat	P. Heid 8 417, 21-22
186, Xandikos 2	Herakleopolis (Upper Egypt)	πυρός	300 dr./art.	loan agreement with a value of 100 artabas of wheat, i.e., 30,000 drachmas	P. Heid. 8 412, 13-14

The sheer variation in wheat prices within this dataset, as compared to the penalty prices, is immediately evident. This variability will be discussed and analyzed in detail in Chapter 7. One of the central challenges in interpreting this data is the prevalence of texts that are not securely dated, or for which only a range of dates are available. If we exclude the texts with only rough date ranges (e.g., the examples at the top of Table 6.2 that are only vaguely "Ptolemaic"), we still see price increases over time, although they are less crisply defined than the penalty prices. We begin in the 270s-60s BCE with prices ~2-2.2 drachmas (of an unknown metal) per artaba, followed by prices in the mid-250s, ranging from around 1.2-2 drachmas paid in bronze coins.[34] In 249, we find an example of a price at 3 drachmas, paid in silver coins.[35] By 234, we find a price of 6 drachmas, and then in 222/3, 4 drachmas of silver: prices between 33-100% higher than the price from 249.[36] Texts that date to either 212 or 195 BCE list prices of around 155-180 drachmas. By the end of our period, in 190 and 186 BCE, the price had risen to 300 drachmas of bronze. Overall it is clear that wheat prices rose, and that there were increases of perhaps ~2-3x between the 260s-230s, and a dramatic increase of another 20-30x sometime between 234 and

[34] These payments were likely made in bronze coins, but not on the bronze accounting standard, which was not introduced until 210 BCE, as discussed in Chapter 4.
[35] This payment 'in silver' was paid in silver coins, as opposed to bronze coins in the price from the 250s noted above. However, both were calculated on the same accounting standard.
[36] For discussion of P. Heid Gr. 6 383, see Christelle Fischer-Bovet and Willy Clarysse, "Silver and bronze standards and the date of P. Heid. VI 383," *Archiv für Papyrusforschung* 58 (2012): 36-42

195, with a final ~2x increase sometime between 212 and 190 BCE. Still, I must add a significant caveat to these calculations, since they are all based on only a few data points; this paucity of data is the very reason for the breadth of the prices collected in this dissertation, so that comparisons across different commodities might be made.

However, these prices increases do not closely align with the stepped increases noted in the penalty prices. The increases did not occur cleanly, and although I have summarized them as a series of discrete increases, that summary is for the sake of convenience and glosses over a great deal of variation observed even among prices at the same date. Almost nowhere do these price levels match with contemporaneous penalty prices.[37] For that reason it is clear that an analysis of price increases from different sources yields different results, and we must not privilege one set of data over another in our analysis of inflationary trends. In general, the price of wheat rose, but it is now helpful to comapre these rough approximations of increases to increases observed for other staples.

Among these we must consider wine, again because of its common appearance in accounts and ration lists. The data on wine prices are presented in Tables 6.3 and 6.4, below.

Table 6.3: Prices of Wine outside the Thebaid

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion, except where noted)*	*Original Price*	*Source Text*
(4th c.)	Memphis (Lower Egypt)	οἶνος		wine: 5 dr.	SB 14 11963, 2/6
(4th c.)	Memphis (Lower Egypt)	οἶνος		another wine: 6 dr.	SB 14 11963, 2/7

[37] This variability is the subject of Chapter 7.

Table 6.3: Prices of Wine outside the Thebaid (cont.)

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion, except where noted)*	*Original Price*	*Source Text*
(4th c.)	Memphis (Lower Egypt)	οἶνος		wine: 5 dr.	SB 14 11963, 2/8
3rd. cent.	Fayyum	οἶνος		1 hemichous = 5 ob.	P. Petrie 3 135, 4
3rd. cent.	Fayyum	οἶνος		wine = 2 dr. 2 ob.	P. Petrie 3 138, 1/5
3rd. cent.	Fayyum	οἶνος		wine = 3 dr.	P. Petrie 3 138, 2/3
3rd. cent.	Fayyum	οἶνος		wine, 1.5 choinix = 2 dr. .5 ob.	P. Petrie 3 140a, 7
3rd. cent.	Fayyum	οἶνος		wine = 2 ob.	P. Petrie 3 142, 4
3rd. cent.	Egypt	οἶνος		30 dr.	BGU 6 1495, 7
3rd. cent.	Egypt	οἶνος	8 dr.	1 keramion = 8 dr.	P. Alex. 1, 6 p. 47
(about 270)	Egypt	οἶνος	8 dr.	7 keramia = 56 dr.	P. Hibeh 1 31, Fr. A, 6-8
(about 270)	Egypt	οἶνος	8 dr.	7 keramia = 56 dr.	P. Hibeh 1 31, Fr. B, 15-18
(263-229)	Fayyum?	Οἶνος	6.5 dr.(?)	16 (keramia?) = 104 dr.	P. Cairo Zen. 4 59738, 3
(263-229)	Fayyum?	Οἶνος	6 dr.(?)	30 (keramia?) = 180 dr.	P. Cairo Zen. 4 59738, 3
(263-229)	Fayyum?	(οἶνος)	4.3333 dr.	2 keramia = 8 dr. 4 ob.	P. Cairo Zen. 4 59739, 12
(263-229)	Fayyum?	Οἶνος παλαιός (old wine)	11 dr. bronze	6 keramia = 66 dr. bronze	P. Cairo Zen. 5 59851, Fr. 2, 3
(263-229)	Fayyum?	Οἴνου ἀνόσμου (wine without a bouquet)	8.4167 dr.	7 keramia = 58 dr. 3.75 ob.	P. Col. Zen. 2 108, 6
(263-229)	Fayyum?	Οἶνος	9 or 12 dr.	1 chous = 1 dr. 3 ob.	P. Lond. 7 2140, 21
(263-229)	Fayyum?	Οἶνος	5 and 6 dr.	at 5 and 6 dr./(keramion)	PSI 6 620, 20
(263-229)	Philadelphia (Fayyum)	οἶνος	8 dr.	3 keramia = 24 dr.	SB 16 12811, 10
259, Artemisios	Fayyum?	Οἴνου Χῖ[α (Chian wine)	18 dr.	70 keramia = 1260 dr.	P. Cairo Zen. 1 59012, 1/17
259, Artemisios	Fayyum?	Οἴνου Χῖ[α (Chian wine)	9 dr./half-Chion	4 half-Chia = 36 dr.	P. Cairo Zen. 1 59012, 1/18
259, Artemisios	Fayyum?	Θάσια (Thasian wine)	20 dr.	3 keramia = 60 dr.	P. Cairo Zen. 1 59012, 1/19

Table 6.3: Prices of Wine outside the Thebaid (cont.)

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion, except where noted)*	*Original Price*	*Source Text*
259, Artemisios	Fayyum?	Οἴνου Χῖ[α (Chian wine)	18 dr.	61 keramia = 1098 dr.	P. Cairo Zen. 1 59012, 1/22
259, Artemisios	Fayyum?	Οἴνου Χῖ[α (Chian wine)	9 dr./half-Chion	2 half-Chia = 18 dr.	P. Cairo Zen. 1 59012, 1/23
259, Artemisios	Fayyum?	Θάσια (Thasian wine)	20 dr.	4 keramia = 80 dr.	P. Cairo Zen. 1 59012, 1/24
259, Artemisios	Fayyum?	σηστός (filtered wine)*	12 dr.	1 keramion = 12 dr.	P. Cairo Zen. 1 59012, 1/9
259/8	Fayyum?	(οἶνος)	6 dr.	1 metretes of 8 chous = 6 dr.	P. Rev. p. 4-36, 31/13
(about 256-245)	Fayyum?	οἶνος	7.2222 dr.	9 keramia = 65 dr.	P. Mich. Zen. 30, 1/5-7
(about 256-245)	Fayyum?	οἶνος	3.9536 or 5.2715 dr.	75.5 choes = 49 dr. 4.5 ob.	P. Mich. Zen. 30, 3/11
255, Pachons (7-30)	Fayyum?	οἶνος	12 or 16 dr.	3 kotylai = 3 ob.	P. Cairo Zen. 2 59176 + P. Lond. 7 2167, 110
(255-246)	Fayyum?	οἶνος	8 dr.(?)	at 8 dr./(?)	P. Lond. 7 2053, 5
(255-246)	Fayyum?	οἶνος	9 dr.(?)	at 9 dr./(?)	P. Lond. 7 2053, 6
254, Tybi 25	Fayyum?	οἶνος	8 dr.	9.3333 keramia = 74.6667 dr.	P. Cairo Zen. 3 59499 Ro & Vo l. 85-102, 10
254	Philadelphia? (Fayyum)	οἶνος	7 dr.	2 keramia = 14 dr.	P. Lond. 7 1974 + PSI inv. 3038 Ro ined. (ined.), 37-38
(mid-3rd c.)	Fayyum	οἶνος		wine: 2 dr.	SB 12 10863, 6
(mid-3rd c.)	Egypt	οἶνος		wine = 2.5 ob.	SB 24 16067 Fragments g+i, 3
(mid-3rd c.)	Egypt	οἶνος		wine = 3.75 ob.	SB 24 16067 Fragments g+i, 7
250, Thoth through Tybi	Fayyum	οἶνος	3.5 dr./ker.	a keramion of wine = 3 dr. 3 ob.	PSI 4 368, 1/17
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	6.6 or 8.8 dr.†	12 hemikadia jars = 37 choes = 37 dr. 3 ob.	P. Cairo Zen. 3 59302, 11
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	6.6 or 8.8 dr.	10 hemikadia jars = 30 choes = 33 dr.	P. Cairo Zen. 3 59302, 12

Table 6.3: Prices of Wine outside the Thebaid (cont.)

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion, except where noted)*	*Original Price*	*Source Text*
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	6 or 8 dr.	5 hemikadia jars = 15 choes = 15 dr.	P. Cairo Zen. 3 59302, 13
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	5.7498 or 7.6664 dr.	4 hemikadia jars = 12 choes = 11.5 dr.	P. Cairo Zen. 3 59302, 14
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	6.4615 or 8.6153 dr.	19 hemikadia jars = 52 choes = 56 dr.	P. Cairo Zen. 3 59302, 15
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	6.1034 or 8.1378 dr.	8 hemikadia jars = 29 choes = 29.5 dr.	P. Cairo Zen. 3 59302, 16
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	2.7273 dr. or 3.6364 dr.	1 hemikadion jar = 5.5 choes = 2.5 dr.	P. Cairo Zen. 3 59302, 17
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	9.6 or 12.8 dr.	1 hemikadion jar = 2.5 choes = 4 dr.	P. Cairo Zen. 3 59302, 18
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	6.9882 or 9.3176 dr.	17 hemikadia jars = 42.5 choes = 49.5 dr.	P. Cairo Zen. 3 59302, 19
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	5.52 or 7.36 dr.	10 hemikadia jars = 25 chous = 23 dr.	P. Cairo Zen. 3 59302, 20
(late 3rd c.)	Fayyum	(οἶνος)	300 dr.	1 keramion = 300 dr.	P. Harris 2 220, 14
(late 3rd c.)	Fayyum	(οἶνος)	300 dr.	1 keramion = 300 dr.	P. Harris 2 220, 22
(late 3rd c.)	Fayyum	(οἶνος)	300 dr.	2 keramia = 600 dr.	P. Harris 2 220, 23
(late 3rd c.)	Fayyum	(οἶνος)	300 dr.	1 keramion = 300 dr.	P. Harris 2 220, 24
(late 3rd c.)	Fayyum	(οἶνος)	150 dr.(?)	2 keramia(?) = 300 dr.	P. Harris 2 220, 25
(late 3rd c.)	Fayyum	(οἶνος)	300 dr.	1 keramion = 300 dr.	P. Harris 2 220, 26
(late 3rd c.)	Fayyum	(οἶνος)	315 dr.	1 keramion = 315 dr.	P. Harris 2 220, 27
(249-246)	Philadelphia (Fayyum)	οἶνος	5 dr. bronze	1 keramion = 5 dr. bronze	P. Cairo Zen. 3 59327, 44
(247-246)	Fayyum?	οἶνος	10 dr.	85 metretes = 850 dr.	P. Cairo Zen. 3 59341, 13-14
245, Thoth 17	Fayyum	οἶνος		if in need of wine, spend up to 200 dr.	PSI 4 386, 11-12
244, Thoth 13	Fayyum?	οἶνος	6 dr. bronze	at 6 dr. bronze/(?)	P. Cairo Zen. 3 59357, 26

Table 6.3: Prices of Wine outside the Thebaid (cont.)

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion, except where noted)*	*Original Price*	*Source Text*
(243-217)	Fayyum		10 dr.	600 metretes = 1 talent	P. Count 13, 3/69
242 or 241, Mecheir 15	Fayyum?	οἶνος	<.1667 dr or <.125 dr.	20 chous. < 1 dr.	P. L. Bat. 20 30, 7-8
241, Phaophi	Fayyum	οἶνος	10 dr./ker.	[wine]: 19 keramia, value [at a rate of] 10 dr. [br]onze/[ker.] - Note that technically "wine" is in the break	PSI 4 396, 11-12
231 or 206, Hyperberetaios	Polemonos Meris (Fayyum)	οἶνος	.6667 dr. bronze or .5 dr. bronze	170 choes at a price per chous of 4 dr. bronze = 680 dr. bronze	CPR 18 5, 3-5
after? 232 or 206, Panemos	Theognis (Fayyum)	οἶνος	.6667 dr. bronze or .5 dr. bronze	750 choes at a price per chous of 4 dr. bronze = [3000] dr. bronze	CPR 18 30, 4-5
226, epagomenal day 5	Fayyum	οἶνος	15 dr./ker.	and 2 keramia of wine, which are worth 30 dr.	P. Sorb. 3 133, 7-8
(late 3rd - early 2nd c.)	Fayyum	οἶνος		Wine = 220 dr.	SB 22 15238, 2/23
(late 3rd - early 2nd c.)	Fayyum	οἶνος	1500 dr./keramion	Wine: from the sale of 16 keramia at 1500 (dr.) = 4 talents	SB 22 15238, vo., 2/39-41
(late 3rd - early 2nd c.)	Fayyum	οἶνος	1400 dr./keramion	wine: another 2 keramia at 1400 (dr.) = 2800 dr.	SB 22 15238, vo., 2/42-45
(late 3rd - early 2nd c.)	Tebtunis (Fayyum)	(οἶνος)	276 dr./Knidion	1 Knidion = 276 dr.	P. Tebt. 3 1079 descr., 12
(late 3rd - early 2nd c.)	Tebtunis (Fayyum)	(οἶνος)	222.0689 dr./Rhodion	29 Rhodia = 1 talent 440 dr.	P. Tebt. 3 1079 descr., 126
(late 3rd - early 2nd c.)	Tebtunis (Fayyum)	(οἶνος)	231.3220 dr./Rhodion	59 Rhodia = 2 talents 1648 dr.	P. Tebt. 3 1079 descr., 128
(late 3rd - early 2nd c.)	Tebtunis (Fayyum)	(οἶνος)	230 dr./Rhodion	1 Rhodion = 230 dr.	P. Tebt. 3 1079 descr., 2
(late 3rd - early 2nd c.)	Tebtunis (Fayyum)	οἶνος	.0606 dr. or .0808 dr.	66 choes(?) = 4 ob.‡	P. Tebt. 3 1079 descr., 23
(late 3rd - early 2nd c.)	Tebtunis (Fayyum)	(οἶνος)	230 dr./Rhodion	6 Rhodia = 1380 dr.	P. Tebt. 3 1079 descr., 24
(late 3rd - early 2nd c.)	Tebtunis (Fayyum)	(οἶνος)	230 dr./Rhodion	1 Rhodion = 230 dr.	P. Tebt. 3 1079 descr., 3
(late 3rd - early 2nd c.)	Tebtunis (Fayyum)	(οἶνος)	230 dr./Rhodion	1 Rhodion = 230 dr.	P. Tebt. 3 1079 descr., 46
(late 3rd - early 2nd c.)	Tebtunis (Fayyum)	(οἶνος)	230 dr./Rhodion	1 Rhodion = 230 dr.	P. Tebt. 3 1079 descr., 47

Table 6.3: Prices of Wine outside the Thebaid (cont.)

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion, except where noted)*	*Original Price*	*Source Text*
(late 3rd - early 2nd c.)	Tebtunis (Fayyum)	(οἶνος)	270 dr./Knidion	1 Knidion = 270 dr.	P. Tebt. 3 1079 descr., 5
218, Phamenoth 27	Kerkesouch a (Fayyum)	οἶνος	14 dr.	126 keramia at 14 dr./metretes of 6 chous	P. Enteux. 34, 4
(before 210)	Ptolemais Hormou? (Fayyum)	οἶνος		wine = 2.5 ob 2 chalkoi	SB 4 7451, 74
(before 210)	Ptolemais Hormou? (Fayyum)	οἶνος		wine from the Delta = 4.5 dr. 2 chalkoi	SB 4 7451, 75
(210-204?) or (193-187?)	Philadelphi a (Fayyum)	(οἶνος)	900 dr.	20 keramia = 3 talents	BGU 7 1516, 2
(210-204?) or (193-187?)	Philadelphi a (Fayyum)	(οἶνος)	900 dr.	14 keramia = 2 talents 1600 dr.	BGU 7 1516, 9
(210-204?) or (193-187?)	Philadelphi a (Fayyum)	(οἶνος)	500 dr.	2 keramia = 1000 dr.	BGU 7 1520, 10
(210-204?) or (193-187?)	Philadelphi a (Fayyum)	(οἶνος)	500 dr.	2 keramia = 1000 dr.	BGU 7 1520, 4
(210-204?) or (193-187?)	Philadelphi a (Fayyum)	(οἶνος)	500 dr.	2 keramia = 1000 dr.	BGU 7 1520, 6
(210-204?) or (193-187?)	Philadelphi a (Fayyum)	(οἶνος)	500 dr.	1 keramion = 500 dr.	BGU 7 1520, 6
(210-204?) or (193-187?)	Philadelphi a (Fayyum)	(οἶνος)	500 dr.	2 keramia = 1000 dr.	BGU 7 1520, 8
(210-204?) or (193-187?)	Philadelphi a? (Fayyum)	(οἶνος)	500 dr.	1 keramion = 500 dr.	BGU 7 1537, 19
(210-204?) or (193-187?)	Philadelphi a? (Fayyum)	(οἶνος)	500 dr.	2 keramia at 500 dr./ker.	BGU 7 1537, 2
(210-204?) or (193-187?)	Philadelphi a? (Fayyum)	(οἶνος)	500 dr.	1 keramion = 500 dr.	BGU 7 1537, 21
(210-204?) or (193-187?)	Philadelphi a? (Fayyum)	(οἶνος)	500 dr.	1 keramion = 500 dr.	BGU 7 1537, 22
(210-204?) or (193-187?)	Philadelphi a? (Fayyum)	(οἶνος)	[500 dr./ker.]	1 keramion at [500 dr./ker.]	BGU 7 1537, 3

Table 6.3: Prices of Wine outside the Thebaid (cont.)

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion, except where noted)*	*Original Price*	*Source Text*
(210-204?) or (193-187?)	Philadelphia? (Fayyum)	(οἶνος)	500 dr.	3 keramia at 500 dr./ker.	BGU 7 1537, 7
208 or 191, Mecheir 24	Fayyum	οἶνος	700 dr. bronze	45 meteretes as payment for the apomoira, at a rate of 700 dr. bronze (χαλκοῦ πρὸς ἀργύριον) per metretes = 5 talents 1500 dr. bronze (χαλκοῦ πρὸς ἀργύριον)	P. Köln Gr. 5 220, 12-13
(208/7?) or (191/0?)	Tebtunis (Fayyum)	(οἶνος)	300(?) dr.	3.875 (metretes) at a rate of 300(?) (dr.) = 1170 (dr.)	P. Tebt. 3 1062 descr., 2-3
(208-206?)	Memphis? (Lower Egypt)	οἶνος	24 or 32 dr.	12 kotylai at a rate of 2 ob./(kotyla), making 4 dr.	UPZ 1 149, 12
(208-206?)	Memphis? (Lower Egypt)	οἶνος	27 or 36 dr.	16 kotylai = 6 dr.	UPZ 1 149, 15
(208-206?)	Memphis? (Lower Egypt)	(οἶνος)	27 or 36 dr.	11 kotylai at a rate of 2.25 ob./(kotyla), making 4.75 (dr.)	UPZ 1 149, 16
206/5? or 189/8	Philadelphia (Fayyum)	οἶνος	110 dr.	9 keramia = 990 dr.	BGU 7 1501, 6
206/5? or 189/8	Philadelphia (Fayyum)	οἶνος	400 dr.(?)	1 keramion(?) = 400 dr.	BGU 7 1501, 7
206/5? or 189/8	Philadelphia (Fayyum)	οἶνος	500 dr.	2 keramia = 1000 dr.	BGU 7 1506, 3
(about 200)	Fayyum	οἶνος	504 or 672 dr.	1.5 chous = 126 dr.	P. Tebt. 3 885, 18
(about 200)	Fayyum	οἶνος	432 or 576 dr.	4 kotylai = 24 dr.	P. Tebt. 3 885, 32
(2nd c.)	Fayyum	οἶνος		(Y) owes the price of the wine from the vineyard of Ammenemeus: 1 talent, 433 drachmas, 2 obols	ZPE 182 (2012), p. 263-264, 5-8
(early 2nd c.)	Egypt	οἶνος	270 dr.	For wine, a keramion = 270 dr.	SB 24 16004, 5
(early 2nd c.)	Fayyum?	οἶνος	80 dr./chous	apomoira: 348 1/3 choes at a rate of 80 (dr./chous) = 4 talents, 3866 dr. 5 ob.	P. Hels. 1 3, 1/7

Table 6.3: Prices of Wine outside the Thebaid (cont.)

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion, except where noted)*	*Original Price*	*Source Text*
(early 2nd c.)	Fayyum?	οἶνος	80 dr./chous	251 choes at a rate of 80 (dr./chous) = 3 talents, 2080 (dr.)	P. Hels. 1 3, 1/10
(early 2nd c.)	Fayyum?	οἶνος	80 dr./chous	86.5 choes = 1 talent, 920 dr.	P. Hels. 1 3, 1/12
(early 2nd c.)	Fayyum?	οἶνος	80 dr./chous	33.5 choes, at a rate of 80 (dr./chous) = 2680 (dr.)	P. Hels. 1 3, 2/21
(early 2nd c.)	Fayyum?	οἶνος	60 dr./chous	200 (choes) at a rate of 60 (dr./chous) = 2 talents	P. Hels. 1 3, 2/37
(early 2nd c.)	Tebtunis (Fayyum)	(οἶνος)	432 or 576 dr.	2 kotylai = 12 dr.	P. Tebt. 3 889, 29
(early 2nd c.)	Tebtunis (Fayyum)	οἶνος	864 or 1152 dr.	2 kotylai = 24 dr.	P. Tebt. 3 889, 4
(before 190)	Fayyum	(οἶνος)	400 dr. bronze	231.5 metretes for the apomoira, at a rate of 400 dr. bronze (χαλκοῦ πρὸς ἀργύριον) for each metretes	P. Köln Gr. 5 221 Ro descr. + P. Köln Gr. 5 221 A-H Ro descr., 14-15
(before 190)	Fayyum	(οἶνος)	400 dr. bronze	at a rate of 400 dr. bronze (χαλκοῦ πρὸς ἀργύριον) for each metretes	P. Köln Gr. 5 221 Ro descr. + P. Köln Gr. 5 221 A-H Ro descr., 18
(before 190)	Fayyum	οἶνος	400 dr.	at a rate of 400 dr.(/metretes)	P. Köln Gr. 5 221 Ro descr. + P. Köln Gr. 5 221 A-H Ro descr., 40
(before 190)	Fayyum	οἶνος	450 dr.	at a rate of 450 dr./metretes	P. Köln Gr. 5 221 Ro descr. + P. Köln Gr. 5 221 A-H Ro descr., B/10
(before 190)	Fayyum	(οἶνος)	450 dr.	at a rate of 450 (dr./metretes)	P. Köln Gr. 5 221 Ro descr. + P. Köln Gr. 5 221 A-H Ro descr., H/3
(about 190)	Philadelphia (Fayyum)	οἶνος	5.4615 dr./ker.	6.5 keramia for 35.5 dr.	P. Yale 1 40, 20-22

* For more discussion of the meaning of σηστός, see Bresson, "Wine, oil, and delicacies at the Pelousion customs," 86.

† This and the following prices from P. Cairo Zen. 3 59302 list a number of hemikadion-jars, along with their capacity in choes. Since it seems that the volume of the hemikadia varied and the volume in choes was added to specifiy the volume of the jars, I have calculated the unit prices based on the price per chous rather than the price per hemikadion. In most of the prices in this text, there were roughly 3 choes per

hemikadion. If, as Bresson reasoned, there were about 3 hemikadia per metretes, this equation would be about 9 choes per metretes. The usual conversion rates are for 6 or 8 choes per metretes, and in this case, I think the higher value of 8 choes per metretes is more likely, given its relationship to hemikadia in this text. ‡ Given this very low value and the very fragmentary nature of this account, I am doubtful that this actually represents the price of the wine. It is possible that the 4 obols were rather paid in exchange for transporting the wine, for example.

Table 6.4: Prices of Wine from the Thebaid

Date	*Location*	*Commodity*	*Unit Price (per metretes)*	*Original Price*	*Source Text*
(Ptolemaic)	Thebes (Upper Egypt)	*ỉrp*	36,000 or 48,000 dr.(?)	3 (hin?) = 150 deben	O. Leiden Dem. 201, 4
(Ptolemaic)	Thebes (Upper Egypt)	*ỉrp*		8 deben	O. Leiden Dem. 206, x+3
(Ptolemaic)	Thebes (Upper Egypt)	*ỉrp*	1152 or 1536 dr.	5 hin = 8 deben	O. Leiden Dem. 211 vo., 1/5
(Ptolemaic)	Thebes (Upper Egypt)	*ỉrp*	2160 or 2880 dr.	1 hin = 3 deben	O. Leiden Dem. 213 vo., x+15
(Ptolemaic)	Thebes (Upper Egypt)	*ỉrp*	32,400 or 43,200 dr.(?)	1 (hin) = 45 deben	O. Leiden Dem. 94, 2/11
(Ptolemaic)	Thebes (Upper Egypt)	*ỉrp*	32,400 or 43,200 dr.(?)	1 hin = 45 deben	O. Leiden Dem. 94, 2/3
(Ptolemaic)	Thebes (Upper Egypt)	*ỉrp*	6893.4857 or 9191.3143 dr. (if 7 hin), or 48,254.3999 or 64,339.2 dr. (if 1 hin)	7 hin (or 1 hin?) = 67 deben 1/5 qite	O. Leiden Dem. 94, 2/5
303, Hathyr 7	Elephantine (Upper Egypt)	*ỉrp*	2 qite/*ḏp*	Send us 1 *ḏp*-measure of wine ...If we do not pay you in year 2, Pachons, then we will pay you 2 qite silver = 1 stater = 2 qite again, in year 2, Paoni	MDAI Kairo 15 (1957), p. 51, 7
3rd. cent.	Upper Egypt	οἶνος	.2917 dr./kotyla	6 kotylai = 1 (dr.) 4.5 ob.	O. Strasb. 1 584, 2
3rd. cent.	Thebes (Upper Egypt)	*ỉrp*	6 dr.(?)	1 (metretes?) = 3 qite	O. Taxes 2 150, 1
260, Tybi 19	Elephantine (Upper Egypt)		20 dr./keramion	keramion (of wine?) = 20 drachmas of silver	UPZ 2 156, 11
259/8	Thebaid	(οἶνος)	5 dr.	1 metretes of 8 chous = 5 dr.	P. Rev. p. 4-36, 31/14

Table 6.4: Prices of Wine from the Thebaid (cont.)

Date	*Location*	*Commodity*	*Unit Price (per metretes)*	*Original Price*	*Source Text*
243, Pharmouthi 21	Thebes (Upper Egypt)	*ἰrp*	6 dr.(?)	1 (metretes?) = 3 qite	O. Taxes 2 157, 3
243, Pharmouthi 21	Thebes (Upper Egypt)	*ἰrp*	8.6667 dr.(?)	1 (metretes?) = 4.3333 qite	O. Taxes 2 157, 7
193 or 180 or 169	Gebelein (Upper Egypt)	οἴνου		οἴνου κερ(άμια) υξ μύρον στεφαλίβανος (δραχμαὶ) π ι. Wine: 460 keramia; sweet oil; unguent: 80 + 10 (dr.)	P. Grenf. 1 39, 2/1-3

These data are wide-ranging, and a large number of the data points are from insecurely dated texts or represent wine that was not strictly commoditized (e.g., imported from a particular region). The increases from more securely dated texts might be roughly summarized as follows:

Approximate dates	Approximate prices per keramion
~270 BCE	8 dr.
259 BCE	5-6 dr.
Mid-250s BCE	~7-16 dr.
250 BCE	~3-8.8 dr.
243 BCE	~6-9 dr.
241 BCE	10 dr.
226 BCE	15 dr.
218 BCE	14 dr.
208-206 BCE	~24-36 dr.
210-204 or 193-187 BCE	500-900 dr.

This summary indicates that there may have been a gradual increase in wine prices over the course of the 250s and 240s BCE, but that in general in the mid-third century, wine prices were simply variable within the same time frame (even the same text). Nontheless, there was likely an increase sometime between ~240-225 BCE, as the price rose ~50%, from around 10 to around 15 drachmas per keramion. Then at some point between 218 and 206 BCE, we see prices roughly

doubled, to around 24-36 drachmas. Most dramatically, by around 193-187 BCE, prices had risen by about 20x, to 500-900 drachmas. In general, the picture is one of prices that varied contemporaneously, with the most clear overall increases occurring at the end of the third century BCE.

To flesh out this picture of the increases in more detail, let us turn to another staple: castor oil. Castor oil appears commonly in Greek texts (although not quite as commonly as wheat and wine). Unlike the other commodities cited, here, castor oil was almost certainly not imbibed or used in cooking; rather, it was used for lighting and perhaps also for bathing. The prices I was able to identify for castor oil are listed in Table 6.5, below.

Table 6.5: Price of Castor Oil

Date	*Location*	*Commodity*	*Unit Price (per metretes of castor oil)*	*Original Price*	*Source Text*
(Ptolemaic?)	Egypt	*tkm*	220 deben per artaba?	what he gave for 1 (artaba of tkm-oil?) out of silver (deben) 220	Enchoria 30 (2006-2007), p. 47 no. 1 , 7
3rd. cent.	Fayyum	κίκι		castor oil = .75 ob.	P. Petrie 3 139a, 2/6
(263-229)	Memphis (Lower Egypt)	κίκι	1.75 dr./chalmaian	and (price of a chalmaian) of castor oil = 1 dr. 4.5 ob. (unit = χαλμαίας)	PSI 5 531, 8
259/8	Fayyum?	κίκιον	30 dr.	30 drachmas per metretes, 2 obols per kotyla (corrected to 48 dr.)	P. Rev. p. 4-36, 40/13
259/8	Fayyum?	κίκιον	48 dr.	48 drachmas per metretes, 2 obols per kotyla	P. Rev. p. 4-36, 40/15
259/8	Fayyum?	κίκιον	48 dr.	48 drachmas per metretes	P. Rev. p. 4-36, 40/16
259/8	Fayyum?	κίκιον	20 dr.	20 drachmas per metretes (crossed out: 1 dr. 2 ob. [per kotyla?])	P. Rev. p. 4-36, 53/15
259/8	Fayyum?	κίκιον	19.3333 dr.	19 dr. 2 ob. per metretes	P. Rev. p. 4-36, 53/20
257	Memphis? (found in Philadelphia)	κίκιον	48 dr.	4 dr. per chous	P. Col. Zen. 1 21, 4

Table 6.5: Price of Castor Oil (cont.)

Date	*Location*	*Commodity*	*Unit Price (per metretes of castor oil)*	*Original Price*	*Source Text*
257, Choiak 2	Herakleopolis (Upper Egypt)	κίκι		castor oil: 13 dr. of bronze	P. Sorb. 1 16, 12
256, Phaophi	Philadelphia (Fayyum)	*tgm**	3 dr.†	1.5 qite per artaba	P. Zen. Dem. 1 + PSI 9 1001, 11
(mid-3rd c.)	Egypt	κίκι		castor oil = .25 ob.	SB 24 16067 Fragments g+i, 9
243, Mesore 4	Thebes (Upper Egypt)	κίκι		castor oil = 1 ob.	UPZ 2 158 A, 5/36
243, Mesore 6	Thebes (Upper Egypt)	κίκι		castor oil = 1 ob.	UPZ 2 158 A, 9/62
243, Mesore 8	Thebes (Upper Egypt)	κίκι		castor oil = 1 ob.	UPZ 2 158 A, 12/78
243, Mesore 11	Thebes (Upper Egypt)	κίκι		castor oil = 1 ob.	UPZ 2 158 A, 15/102
243, Mesore 13	Thebes (Upper Egypt)	κίκι		castor oil = 1 ob.	UPZ 2 158 A, 18/124
243, Mesore 15	Thebes (Upper Egypt)	κίκι		castor oil = 1 ob.	UPZ 2 158 A, 21/142
(about 200)	Tebtunis (Fayyum)	κίκιον	4,032 dr.	28 dr. per kotyla	P. Tebt. 3 885, 22
(about 200)	Tebtunis (Fayyum)	κίκιον	2,880 dr.	20 (dr. per kotyla)	P. Tebt. 3 885, 36
(about 200)	Tebtunis (Fayyum)	κίκιον		42 (dr.)	P. Tebt. 3 885, 58
(2nd cent.)	Tebtunis (Fayyum)	κίκιον	8,640 dr.	1 chous at a rate of 60 (dr. per kotyla), making 720 (dr.)	P. Tebt. 3 891, 14
(2nd cent.	Tebtunis (Fayyum)	κίκιον	7,200 dr.	1 chous at a rate of 50 (dr. per kotyla), making 600 (dr.)	P. Tebt. 3 891, 15

* While *tgm* could be used for castor in either form, the pot-determinative used here could indicate the liquid form. Because of this ambiguity, I am listing this example under both castor seeds and castor oil.

† As was discussed in Chapter 5, 1 artaba could have a volume of 30 or 40 liters, and 1 metretes was about 34.8 liters. In this case, I am treating the artaba and metretes as metrically equivalent for the sake of simplicity, although that calculation might not be fully accurate. The price in this example seems perhaps more appropriate for castor seeds than oil.

The data on castor oil prices are less conclusive than our other commodities thus far.

When we ignore texts that were not securely dated, that lack clear quantities, or that include

extreme outliers (e.g., P. Zen. Dem. 1 + PSI 9 1001), we do not have enough data to clearly track change over time. In 259/8 BCE, the price was around ~20-48 drachmas per metretes; a price of 48 drachmas is also attested in 257 BCE. Clearly there were dramatic increases, with prices of 2,880-8,640 drachmas attested from later texts, but the dates of those texts are very unclear (maybe around 200 BCE, or perhaps just sometime in the second century). Thus castor oil prices show a general increase, but without enough data to pinpoint that increase more precisely.

Finally, we may turn to the price of barley, another common grain, although one whose importance decreased over the course of the period. The surviving data on barley prices expressed in terms of money (displayed in Table 6.6) are clustered early in the Ptolemaic period and do not extend past the reign of Ptolemy II (at least not in securely dated texts).[38] Thus they do not include the time of the dramatic price increase known for the other staple commodities above. These data unfortunately do not provide much in terms of useful information on Ptolemaic inflationary trends. In fact, barley prices actually show a rough *decrease* over the course of the period: not the increase I would expect to see as evidence of inflation.[39] Since barley was waning in popularity as wheat took over as the grain of choice, the perceived value of barley was not stable in this period.[40] This lack of stability indicates that barley prices could very well have been influenced by changes in demand rather than just macroeconomic trends. Therefore, barley prices are not a good benchmark by which to measure Ptolemaic inflation.

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[38] Barley prices are analyzed in more detail in Chapter 7, section 7.3.4 "Commodities with Supervised Production: Wine, Agricultural Staples, Beer, and Cloth." See especially Chapter 7 Table 25.
[39] See Chapter 7, section 7.3.4 "Commodities with Supervised Production: Wine, Agricultural Staples, Beer, and Cloth." The decrease in barley prices is the opposite of the trend seen in wheat prices (as wheat became more preferred).
[40] For a further discussion of this phenomenon and more references, see Chapter 4, section 4.3.3 "Agriculture." See especially Dorothy J. Crawford (Thompson), "Food: Tradition and Change in Hellenistic Egypt," *World Archaeology* 11.2 (1979): 136-146.

Table 6.6: Price of Barley expressed in Money

Date	*Location*	*Commodity*	*Unit Price (per artaba of barley)*	*Original Price*	*Source Text*
(4th cent.)	Herakleopolites (Upper Egypt)	*ỉt*	.5833 dr.	800 (art.?) = 23.3333 deben	Enchoria 14 (1986), p. 21-22, 1/12
(332-30)	Thebes (Upper Egypt)	*ỉt*	10 dr.	8 art. = 2 deben	O. Leiden Dem. 156, 4
3rd. cent.	Fayyum	κριθή		barley (for the donkey???) = 4 ob.	P. Petrie 3 135, 7
3rd. cent.	Fayyum	κριθή		barley = .75 ob.	P. Petrie 3 139a, 2/3
(271-246?)	Herakleopolites (Upper Egypt)	κριθή	1.5833 dr.	88 art. = 139 dr. 2 ob.	P. Hibeh 1 110 ro., 15-16
(263-229)	Philadelphia? (Fayyum)	κριθή	4 dr. silver	15 art. barley at a rate of 4 drachmas silver = partial payment of 150 dr.	P. Cairo Zen. 4 59787, 29
(263-229)	Pelousion	κριθή		barley in Pelousion for the horses: 1 dr. 3.5 ob.	PSI 5 543, 1/5
(263-229)	Herakleopolis	κριθή	4 ob./art.	(in Herakleopolis), barley: 1.5 art. at 4 ob./art. = 1 dr.	PSI 5 543, 1/7
(263-229)	Kalamine	κριθή	5 ob./art.	in Kalamine for breakfast, an artaba of barley = 5 ob.	PSI 5 543, 1/9
(263-229)	Phakoussai	κριθή	3 ob./(art.)	in Phakoussai for dinner, (1 art.) of barley = 3 ob.	PSI 5 543, 1/10-11
(263-229)	The Isieioi	κριθή	1 dr./art.	in the Isieioi for breakfast, barley: 1 art. = 1 dr.	PSI 5 543, 1/13-14
(263-229)	Herakleopolis	κριθή	2 ob./art.	in Herakleopolis, barley: 1.5 art. = 3 ob.	PSI 5 543, 1/23
(263-229)	Isios	κριθή	5 ob./art.	in Isios, 1 aft. of barley = 5 ob.	PSI 5 543, 1/34
(263-229)	Naukratis	κριθή	2 ob./art.	in Naukratis, barley: 1.5 art. = 3 ob. for dinner	PSI 5 543, 2/35-36
(263-229)	Hermopolis	κριθή	2 ob./art.	in Hermopolis, barley: 1.5 art. = 3 ob. for breakfast	PSI 5 543, 2/41
(263-229)	Thegkours	κριθή	2 ob./art.	in Thegkours for dinner, barley: 1.5 art. = 3 ob.	PSI 5 543, 2/42
(263-229)	Thebachuth	κριθή	2 dr./art.	in Thebachuth, barley: 1.5 art. at 2 dr./art. = 3 dr.	PSI 5 543, 2/45

Table 6.6: Price of Barley expressed in Money (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of barley)*	*Original Price*	*Source Text*
261, Epeiph 21	Oxyrynchites (Upper Egypt)	κριθή	<1 dr.	(1 art.) <1 dr. (hypothetical)	P. Hibeh 1 40, 6-8
(259)	Palestine? or Alexandria?	κριθή	2.8333 dr.	10 art. = 28 dr. 2 ob.	P. Cairo Zen. 1 59010, 2/21
257, Mecheir 8	Memphis? (Lower Egypt)	κριθή	1.2 dr.	3.3333 art. = 4 dr.	P. Lond. 7 1937, 4
252, Pharmouthi 2	Fayyum?	κριθή	.2 dr. silver	500 art. = 100 dr. silver = 108 dr. 2 ob. bronze	P. Cairo Zen. 5 59825, 10
(250)	Fayyum?	[κριθή?]	.6667 dr.?	1329 art. = 886? dr.	P. Lond. 7 1996, 37
(250-211), Pharmouthi through Epeiph	Fayyum	κριθή		for the barley in Eleusis, which he owed(?) you, in the house of Korion: 11 dr.	P. Köln Gr. 8 346, 2/32-34
(late 3rd - early 2nd c.)	Fayyum	κριθή		barley = 170 dr.	SB 22 15238, 2/15-16
(249-246)	Fayyum?	κριθή	1.1111 dr.	9 art. = 10 dr. silver	P. Cairo Zen. 3 59326 + P. Lond. 7 2002 + P. Cairo Zen. 3 59326 bis, 103-107
(249)	Fayyum?	κριθή	.2083 dr.	2 art. = 2.5 ob.	P. Cairo Zen. 3 59325, 1/25
(249)	Fayyum?	κριθή	.2049 dr.	5.0833 art. = 1 dr. .25 ob.	P. Cairo Zen. 3 59325, 3/74

All told, prices of castor oil and barley were not particulary telling with regard to inflation, but wheat and wine did show clear price increases over the course of our period. The extant data are uneven and generally not precisely dated, so a very precise calculation of inflation rates could be misleading for its very apparent accuracy. Even the estimates that remain from clear prices in securely dated texts are not always easy to make sense of, so the observed increases must be understood as rough orders of magnitude only. In Table 6.7, below, I attempt to summarize the observed increases

Table 6.7: Estimated price increases from Indicator 1

Date of Increase	Magnitude	Commodity
~250s	Slight, gradual (<30%)	wheat
~250s-240s	Slight, gradual (<30%)	wine
Between ~250-235	~2-3x	wheat
Between ~240-225	~50%	wine
Between ~235-195	~20-30x	wheat
Between ~218-206	~2x	wine
Between ~212-190	~2x	wheat
Between ~206-186	~20x	wine

It must first be noted that these increases should not be seen as clear steps. Generally, these 'dates of increase' represent gaps in the data: it is possible to tell, for example, that an increase in the price of wheat came about at some point between around 250 and 235 BCE, but we cannot determine with certainty whether that was a gradual evolution over 15 years or a massive overnight change in, say, 241 BCE. Again, our knowledge is approximate only, but that difficulty of assymetric, imperfect data can be helped if we triangulate our approach from multiple angles, with an analysis of further indicators of inflation.

6.2.3 Indicator 2. Fixed Values from Demotic Annuity Contracts

An alternative angle to approach identifying the cost of living in Ptolemaic Egypt is to compare the values related to annual support that can be found in Demotic annuity contracts. These contracts were written in situations of cohabitation (potentially marriage) between a man and a woman and served to protect both parties financially.[41] They usually include clauses that specify the amount of support (in money and in kind) that the man would provide for the woman.

[41] Mark Depauw, *A Companion to Demotic Studies*, Papyrologica Bruxellensia 28 (Bruxelles: Fondation Égyptologique Reine Élisabeth, 1997), 139-140.

Since it is highly likely that annuity contracts were written only for wealthy families, the data from these contracts cannot be considered representative of the cost of living as experienced by the wider population. However, these data do make it possible to track changes in the cost of living experienced by the wealthy, Egyptian-speaking families that employed these contracts.[42] The goal of the analysis, therefore, is not to quantify the cost of living in Egypt in absolute terms but is rather more relative, intended to track change over time.

The Demotic term used for the subsistence annuity in these contracts was *ʿq-ḥbs*: literally, "food and clothing."[43] This subsistence included fixed amounts of grain, sometimes augmented by an allowance that was quantified in cash. Here is an example from P. Hawara OI 8 (243 BCE):

mtw=y tỉ.t n=t	And I will give you:
bt 36 n tȝ ḥn 40 r ỉt 24 n tȝ ḥn 40 r bt 36 n tȝ ḥn 40 ʿn	36 (sacks of) emmer (by the measure of) 40 hin = 24 (sacks of) wheat (by the measure of) 40 hin = 36 (sacks of) emmer (by the measure of) 40 hin again,
ḥḏ 1 qt(.t) 8(.t) n nȝ tnỉ.wt nt n pr-ḥḏ Ptḥ wtḥ r ḥḏ 1 qt(.t) 7(.t) 5/6 1/10 1/30 1/60 1/60 r ḥḏ 1 qt(.t) 8(.t) n nȝ tnỉ.wt n pr-ḥḏ Ptḥ wtḥ ʿn	and 1 deben and 8 qite (weighed by) the pieces of the Treasury of Ptah, refined, = 1 deben and 7 + 5/6 + 1/10 +1/30 + 1/60 + 1/60 qite = 1 deben and 8 qite (weighed by) the pieces of the Treasury of Ptah, refined, again,
n pȝy=t ʿq-ḥbs ḫr rnp.t	as your *ʿq-ḥbs*-subsistence annually.

[42] It is possible that, since these were legal documents, they run the risk of maintaining archaic phraseology and archaic numbers; that is, the numbers may have been traditional rather than based on current 'market' rates. However, the only way to test how these numbers may have moved is to compare them, as I am doing here. It must be kept in mind throughout that we cannot immediately assume these are real market rates but must test that assumption.

[43] CDD, *ʿ*, 03.1 (23 July 2003): 146-148.

In this case, the woman received from her husband 36 sacks of emmer and 1.8 deben of silver as her annual subsistence. It is possible to track these values over time to gauge how daily life became more expensive over time.

I expect that subsistence would not change much, so the volume of grain provided has the potential to serve as a sort of control against which changes in the value of monetary allowances might be more apparent. Of course, it must be taken into account that these contracts were primarily employed by relatively wealthy priestly families, so the grain volumes mentioned might have been intended to support somewhat larger than average households. Nevertheless, if the grain allowances from annuity contracts are considered as one group—one which is not likely to represent the wider population of Egypt—we can still expect that grain allowances for this relatively wealthy class of people would not vary substantially over time.

Table 6.8 presents the support given annually according to *ʿq-ḥbs* clauses of these annuity contracts. Nearly all the contracts include some sort of monetary support (in deben) and support in kind in the form of emmer. Support in kind also often included oils, both generic oil (Demotic *nḥḥ*) and castor oil (Demotic *tgm*). Some contracts include additional daily rations of grain.

Table 6.8: Annual Support in *ʿq-ḥbs* Clauses of Annuity Contracts

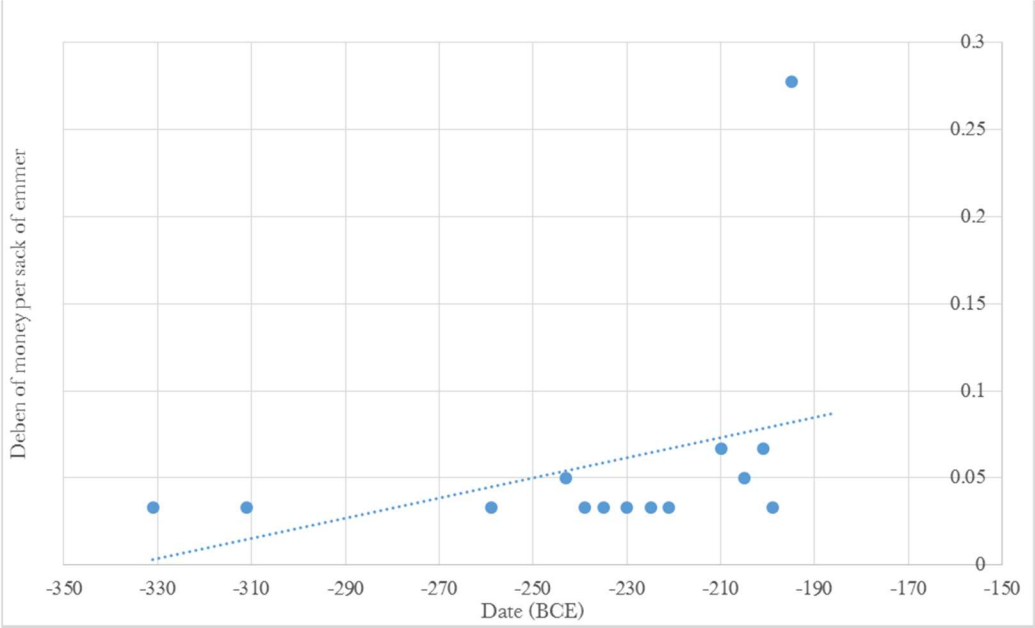
Text Name	*Year*	*Money (deben)*	*Emmer (sacks)*	*Nḥḥ (hin)*	*Castor Oil (hin)*	*Unspecified Grain*
P. Hawara OI 2	331	1.2	36			
P. Eheverträge 10 + P. Ryl. Dem. 10	315	1.2			24	1/16 6-heqat daily
P. Hawara OI 3	311	1.2	36			
P. Eheverträge 13 + P. Phil. Dem. 14	264	0.6		12		1/16 4-heqat daily
P. Hawara OI 6	259	1.2	36			
P. Eheverträge 14 + Revue égyptologique 5 (1888), p. 90 & pl. 24 [2433] descr.	252	1.2		36		1/16 6-heqat daily

Table 6.8: Annual Support in *ʿq-ḥbs* Clauses of Annuity Contracts (cont.)

Text Name	*Year*	*Money (deben)*	*Emmer (sacks)*	*Nḥḥ (hin)*	*Castor Oil (hin)*	*Unspecified Grain*
P. Hawara OI 8	243	1.8	36			
P. Hawara 1	239	1.2	36			
P. Hawara 2	235	2.4	72			
P. Eheverträge 17	230	2.4	72	24	24	
P. Eheverträge 19	225	1.2	36	12	12	
P. Eheverträge 20 + P. Phil. Dem. 25	223	1.2		12	12	1/16 6-heqat daily
P. Eheverträge 21	221	1.2	36	12	12	
P. Eheverträge 25 + P. Berl. Spieg. p. 7 no. 3075	210	2.4	36	12	12	
P. Eheverträge 27 + P. Berl. Spieg. p. 17-18 no. 3145	201	2.4	36	12	12	
P. Eheverträge p. 148-150 no. 4 D + P. Eheverträge p. 150-152 no. 4 Z	199	2.4	72			
P. Eheverträge 31 + Acta Orientalia 23 (1958), p. 126 no. A	195	20	72			
P. Eheverträge 29	191	1.2		12		1/16 3-heqat daily
P. Eheverträge 30 + Acta Orientalia 23 (1958), p. 123-124 no. B	186		48			

The amounts given in money and in emmer vary, but in clear multiples. They do not seem to have been random amounts of money and supplies based on the man's particular assets, but rather somewhat customary values. In order to use the emmer as a sort of control against which to measure changes in the amount of money included in this support, i.e., to see if increases in monetary support were in proportion to increases in grain support (and therefore not likely to be inflationary), I next divided the monetary support by the sacks of emmer included to create a new value, deben of money per sack of emmer. Changes in this value are displayed in Figure 6.1.

Figure 6.1: Relative Amount of Money in ʿq-ḥbs, 332-186 BCE



In general, the deben of money per sack of emmer included in *ʿq-ḥbs* were relatively stable over most of the early Ptolemaic period, at a rate of .0333 deben/sack. However, clear increases in the relative amounts of money in the support are evident in the data from later in the early Ptolemaic period. Two outliers from 210 and 201 BCE double this rate, with values of .0667 deben/sack, followed by a dramatic increase to .2778 deben/sack in one text from the Fayyum dating to 195/4 BCE: an increase of more than 4x (400%). These increases are based on only a few examples, and thus should not be overgeneralized. It should be noted that the increase was not universal; after the doubling in values circa 210 BCE, there is still an attestation of a value of .0333 deben/sack as late as 199 BCE. Still, the data do seem to follow the expected trend of general increases in prices circa 211-210 BCE and again in the first years of the second century BCE.

The data based on *ʿq-ḥbs* figures in the Demotic annuity contracts thus do not preclude the possibility of price increases around these years. If these data are meaningful, the increases

seem to have occurred in a stepped pattern rather than gradually. As in wheat penalty prices, which were perhaps more 'traditional' than market rates, prices in these legal documents moved in more artificially rigid, stepped ways than did market prices, because of the genre of the text that these data come from. Even though the families represented in these contracts were not representative of the entire Egyptian population, it is still meaningful to see that the women in these contracts were receiving higher amounts of money relative to grain at the same times that other data show price increases.

6.2.4 Indicator 3. The Cost of Labor

Labor costs can provide insight into both the cost of living and the cost of doing business. These costs thus serve as a third indicator of potential inflationary price changes. More than any other indicator, labor should, by definition, serve as the standard of comparison par excellence. As was discussed in Chapter 2, Adam Smith and Karl Marx both saw labor as the ultimate value-generating property of a good.[44] While the value of money might change from century to century, and the value of grain might change seasonally, Smith wrote that labor "is the only universal, as well as the only accurate measure of value, or the only standard by which we can compare the values of different commodities at all times and all places."[45] For Smith and Marx, the value of a day of a man's life was the same, regardless of time or place.

However, the wages a man could earn with that day of his life naturally fluctuated based on changes in the supply of and demand for labor. In ancient Egypt, the wages paid for an agricultural laborer's time probably varied seasonally due to shifts in demand: it is likely that during the inundation, for example, agricultural labor would have been less valuable than during

[44] See section 2.3.3 "The Labor Theory of Value: Smith and Marx."
[45] Adam Smith, Wealth of Nations, 41.

the harvest, since there was less agricultural work to be done when the fields were flooded. This is likely one reason behind the state's annual corvée labor requirement; the corvée system ensured that the state could satisfy its labor needs when the cost of labor was highest, during the harvest.[46] Despite the fact that the value of labor, as the abstract concept conceived by Smith, Marx, and other economic theorists—does not change, the price of labor--i.e., wages—certainly does change over time. In this section, changes to the price of labor will be considered as a standard against which to measure inflation.

While the value of a day on earth is equal for all people, of course certain people could earn more money than others in exchange for their day's labor. If all labor were included in this calculation, quirks in the data could skew the calculation of the price of a day's work (e.g. one highly skilled high-earner who happens to appear in texts of a certain year would skew the average wage for that year too high). As Smith and Marx suggested, it is best to reduce all labor down to its most basic, elemental form: unskilled labor.[47] Unskilled labor, the only sort of labor that is included in the present indicator, could consist of a variety of different jobs, all essentially manual labor: agricultural labor, construction work, portage, etc. Highly-skilled labor, such as that of clerks, architects, and particularly talented weavers, is excluded because of its exceptionality: it cannot serve as a clear standard of comparison.

The price of labor can be quantified most directly with wage data. Wages could be expressed in coins or in rations in kind, consisting of grains, wine, and other basic needs. Maresch compiled a list of the daily wages of such unskilled workers from the Ptolemaic period, and I am using his data here, simply because a new collection of a complete set of wage data would be

[46] Brian Muhs, personal communication, January 22, 2017.
[47] See section 2.3.3 "The Labor Theory of Value: Smith and Marx" and references there.

outside the scope of the present project.[48] Maresch's prices are not unproblematic; while Maresch did search material in both Greek and Demotic, all the extant wage data were from Greek texts.[49] and the amount of time included is sometimes unclear. He noted that, while these wages were generally paid daily, the texts do not specify the length of a 'day,' and it is possible in some cases that the wages represented only a partial day's work.[50] Likewise, the precise seasonality of the prices is not always determinable due to the incomplete nature of the dates given in texts.[51] As noted above, the price of labor likely varied over the course of an agricultural year, so some of the differences in wages might have been a result of that seasonality. Nevertheless, these data do make it possible to see notable wage increases around the times of known inflation.

Similar to the annuities paid to women in the Demotic annuity contracts, workers were commonly paid with rations in kind in addition to or instead of money wages. It may be interesting, in a future study, to use grain rations as a sort of control against which to measure changes in monetary wages in the same time and place. Grain rations were not substitutes for money, so the amount of grain provided is unlikely to have increased over time to keep pace with inflation.[52] However, grain rations are not irrelevant to understanding the power of Ptolemaic inflation. When grain rations were issued alongside money salaries, the amount of grain provided would therefore not need to be purchased with money. In that sense, then, grain rations could have been anti-inflationary, though it is likely that the goal of issuing such grain rations was primarily to prevent short-term hoarding of grain and speculation in the grain markets rather than

[48] Maresch, *Bronze und Silber*, 191-194.
[49] Ibid.
[50] Ibid.
[51] Ibid.
[52] Muhs, Ancient Egyptian Economy, 231.

to prevent long-term inflation.[53] Such a comparison of grain rations with money wages has the potential to be quite revealing in the future, but it is outside the scope of the present dissertation.

The wages discussed so far were paid based on the time spent on the work (i.e., a daily wage), but certain types of common agricultural work were paid in proportion to the area of land worked (i.e., a wage per aroura). Such work included clearing land, weeding, cutting brushwood, burning brushwood, etc.[54] These wages could be interesting to compare on a per-aroura basis, and such a study could track change in agricultural wages over time. Wages per aroura have not been previously collected and published, and for that reason they are excluded from the present dissertation.

Other work could be paid by the task completed, but often such references are too vague to merit inclusion in the present study. For example, P. Hibeh 1 114 includes the following account: πλύνου ροζ "(for) washing, 177 (drachmas)." This text does not clarify how much washing was done, by how many people, or how long the work lasted. Perhaps a future investigation could compare these fees to each other over time (e.g., one could track all known "washing" costs) in order to find any potential patterns, but that work is outside the scope of the dissertation.

Not all work was paid, and there is extant data regarding the cost of slaves that could be included in an investigation of Ptolemaic labor costs.[55] Likewise, the price of laboring animals, especially donkeys, could be included in a future study, with comparisons to be drawn between the costs of such animals and the price of wage labor and slaves. It is unclear to what extent the

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[53] Brian Muhs, personal communication, January 22, 2017.
[54] Examples of wages paid for such labor are rather common; see, for example, P. Cairo Zen. 1 59116, P. Cairo Zen. 1 59118, P. Cairo Zen. 1 59119, and P. Cairo Zen. 2 59269.
[55] For more information on slavery in Ptolemaic Egypt, see Willy Clarysse and Dorothy J. Thompson, *Counting the People in Hellenistic Egypt, Volume 2: Historical Studies* (Cambridge: Cambridge University Press, 2006), 262-267, and further references there.

supply of laboring animals would have been correlated with the supply of human labor, but in some cases, it may have been possible to choose one type of labor over another based on price (e.g., if donkeys were in short supply and therefore expensive, a person might hire men to transport his goods instead of the usual donkeys). For that reason, there may have been a relationship between the price of free human labor and that of laboring animals or slaves. However, such a complex analysis is outside the scope of the present study.

A more comprehensive future study of Ptolemaic labor costs could also include data categories that do not represent labor costs directly but serve as useful proxies. For example, the price of bricks can provide insight on the value of labor: since the raw materials that went into making bricks—essentially just mud, straw, and water—were so cheap, the price of bricks should be relatively close to the price of labor. Thissen noted that the amount of bricks that could be produced in a day was relatively constant, between 220 and 260 bricks per worker per day.[56] By extension, the value of a day's labor making bricks should be about 220-260 times the price of a brick. It is possible to track brick prices over time and extrapolate labor prices from them. Nevertheless, such nuances in the price of labor are outside the scope of this dissertation.

A future study of inflation, one that covers the entire Ptolemaic period, including the periods of known, complicated inflation in the second and first centuries BCE, should take into account as much data on labor as possible. However, since this dissertation is primarily concerned with fluctuations in commodity prices and since the inflation of the early Ptolemaic period is less hotly debated, I hope my readers will permit me a simplified analysis here. This analysis is based only on the data previously presented by Maresch, with the caveats noted above. Maresch's data are reproduced here, for reference, in Table 6.9.

[56] Heinz-Josef Thissen, "Ziegelfabrikation nach demotischen Texten," *Enchoria* 12 (1984): 51-55, esp. 54.

Table 6.9: Maresch's Ptolemaic Wage Data*

Date	*Daily wage (obols)*	*Labor type*	*Reference*
ca. 270	1-2.5	σώματα	P. Hibeh 1 110
257/6	0.5	ἀπότριψισ σκόρδων	PSI 4 332, 24
257/6	1	ἐργάτης	PSI 4 332, 10 (& passim)
257/6	2	Donkey driver & donkey	PSI 4 332, 21f.
257/6	0.5	Agricultural worker	PSI 9 1010 B 336, 5
256	1	ἐργάτης	P. Lond. 7 1957, 6
255	0.5	παιδάριον	P. Cairo Zen. 2 59176, 89 & 119-121
255	0.5	λατόμος	P. Cairo Zen. 2 59176, 217f.
255	0.75	ἀχυρηγεῖν	P. Cairo Zen. 2 59176, 126-128
255	1	πλινθηγεῖν	P. Cairo Zen. 2 59176, 314f.
254	0.5	παιδάριον	P. Wisconsin 2 77, 16
254	0.75	σῶμα	P. Wisconsin 2 77, 4
254	0.75	τό σήσαμον τίλλοντες	P. Wisconsin 2 77, 9
254	1	σῶμα	P. Wisconsin 2 77, 6
250	1	ἐργάται	P. Lond. 7 2000, 19
250	0.75	ἐργάται	P. Lond. 7 2000, 24
mid-3rd cent.	0.75	Wood collector	P. Cairo Zen. 3 59517, 4
mid-3rd cent.	1.5	-	P. Cairo Zen. 4 59701, 2
mid-3rd cent.	1.5	Earth worker, πλινθοφόρος	PSI 6 672, 5
mid-3rd cent.	2	Earth worker	PSI 6 672, 4
mid-3rd cent.	2	-	PSI 6 672, 7
mid-3rd cent.	2	Dam worker	P. Cairo Zen. 4 59788, 2
mid-3rd cent.	1	Worker	P. Cairo Zen. 4 59788, 16ff.
3rd cent.	2	σῶμα	P. Lille 1 25, 35
2nd cent.	6	παιδάριον	BGU 6 1290, 21 & 23
2nd cent.	7.5	παιδάριον	BGU 6 1290, 16 & 25
2nd cent.	10	παιδάριον	BGU 6 1290, 3 & 18
2nd cent.	15	Earth worker	BGU 6 1290, 14f. & 20
2nd cent.	20	πηλοποιός	BGU 6 1290, 2 & 8
2nd cent.	20	κυλίειν λίθους	BGU 6 1290, 10 & 19
up to 200	10	παιδάριον	P. Tebt. 3.2 885, 29

* This data is reproduced from Maresch, *Bronze und Silber*, 192-193.

Table 6.9: Maresch's Ptolemaic Wage Data (cont.) *

Date	*Daily wage (obols)*	*Labor type*	*Reference*
210/05 or 193/83	10	ἐργάτης	BGU 7 1512, 10f.
210/05 or 193/83	10?	παιδάριον	BGU 7 1518, 12-14
210/05 or 193/83	15	Thresher	BGU 7 1507, 13
210/05 or 193/83	15?	σκαφεύς	BGU 7 1538, 3-4
210	20	Earth worker	O. Mich. 1, 7
late 3rd cent.?	20	Agricultural worker	P. Tebt. 3.2 1080, 9

* This data is reproduced from Maresch, *Bronze und Silber*, 192-193.

Maresch's collection of prices in *Bronze und Silber* includes 37 attested wages from 20 Greek texts, primarily from the Fayyum, that date between 332 and 186 BCE.[57] He divided these texts into two broad categories based on date: before 210 BCE (12 texts, 24 wages) and ca. 210-183 BCE (8 texts, 13 wages). Between these two broad categories, there is a marked increase in average wages—an increase of 7223%. The early group of wages range from .5 to 2.5 obols per day, with an average of 1.125 obols per day. The later group of wages range from 6 to 20 drachmas per day, with an average of 13.731 drachmas (= 82.385 obols) per day.[58]

Of course, these data are not perfectly trustworthy. They are not all securely dated, and in fact some were dated on the basis of the price data they include. Even when the year is certain, the season in which the work was completed is not always clear, and it is likewise unclear in many cases whether the wage represented work for one day or a different amount of time. The labor involved is described using a variety of terms (e.g., ἐργάτης, παιδάριον, σῶμα, etc.)—all likely unskilled labor, but nevertheless, the possibility exists that different unskilled labor was paid differently (for example, the labor of an adult man vs. that of a child). These differences between

[57] Maresch, *Bronze und Silber*, 192-193.
[58] Ibid.

labor of different types might explain the discrepancies within each category of data (for example, the distinction between daily wages of .5 and 2 obols within PSI 4 332, which dates to 257/6 BCE).

These caveats are significant, and this data must be handled with caution. Nevertheless, the rise in wages is so dramatic that it cannot be ignored. The date of the wage increase cannot be dated securely, since the few wages that seem to fall in an intermediate category (6, 7.5, and 10 drachmas) are all from BGU 6 1290, which is dated only very broadly to the 2nd century BCE. The latest securely dated attestation of a wage in the lower range is from 250 BCE, and the earliest example of a higher wage from a securely dated text is from 210 BCE. Thus, sometime between 250-210 BCE, wages rose dramatically. In general and based on this very limited data, the rise seems to have occurred at once rather than gradually; no wages between 2 obols and 6 drachmas are attested.

This increase of roughly 72x in the cost of labor is well in line with earlier studies of the dramatic increase in prices circa 210 BCE, noted by Maresch and others.[59] For example, Clarysse and Lanciers cite a rise in wages of 30-120x between the 3rd century BCE and the period 210—183 BCE, based on the work of Reekmans.[60] Noting this increase, Reekmans explained that the rigidity with which wages seem to have increased implies that "it is very unlikely that … [the rise in wages] should be attributed to any extent to the influence of economic factors" – he attibuted this rise to a change in accounting standards.[61]

[59] Cf. 3.3.2 "Review of Literature on Ptolemaic Prices."
[60] W. Clarysse and E. Lanciers, "Currency and the Dating of Demotic and Greek Papyri from the Ptolemaic Period," *Ancient Society* 20 (1989): 117-132, esp. 117.
[61] Reekmans, "The Ptolemaic Copper Inflation," 71.

6.2.5 Indicator 4. Non-Proportional Taxes

Taxes can serve as a further potential indicator of Ptolemaic inflation. The goal of any indicator is to serve as a standard of comparison, some value against which to measure relative change. Taxes work well in this regard because they were relatively standardized (at least more standardized than many other ancient quantitative data). That is, when two texts provide values paid for a certain tax, it is clear that those values represent payments for the same thing (as opposed to, say, the prices of unique goods like heirloom jewelry). The Ptolemies levied taxes against a majority of the population, so the data on taxes are relatively representative of payments most people would have had to make. Even more, many taxes were levied at fixed rates. Since taxes were so standardized, we can use them as an indicator against which to measure inflation.

Taxes are useful indicators because of their standardization, but that standardization only really applies to non-proportional taxes. The Ptolemies taxed their people in a variety of ways.[62] Many Ptolemaic taxes will be difficult to analyze for my current purposes, because they were taxed proportionally to certain other things. For example, the hundredth of heralds was a sales tax of 1% on purchases made at public auctions.[63] Such sales tax numbers are useful because they make possible a derivation of the sales price of the thing purchased, but as a group, sales tax payments do not provide meaningful information on how the absolute value of taxes paid rose or fell.[64] Indicators of inflation must be absolute numbers rather than proportional rates—changes in the value of which would not be expected to correlate with inflation. For that reason, proportional taxes are more difficult to analyze with regard to inflation and will be omitted here. Instead, the present study only investigates non-proportional taxes, since they can be compared to each other

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[62] For a more detailed discussion of the taxes levied in the Ptolemaic period, see section 4.4.10, "Taxes."
[63] Muhs, *Tax Receipts*, 72-73.
[64] One example of such a sales tax is the "tenth" paid on sales of houses: a quick multiplication of the tax amount by 10 indicates the price of the house. See Muhs, *Tax Receipts*, 66-68.

more readily in absolute terms. These taxes served as more fixed fees, levied on the population based on clear standards.

The non-proportional taxes that make up the data set for the present analysis include taxes on people levied at flat rates--essentially capitation taxes--plus the burial tax, levied at a per person rate on the deceased. For the sake of simplicity, I am narrowing in on those capitation taxes that were tabulated in terms of money: I am excluding receipts for compulsory labor as quantified in terms of naubia of earth moved.[65] I am likewise only including those taxes for which multiple (>2) data points have been published.

Tax receipts that record these values were incredibly common in Ptolemaic Egypt. The sheer quantity of texts that provide data on taxes makes a new collection of data on tax rates beyond the scope of the present dissertation. Moreover, the tax rates did not show much variation, so it is unlikely that re-collecting tax data would provide dramatically new, different information on tax rates. Ptolemaic taxes have primarily been studied by Brian Muhs, so I am using his previously published data here.[66] Muhs' publications primarily deal with evidence from the Theban region, so the tax data do not represent all of Egypt. Certain Greeks were exempt from some of these capitation taxes, so the tax data are not perfectly representative of all segments of the Ptolemaic population.[67] Nonetheless, as was the case for the analysis of annuities above, tax rates are still useful as an intact group of relatively standard data.

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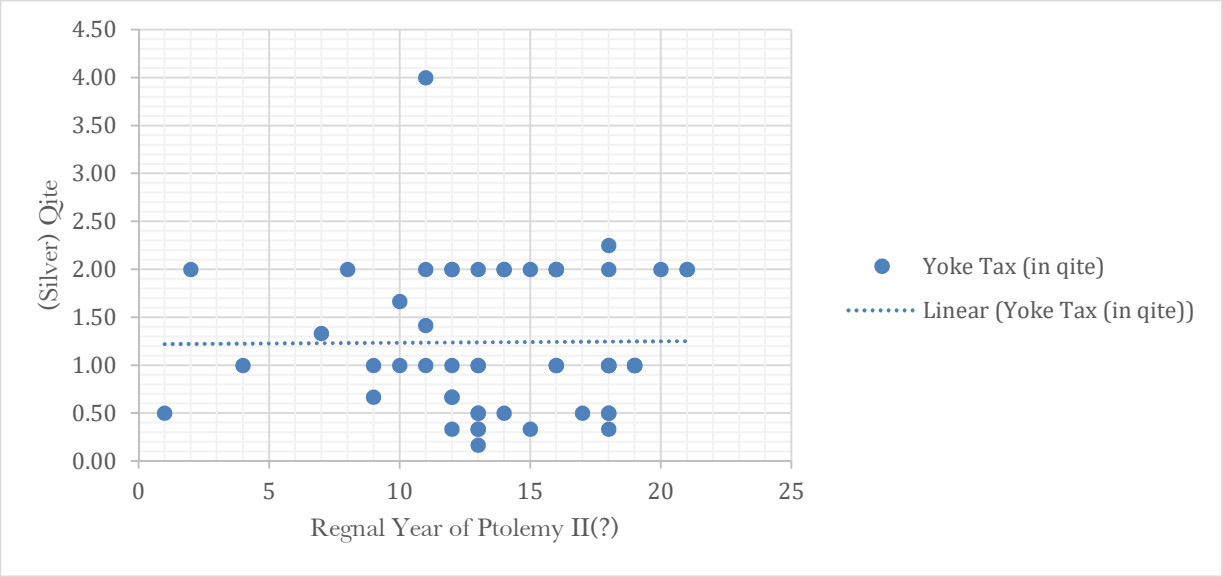
[65] For more on receipts for compulsory labor, see Muhs, *Tax Receipts,* 36 & 57-60 and references there. See also section 4.4.10, "Taxes."

[66] Muhs, Tax Receipts, *Taxpayers, and Taxes in Early Ptolemaic Thebes*, Oriental Institute Publications 126 (Chicago: Oriental Institute, 2005); Brian P. Muhs, *Receipts, Scribes, and Collectors in Early Ptolemaic Thebes (O. Taxes 2)*, Studia Demotica 8 (Leuven: Peeters, 2011).

[67] For further discussion of the privileged position of certain Greek-speaking populations in the Ptolemaic period, see section 4.2.3 "Immigration" and section 4.4.10, "Taxes." See also Muhs, *Tax Receipts*, 42.

The first clear Ptolemaic capitation tax, the yoke tax (*ḥḏ nḥb*), was introduced by Ptolemy II in 285 BCE.[68] The data Muhs presents on the yoke tax all likely date to the reign of Ptolemy II, so there is not much room within this data set to find change over time.[69] Nonetheless, while these data do show plenty of variation, there is no clear trend of an increase or decrease throughout Ptolemy II's reign. Figure 6.2 displays the 54 data points available from Muhs' data set, with rates ranging between 1/6 and 4 qite. It is very possible that, as Muhs suggests, the smallest rates represented fractional payments of an annual tax, perhaps monthly payments.[70] Regardless of whether each of these data points represents an actual annual rate or a fraction thereof, the important information to gather from this figure is that the trend line is flat; the yoke tax rates did not demonstrably rise or fall overall during the two decades for which data exist. The published data on yoke tax rates do not indicate any visible rise or fall, so they do not show any inflation or deflation.

Figure 6.2: Yoke Tax Rates in Thebes, 284-264 BCE



[68] Muhs, *Tax Receipts,* 6 & 30-35; See also section 4.4.10, "Taxes."
[69] These data are from Muhs, *Tax Receipts,* 32-35.
[70] Muhs, *Tax Receipts*, 32.

The yoke tax was replaced by the salt tax (ἁλικῆς, *ḥḏ ḥmȝ*) in 263 BCE, and this capitation tax remained in place until 217 BCE.71 Unlike the yoke tax, which was the responsibility of adult men only, the salt tax was levied against both genders at different rates.[72] The salt tax rates were heavily standardized but did change twice, in 254 and 243 BCE, as indicated in Table 6.10.[73] While the yoke tax remained flat, the salt tax rates decreased by 33.33% (men) and 50% (women) in 254 BCE, followed by another decrease of 33.33% (men) and 50% (women) in 243 BCE. These sharp drops in the rate of a tax that was ostensibly levied on almost the entire adult population seem to indicate a deflationary trend. Taxpayers had to pay the salt tax in the form of bronze coins, so it is possible that the drops in the tax rate were due to the difficulty of obtaining the appropriate coins around these dates—i.e., to a decrease in the supply of bronze money that was readily circulating.[74]

Table 6.10: Salt Tax Rates in Thebes

Date Range	Rate for Men	Rate for Women
Years 22-31 of Ptolemy II (263-254 BCE)	¾ qite (1 drachma and 3 obols = 9 obols)	½ qite (1 drachma = 6 obols)
Year 31 of Ptolemy II – Year 5 of Ptolemy III (254-243 BCE)	½ qite (1 drachma = 6 obols)	¼ qite (3 obols)
Year 5 of Ptolemy III – Year 4 of Ptolemy IV (243-217 BCE)	1/3 qite (4 obols)	1/8 qite (1 ½ obols)

71 Muhs, Muhs, *Tax Receipts*, 41-51; Muhs, *O. Taxes 2*, 21-86; Muhs, *Ancient Egyptian Economy*, 234. For a further discussion and more references concerning the salt tax, see section 4.4.10, "Taxes."
72 Muhs, *Tax Receipts*, 41-42.
73 Muhs, *Tax Receipts*, 41-51; Muhs, O. Taxes 2, 21-86; Muhs, *Ancient Egyptian Economy*, 234.
74 Muhs, *Tax Receipts*, 12.

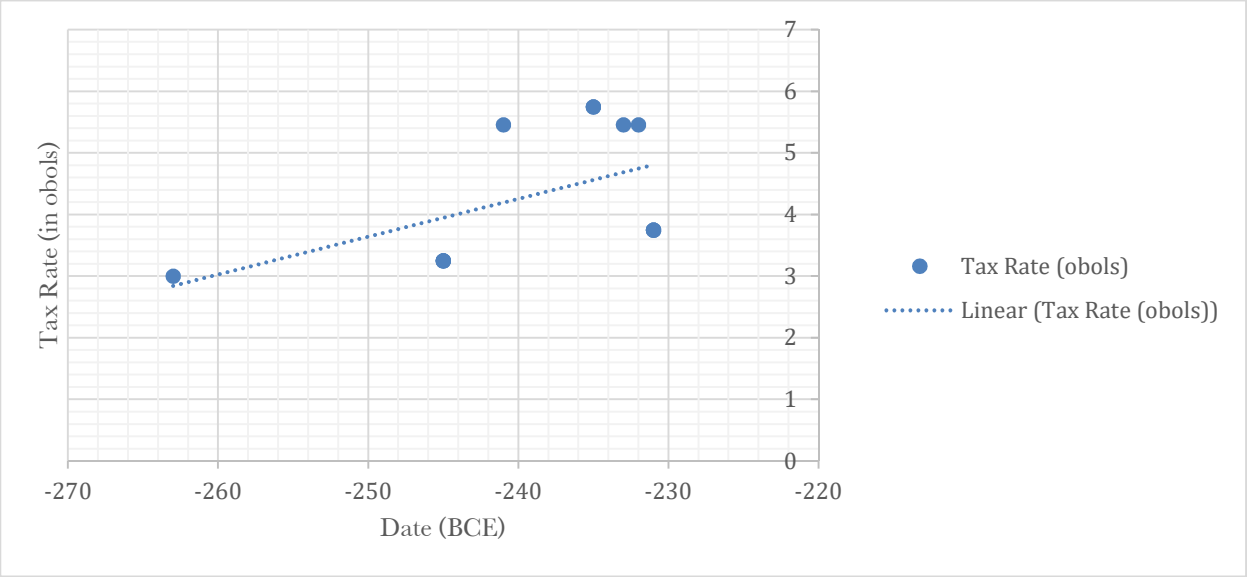
A third major capitation tax was the wool tax (ἐρέα, *ḥḏ ỉnw*), which was introduced in 254 BCE and was paid only by women.[75] The extant examples from both Demotic and Greek texts from early Ptolemaic Thebes indicate that the wool tax was paid at a flat rate of 3.75 obols.[76] Despite two outlying attestations in Demotic (from Edfu rather than Thebes) at a lower rate of 2.77 obols that might indicate some regional variation, in general, the Theban evidence for the wool tax rate seems to have been remarkably stable.[77]

Other taxes (for which fewer data points exist) might show small increases in tax rates. One such tax was the income of a server tax (*ʿq rmṯ ỉw=f šms*), paid only by men and attested in the reigns of Ptolemies II and III.[78] The rate of this tax is more difficult to ascertain, and the graph of these rates (Figure 6.3) is based on only 12 data points. As Muhs notes, these 12 texts are not all securely dated.[79] Five of the texts include sums of the income of a server tax and the salt tax, so the rates for the income of a server tax derived from those texts necessitated a subtraction of the standard salt tax rate of that time from the number included in the text. These caveats aside, Figure 6.3 seems to demonstrate a clear increase in the rate of this tax within the three decades of extant data. The earliest example, dating to year 23, probably of Ptolemy II, was for ¼ qite (3 obols); later examples that probably date to the reign of Ptolemy III include rates of 5 ½ ¼ obols

[75] Ibid.. For further discsussion, see section 4.4.10, "Taxes."
[76] Muhs, *Tax Receipts*, 52-53.
[77] Didier Devauchelle, "Quelques ostraca démotiques déposés à l'IFAO [avec deux planches]," *Bulletin de l'Institut français d'archéologie orientale (BIFAO)* 85 (1985): 99-104, esp. 100, inv. no. 1002; Bernadette Menu, "Reçus démotiques romains provenant d'Edfou (O.D. Ifao; 3e série) [avec 6 planches doubles]," Bulletin de l'Institut français d'archéologie orientale (BIFAO) 80 (1980): 171-190, esp. 188, inv. no. 361. See Muhs, Tax Receipts, 53 & n. 357.
[78] Muhs, *Tax Receipts*, 55-56. For further discussion, see section 4.4.10, "Taxes."
[79] Muhs, *Tax Receipts*, 55-56.

and 5 1/3 1/8 obols.[80] An increase of just 2 obols over 30 years would represent an annual increase of roughly 1.67%, so these tax increases would not have been dramatically large if they occurred gradually; unfortunately there is not enough data to say whether the increases were gradual or stepped. However, Muhs' more recent investigations into this tax have noted that the tax did not actually increase over time. The apparent increases were the result of an increase in bundling this tax with others on receipts; sometimes these additional taxes were named, but sometimes not, leading to the illusion of an increase.[81] Thus income of a server tax receipts do not provide strong evidence for inflation.

Figure 6.3: Apparent Income of a Server Tax Rates in Thebes, 263-231 BCE



More data exist for the burial tax (*ḥḏ mr ḫ3s.t* "money of the Overseer of the Necropolis," or *tny mr ḫ3s.t* "tax of the Overseer of the Necropolis," or just *r ḥ.t-nṯr* "for the temple"), for

[80] Sten V. Wångstedt, "Demotische Quittungen über Salzsteuer," *Orientalia Suecana* 27-28 (1978-1979): 5-27, esp. 9, no. 4 (O. BM 5708); Muhs, *Tax Receipts*, 55, 163 no. 36 (OIM 19328), 174 no. 52 (OIM 19345).
[81] Muhs, *O. Taxes 2*, 91-93.

which the rate may have increased during the reign of Ptolemy III.[82] Muhs includes examples from 63 texts dating from year 7 of Alexander IV (310 BCE) to year 20 of Ptolemy III (224 BCE).[83] Most of the burial tax receipts indicate a rate of 1 drachma per person whose body was brought to the necropolis, to be paid to the "overseer of the necropolis," likely a temple official. However, as Muhs notes, a few examples were paid at a rate of 7 obols per person: an increase of one obol.[84] The examples of the 7-obol rate date to years 13 and 24, probably of the reign of Ptolemy III.[85] Thus, as Muhs writes, "it is tempting to suggest that the rate of the burial tax was increased by 1 obol by Egyptian year 13 of Ptolemy III, except that one late burial tax receipt for 1 kite for two individuals is dated to Egyptian year 20, probably of Ptolemy III."[86] The 1-obol (16.67%) increase is possible but might actually just represent simple variation in the tax rate in a few isolated examples.

The tax rate data from early Ptolemaic Thebes are inconclusive with regard to the potential for inflation. Some rates were stable (the yoke and wool taxes, plus the income of a server tax), while the most commonly attested tax in the period actually decreased. These data are an excellent example of the importance of approaching inflation through multiple data sets, since the particular parameters of these different taxes may have led to their different rate trends. For example, the fact that a tax levied against the population as a whole (the salt tax) decreased at the same time that one charged only to certain categories of individual (the income of a server tax) stayed stable may indicate that the Ptolemies' tax policy was dynamic, with changes in tax rates that might have compensated for each other in aggregate. Likewise, the particular form of

[82] For further discussion and more references, see section 4.4.10, "Taxes." See also Muhs, *Tax Receipts*, 88-95.
[83] Ibid., 90-95.
[84] Ibid., with n. 640.
[85] Ibid., 89.
[86] Ibid.

payment required for these taxes is crucial to consider. If the decrease in the rate of the salt tax was related to changes in the supply of circulating bronze coins, the Ptolemies might have had greater flexibility in establishing the rates of other taxes that could be paid in a more diverse set of forms.

6.2.6 Indicator 5. Standard Social Payments

Tax rates had potential as indicators of inflation because non-proportional taxes were essentially payments made for certain clear, standardized things: an analysis of capitation tax rates controls for the variation other prices show in terms of the thing being paid for. Likewise, the people of Ptolemaic society sometimes paid certain standard payments and recorded the amounts they paid. The long-standing Egyptian practice of writing contracts led to the development of sets of key terminology used in contracts to reflect payments made. One key example of this practice is annuity contracts related to marriage, which included standard clauses on the necessary payments involved, such as a bride-price, annuities, penalties for divorce, etc. The concept being paid for in each case, while abstract, was well understood and did not vary from contract to contract. In other words, my argument is that it is fair to consider a divorce penalty as a sort of commodity, since the concept of 'divorce' was well understood and since all divorces represented basically the same thing. In this section, I will track the price paid for various standard clauses in contracts, i.e., those payments for which a clear set of terminology existed, for which the definition was clear and relatively unchanging from contract to contract. Changes in the amounts paid for these standard payments over time might be a further indication of broader inflation.

I am excluding those payments in contracts that were unusual or specific to a particular contract: those that needed more description than just filling a number into a standard spot on a

contract template. Likewise, I am also excluding payments that may have been standard--including fees paid to officials, fines, etc.—but for which the price probably would have varied based on more factors. For example, the fine paid for an offense like ὕβρις "violence" may have varied based on the nature and severity of the violence or the social standing of the parties involved. Similarly, the ναῦλον "shipping fee" is mentioned in many contracts and letters, but the cost of shipping likely varied according to the amount and nature of shipped goods, distance covered, time of year, etc. My selection of the standard payments to use here as indicators of inflation centers on the extent to which these payments were commoditized.

The sort of payments that will be discussed in this section may seem unusual data sets for an analysis of inflationary trends. In searching for evidence of inflation, I am attempting to control as much as possible for other factors that could have influenced the price of the thing. In an ideal world with an ideal data set, the price would be the only independent variable, with supply and demand held constant. Of course no data will match this ideal situation perfectly. The payments discussed here, though, are in some ways closer to this ideal than are the prices of commodities, for which supply and demand might have been more changeable. These payments are largely payments in exchange for abstractions, and the supply of abstractions is (theoretically) limitless. Changes in the price of one of these payments would therefore have more to do with the resources of the parties involved and with changes in the value of money than with changes in the value of the abstraction (e.g., if divorce penalties were to go up, the increased price would not have been due to a decrease in the supply of divorces). At least in theory, then, the things being paid for (divorce, wives, a lack of oaths, etc.) can fade into the background as standard abstractions, and the prices themselves can come to the forefront of the present analysis.

While the abstract things being paid for in these contracts do come close to representing the ideal data set in their standardization and infinite supply, the data naturally do not fit this ideal criteria perfectly. I will consider specific deviations from the ideal neutrality of each thing in turn as this section progresses. For all of them, though, there are two major caveats to keep in mind. First, the price of these payments was very likely related to the power the payers had to pay: that is, how wealthy the people paying were. Divorce penalties were almost certainly proportional. However, if we assume that the relative wealth status of the parties writing these contracts did not change (e.g., that they consistently represented households in the top 25% of wealth, even though, in absolute terms, the wealth level of the 75th percentile cutoff changed over time), then it is possible track this household wealth using divorce penalties as a proxy. I will continue to use payment for abstractions, which I expect would be proportional to household wealth, as proxies for wealth throughout this section (e.g., with annuity money and money for becoming a wife). We must keep in mind that this is based on the assumption that the relative wealth of these parties was mainly constant, however, although the shifting cultural and political dynamics of the fourth and third centuries probably did impact the social position of the sorts of families writing these contracts (especially wealthy Egyptian priestly families). Second, changes in the cultural perception of these abstractions cannot be ruled out as potential factors influencing the prices paid. It is theoretically possible that the penalty for divorce could have risen, for example, because morals changed and divorce came to be seen as a worse offense. These caveats should not be ignored, but it does still seem possible to analyze standard payments as an additional indicator of inflationary trends.

Most of the payments I will discuss in this section were included in Demotic annuity contracts (often referred to as 'marriage documents') made between a man and a woman when

they decided to formally protect their rights in the relationship. Earlier in this chapter, I analyzed the *ꜥq-ḥbs* payment from these contracts—ongoing support paid by the man to the woman.[87] Here, I will analyze those payments or valuations of lump sums, namely the *šp n sḥm.t* "bridal gift" paid from the man to the woman, the penalty for divorce paid by the man to the woman, the *sꜥnḫ* annuity paid from the woman to the man, an alternative payment from the woman to the man known as the *ḥḏ n ỉr ḥm.t*, and the value placed on the *ỉnw*-cloth, which many women brought with them into the marriage. Since all these prices come from a similar context of marriage, I will analyze the trends in these prices all together, after some brief definitions of each payment.

The *šp n sḥm.t* literally means "gift of a woman" and is often translated "bridal gift"; it can be traced back as early as the 25th Dynasty.[88] As such, it represented an amount of money, sometimes with the addition of some grain, that a man paid to his wife upon the formalization of their relationship; Pestman considered it a sort of bride-price.[89] In the case of divorce, the woman would retain rights to her *šp n sḥm.t* and would take it with her, even if the man had not formally transferred it to her when they first married.[90] Here is an example from P. Hauswaldt Manning 4 (c. 247-221 BCE):

ỉr=y ẖ=t n ḥm.t ty=y n=t ḥḏ 1 r sttr(.t) 5.t r ḥḏ 1 ꜥn n pȝy=t šp n sḥm.t	I make you wife. I give you 1 deben = 5 staters = 1 deben again for your bridal gift.

In this example, the man is giving the woman 1 deben, essentially in exchange for her becoming his wife. The abstraction being paid for, then, is the right to treat the woman as wife, the right to

[87] See section 6.2.3 "Indicator 2: Fixed Values from Demotic Annuity Contracts," above in this chapter.
[88] See CDD, *šp n sḥm.t*, under *šp* "gift; prize; award; indemnity; recompense."
[89] P. W. Pestman, *Marriage and Matrimonial Property in Ancient Egypt*, PLB 9 (Leiden: Brill, 1961), 13-20.
[90] Ibid., 15.

the bond of marriage: Pestman describes this as "a right which the husband acquires in his wife to the end that she may behave as a good wife should; be a worthy mistress of the house, not commit adultery etc. By paying the *šp* the legal family tie between the wife and the parental home is, as it were, severed and a new legal family bond is formed between her and her husband, founding a new family."[91]

The exact nature of this relationship, the obligations the wife took on, etc. are not particularly relevant to my analysis. What is clear, though, is that this purchased abstraction was well understood enough to not need specific definition from contract to contract; the parties involved knew what the *šp n sḥm.t* meant. The rights involved would not have varied based on any other economic factors like supply and demand, since I know of no evidence that the supply of women relative to men changed dramatically in this period.[92] For these reasons, the *šp n sḥm.t* fits the criteria for my analysis of inflation.

The caveats discussed above apply to the case of the *šp n sḥm.t*, in that it likely varied based on the general wealth of the families involved and could theoretically have varied based on changes in the cultural value placed on marriage. Pestman further suggests that the early attestations of the payment, before the Ptolemaic period, show a possible relationship between the value of the *šp n sḥm.t* and the common purchase price of female slaves at the time.[93] In these early examples, the payment was made from the groom to the bride's father and therefore could,

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[91] Ibid., 20.

[92] Clarysse and Thompson report an average of 102 men for every 100 women in the Fayyum – a slight overrpresentation of men, either due to higher mortality among females or higher immigration rates among males. While there were dramatic differences in the supply of women in the Fayyum from village to village (Clarysse and Thompson note a range of 67.0 to 176.7 males per 100 females), that dataset represented the Fayyum only – whereas most of these contracts are from Upper Egypt. I have not seen any evidence for shifts in sex ratios of that magnitude over time, only over geography and only in the Fayyum. See Clarysse and Thompson, *Counting the People*, 2: 106 and 309, Table 7:27.

[93] Pestman, *Marriage*, 16.

in a sense, be seen as the purchase price of the woman.[94] In the Ptolemaic examples, the payment is made to the wife, not her father, and thus seems to be less of a purchase price.[95] It is theoretically possible, still, that the value of the *šp n sḥm.t* could have varied based on the perceived 'quality' of the woman. Nonetheless, I would argue that the fact that these contracts were made directly between the man and the woman, coupled with the lack of a description of the woman's qualities (as is included in documents recording the sale of slaves and livestock), indicates that the *šp n sḥm.t* payment was made in exchange for the abstract concept of marital rights and bonds.[96]

The annuity contracts that include a *šp n sḥm.t* generally also specify an additional penalty that the man would be required to pay to the woman in the case of divorce, in addition to the value of her *šp n sḥm.t*, which she would also take with her. These contracts of the format <*šp n sḥm.t* + divorce penalty> constitute Pestman's "type A" contracts.[97] While there was not one definite term in Demotic for this divorce penalty, the clause concerning this penalty was quite standard in these texts, following a standard template. An example can be seen in P. Eheverträge 13 + P. Phil. Dem. 14 (264 BCE):

iw=y ḫꜣᶜ=t n ḥm.t mtw=y mst.ṯ=t mtw=y ḫn k.t sḥm.t ḥm.t r-ḥr=t iw=y r ty.t n=t ḥḏ 5 r sttr 25 r ḥḏ 5 ʿn pꜣ bnr pꜣy ḥḏ 1 r sttr 5.t r ḥḏ 1 ʿn nt ḥry r-ty=y n=t n pꜣy=t šp n sḥm.t r mḥ ḥḏ 6 r sttr 30 r ḥḏ 6 ʿn	If I leave you as wife, if I hate you and I prefer another woman as wife besides you, I will pay to you 5 deben = 25 staters = 5 deben again, aside from this 1 deben = 5 staters = 1 deben again, aforementioned, which I gave to you as your *šp n sḥm.t*, to total 6 deben = 30 staters = 6 deben again.

[94] Ibid., 16-20.
[95] Ibid., 20. He explains that the payment of the *šp n sḥm.t* is not the wife's selling herself as property (similar to a slave) to her husband, but rather that she is giving her husband the right to her as a wife "to the end that she might behave as a good wife should."
[96] In the case of livestock, P. Cairo Zen. 3 59370, for example, includes different prices for large and small calves. In the case of slaves, BGU 6 1290 lists the prices for several slaves who served as potters; those also described as "young" cost half as much as those without the youthful designation.
[97] Pestman, *Marriage*, 21-32.

Here, if the man divorces the wife, he will pay her a penalty of 5 deben, on top of the 1 deben he already gave her as her *šp n sḥm.t*, for a total penalty of 6 deben. No similar penalty is mentioned for a wife who chooses to instigate the divorce.

The divorce penalty fits the criteria for my present analysis because it is a clear payment for an abstraction: in this case, the pain and humiliation of divorce, plus perhaps for the support of the woman who would now be living on her own (a sort of lump sum for damages plus alimony). Unlike in a modern context, where the particular circumstances of the divorce might play a role in the penalty, the Demotic prenuptial contracts do not go into much detail regarding the nature of the husband's indiscretions or of the wife's time of service or production of children. In that case, then, the divorce penalty was a fairly standard, formal affair.

Although the texts do not provide much detail regarding the details of divorce, in the example above, it is clear that the man is not only divorcing his wife but also taking a new woman as his new wife. While mention of leaving the wife for another woman is very common, it is not specified in all cases. Thus it is theoretically possible that penalties may have been higher in divorces that included this particular added misdeed. Some texts specifically distinguish the penalty for divorce from an added penalty for leaving the marriage for a new wife. An example can be noted in P. Eheverträge 17 (230 BCE):

ỉw=y ḫꜣꜥ.t=t ḥm.t ỉw=y ty.t n=t ḥḏ 10 r sttr(.t) 50(.t) r ḥḏ 10 ꜥn bdt 400 ṯꜣ hn 40	If I leave you as wife, I will give you 10 deben = 50 staters = 10 deben again, (plus) 400 emmer by the 40-hin measure.
ỉw=y ḫn k.t sḥm.t r-ḥr=t ỉw=y ty.t n=t [ḥḏ] 10 r sttr(.t) 50(.t) r ḥḏ 10 ꜥn bdt 400 ṯꜣ hn 40	If I prefer another woman to you, I will give you 10 [deben] = 50 staters = 10 deben again, (plus) 400 emmer by the 40-hin measure;
r mḥ ḥḏ 20 r sttr(.t) 100(.t) r ḥḏ 20 ꜥn bdt 800 ṯꜣ hn 40 [r ỉt 53]3 1/3 bdt 800 ṯꜣ hn 40 ꜥn	To total: 20 deben = 100 staters = 20 deben again, (plus) 800 emmer by the 40-hin measure [=53]3 1/3 [wheat] = 800 emmer by

	the 40-hin measure again.

In this example, reflected as well in P. Eheverträge 21 (221 BCE), the divorce penalty is doubled if the man is leaving his wife for another woman. It might seem, then, that such an insult was considered a worse divorce and that this penalty represented an addition to the usual penalty because of the severity of the misdeed. That interpretation is certainly possible. However, the total divorce penalty (including the doubling for adultery) is still only 20 deben: a typical divorce penalty for other texts from around this date that do not distinguish divorces involving other women from more amicable divorces. Rather than observing this doubling as an extra punishment, it might be possible to consider the reverse: in these texts, there was a *relaxation* of the penalty in cases in which another woman was *not* involved. Unlike most other contracts with divorce penalties, these do not include a *šp n sḥm.t*—so the total amount paid in divorce (usually the *šp n sḥm.t* plus the divorce penalty) was not much different from the total payment in other contracts. These two examples including the 'adultery' penalty—from P. Eheverträge 17 and P. Eheverträge 21—were both from Akhmim (and they represent the only examples from Akhmim that I could find), so a regional variation in contracts may have been the cause of this difference.

The purpose of these contracts was, in part, to establish guidelines for what would happen to the couple's assets in the case of divorce, so all the texts include some information on the amount of support the woman would receive from the man. Variation can be noted, however, in the reasoning behind different components of this support. In the results in Table 5, below, I have added a column to display the total penalty the man would owe to the woman in case of divorce, excluding the value of the goods she brought with her into the relationship. This total column

makes it possible to compare changes in the expense of divorce, regardless of the specific type of payment.

Other contracts—Pestman's "type C"—replaced the specification of the *šp n sḥm.t* and divorce penalty with the *sʿnḫ* payment.[98] The *sʿnḫ*--which literally means "to cause to live," or perhaps "to make living possible"--was a lump sum paid by the woman to the man, in exchange for the *ʿq-ḥbs* support he paid to her on an ongoing basis (discussed above as Indicator 2).[99] This payment was typically quantified in terms of coins rather than in kind. An example can be noted from P. Hawara OI 2 (331 BCE):

tỉ=t mtry ḥȝ.t=y n ḥḏ 10 n nȝ tnỉ.wt nt n pr-ḥḏ n Ptḥ n wtḥ r ḥḏ 9 qt(.t) 9(.t) 5/6 1/10 1/30 1/60 1/60 r ḥḏ 10 (n) nȝ tnỉ.wt nt n pr-ḥḏ n Ptḥ n wtḥ ʿn n pȝy=t sʿnḫ	You have caused my heart to agree to the 10 deben (weighed by) the pieces which are in the Treasury of Ptah, refined = 9 deben & 5/6 + 1/10 + 1/30 + 1/60 + 1/60 qite = 10 deben (weighed by) the pieces which are in the Treasury of Ptah, refined again as your *sʿnḫ*-annuity.

Here the man is saying he has agreed to the *sʿnḫ* of 10 deben which his wife is paying to him. The *sʿnḫ* was not intended to be spent, since the husband could have been compelled to pay it back to the wife if and when she asked for it (as in the case of divorce).[100] Muhs has suggested that if the couple stayed together and had daughters, the *sʿnḫ* may have been passed down to one of them intact.[101] Essentially, Muhs' idea is that it could have served as a priest's daughter's inheritance, given to her as a lump sum paid in money so that the family's priestly revenues could be inherited by her brothers without division.

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[98] Pestman, *Marriage*, 37-48.
[99] *CDD*, "S" 13.1 (15 November 2003), 53-55; Pestman, *Marriage*, 37-39. See also 6.2.3 "Indicator 2: Fixed Values from Demotic Annuity Contracts," above in this chapter.
[100] Muhs, "The Girls Next Door"; Brian Muhs, "Fractions of Houses in Ptolemaic Hawara," in *Graeco-Roman Fayum – Texts and Archaeology, Proceedings of the Third International Fayum Symposium Freudenstadt, May 29 – June 1, 2007* (Wiesbaden: Harrassowitz, 2008), 187-197.
[101] Muhs, "The Girls Next Door"; Muhs, "Fractions of Houses in Ptolemaic Hawara."

This lump of money was passed around--certainly from wife to husband, and perhaps then from father to daughter, and so on---intact, not being spent or *used for* anything, really. Likewise, if it were indeed passed from hand to hand as a lump sum, it seems that it would not have been spent or added to along the way. The value of the *sʿnḫ* is unlikely to have been tied to the price of other things that could have fluctuated based on a wide range of other factors. As a lump of coins, it was a physical store of wealth; as a store of wealth without a clear purpose, it was a sort of abstraction. For that reason, it can serve my present purposes as a clear abstraction.

Naturally, the value of the *sʿnḫ* could have represented the wealth of the families it belonged to; variation in *sʿnḫ* values therefore could be tracing trends in the wealth of the sort of priestly families that drew up these annuity contracts. If we were able to follow the trending wealth of one family over these decades, changes in that family's wealth stores could have been affected by factors other than inflation. A rise or fall in the family's fortune could be caused any multitude of reasons aside from the macroeconomic trends I am investigating here. My hope is that in aggregate, tracing the values of all known *sʿnḫ*s from many families, I will be able to see a more accurate image of changes in the value of inheritance. Still, changes in the wealth of priestly families who wrote contracts in Demotic, even as one body, were certainly affected by political changes and shifts in the power and wealth of the temples over time. These trends therefore should not be taken as representative of the entire Egyptian economy, of the fortunes of average Egyptian families, or the wealth of families in general. *Sʿnḫ* trends merely serve as another indicator of how the economic and political changes of the third century may have impacted one particular segment of the population.

The least common type of contract in our period—Pestman's "type B"—replaced the *sʿnḫ* with an alternatively named payment, the *ḥḏ n ỉr ḥm.t* "money for becoming a wife."[102] This payment, like the *sʿnḫ*, was paid from the woman to the man in exchange for the right to become his wife. Pestman noted nine examples of this contract type, one dating as early as 517 BCE, but most fall in the later Ptolemaic period and only two date to our period of 332-186 BCE.[103] Both of these texts--P. Eheverträge 30 + Acta Orientalia 23 (1958), p. 123-124 no. B and P. Eheverträge 31 + Acta Orientalia 23 (1958), p. 126 no. A—were written in the Fayyum during the time of the Great Revolt in Upper Egypt (186 and 195/4 BCE respectively), so they can serve as a useful basis for comparison between practices in the north and south at this time. The example from P. Eheverträge 30 + Acta Orientalia 23 (1958), p. 123-124 no. B is worded as follows:

ty=[t] n=y ḥḏ 90 ḥmt 24 (r qt.t 2.t) sttry(.t) 450(.t) r ḥḏ 90 ḥmt 24 r qt(.t) 2(.t) ʿn n pȝy=t ḥḏ [n ỉr] n=y ḥm.t	You have given me 90 deben, at the rate of 24 bronze (obols to 2 silver qite), = 450 staters = 90 deben, at the rate of 24 bronze (obols) to 2 (silver) qite, again for your money [of becoming] a wife to me.

Here, the man is formally acknowledging that the woman has paid him 90 deben as the fee to become his wife. Pestman argues that, as was the case with the *sʿnḫ*, the man would then be obligated to pay her back this money if they were to divorce.[104]

In Greek, such a payment from the woman to the man was expressed with the term φερνή, or "dowry."[105] Three texts in my corpus include mention of such a φερνή, quantified in bronze drachmas. I am including these texts in the present analysis as well (see Table 5, below).

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[102] Pestman, *Marriage*, 32-37.
[103] Ibid., 32-33.
[104] Pestman, *Marriage*, 35.
[105] Pestman, *Marriage*, 36. According to the LSJ, the φερνή was given by the woman to the man. See < http://www.perseus.tufts.edu/hopper/morph?l=fernh%2F&la=greek#lexicon> (accessed March 18, 2018).

In cases of divorce, the woman would also be entitled to take with her either those belongings she brought into the marriage, similar items, or their equivalent value.[106] For this reason, many of the contracts also include inventories of the woman's property (known as *nkt.w n sḫm.t* "property of a woman") along with valuations of the listed items. These lists tend to include primarily clothing, jewelry, vessels, mirrors, and other household goods. The items thus seem to have been mostly for the woman's personal use, and their value remained her property throughout the marriage.[107] Most of the goods listed were not commodities: they represented particular bracelets, vessels, etc. which were occasionally described in greater detail. These goods therefore would not suit the present analysis. Many lists of *nkt.w n sḫm.t* included the *ỉnw*, a type of cloth (previously read *ỉnšn*).[108] Exactly what type of cloth the *ỉnw* was is uncertain—it may even have been a wig—but such identification is not important for the purpose of the present analysis.[109] To be clear, it is certain that the *ỉnw* was a real, tangible item. As pieces of clothing that probably had specific, differentiable traits, not all *ỉnw* cloths were the same. As I will demonstrate in Chapter 7, the prices of finished clothing varied wildly, and most items of clothing were not undifferentiated commodities.[110] However, unlike the many specific items of jewelry that were included on these lists to varying degrees from woman to woman, every list I have found invariabilty includes a *ỉnw*. Because of their commonality, it is worth considering the possibility of using *ỉnw* prices as one economic indicator. While individual cloths certainly varied in their quality, it still might be possible to use them, because of their commonality, as a proxy to track

[106] Pestman, *Marriage*, 98-99.
[107] Pestman, *Marriage*, 100.
[108] CDD "ỉ" 11.1 (April 2011), 164-166.
[109] CDD "ỉ" 11.1 (April 2011), 164-166; Brian Muhs, *Tax Receipts*, 51-52; P. W. Pestman, *Marriage and Matrimonial Property in Ancient Egypt.* PLB 9 (Leiden: Brill, 1961), 65, n. 1; G. R. Hughes, "Review of *Demotisches Glossar*, by W. Erichsen," *Journal of Near Eastern Studies* 16 (1957): 57-58.
[110] See 7.3.3 "Commodities with Supervised Production: Wine, Agricultural Staples, Beer, and Cloth."

other economic changes. To put this reasoning in a modern context, despite the fact that wedding dresses each vary according to their unique properties, an economist could track these values as proxies for income, consumer confidence, desire to signal wealth, etc. Possession of *ỉnw*-cloths does not seem to have been limited to brides, so a comparison to engagement rings might not seem appropriate. Nevertheless, just as modern economists might be able to track changes in the price of engagement rings since the introduction and marketing of DeBeer's "two months' salary" rule in the 1930s as a proxy for overall income, it might be possible to track *ỉnw* values as a proxy both for wealth and for changes in overall pricing levels. As I began this investigation, I was interested in testing whether the *ỉnw*-cloth might be able to serve as a proxy indicator of changes in the valuation (i.e., the price) of the overall wealth of the women in these documents.

Essentially, I am testing the validity of the assumption that the values given for these cloths would not have varied much based on the supply of wool, that the demand for the cloths remained relatively constant, and that the particular qualities of a given cloth would not have been the deciding factors of its value.[111] These assumptions may be a stretch, but it is possible to test them by comparing trends in the price of *ỉnw* cloths with trends in the price of the other payments mentioned in these documents. It should also be noted that, unlike some the payments discussed previously, the valuation listed for the *ỉnw*-cloth only became a payment in the case of divorce. The woman was not selling her cloth to the man, but rather listing its value which could be repayed in lieu of the cloth itself in the case of divorce. Since the same could be said for the value of the other payments, that they only really became real upon divorce, I still think it is valid to include the *ỉnw* value here.

[111] For further discussion, see 7.3.3 "Commodities with Supervised Production: Wine, Agricultural Staples, Beer, and Cloth."

The data on all these various payments from annuity contracts are presented in Table 6.11.

Table 6.11: Standard One-Time Payments in Annuity Contracts

Text	*Date*	*Location*	*šp n sḫm.t (deben)*	*Divorce Penalty (deben)*	*sᶜnḫ (deben)*	*ḥḏ n ỉr ḫm.t (deben)*	*φερνή (bronze drachmas)*	*Total Monetary Divorce Payment, Including Other Woman (deben)*	*ỉnw-Cloth (deben)*
P. Hawara OI 2	331	Hawara			10			10	
P. Eheverträge 10 + P. Ryl. Dem. 10	315	Djeme (Thebes west)	2	10				12	
P. Hawara OI 3	311/0	Hawara			10			10	
Revue d'Égyptologie (RdE) 35 (1984), p. 4-6	287	Thebes						5	0.4
P. Eheverträge 13 + P. Phil. Dem. 14	264	Djeme (Thebes west)	1	5				6	
P. Hawara OI 6	259	Hawara			10			10	
P. Eheverträge 14 + Revue égyptologique 5 (1888), p. 90 & pl. 24 [2433] descr.	252	Dios Polis (Thebes east)	1	20				21	
P. Hauswaldt Manning 4	(247-221)	Apollonopolites (Edfu)	1	1				2	0.6
P. Hawara OI 8	243	Hawara			21			21	
CPR 18 28	(after 232 or after 206)	Polemonos Meris					1000 dr. of bronze = 50 deben	50	
CPR 18 8	*231 or 206*	*Samareia*					*600 dr. of bronze = 30 deben*	*30*	

Table 6.11: Standard One-Time Payments in Annuity Contracts (cont.)

Text	*Date*	*Location*	*šp n sḫm.t (deben)*	*Divorce Penalty (deben)*	*sᶜnḫ (deben)*	*ḥḏ n ỉr ḫm.t (deben)*	*φερνή (bronze drachmas)*	*Total Monetary Divorce Payment, Including Other Woman (deben)*	*ỉnw-Cloth (deben)*
CPR 18 9	231 or 206	Samareia					500 dr. of bronze = 25 deben	25	
P. Eheverträge 17	230	Akhmim		10 deben, plus 400 emmer (ṯ hn 40)*				20	
P. Dem. Memphis 1	226	Memphis			21			21	
P. Recueil 7	226	Djeme (Thebes west)	1	2				3	1.6
P. Eheverträge 19	225	Djeme (Thebes west)	2	10				12	
P. BM Andrews 46	225/4	Armant							2
P. Eheverträge 20 + P. Phil. Dem. 25	223	Dios Polis (Thebes east)	1	5				6	
P. Eheverträge 21	221	Akhmim		5 deben, plus 200 emmer (ṯ hn 40)†				10	
P. Eheverträge 22 + MDAI Kairo 16 (1958), p. 2 & 4	220	Djeme (Thebes west)	1	5				6	
P. Hauswaldt Manning 6	219	Apollonopolites (Edfu)	2	2				4	0.6
P. Hauswaldt Manning 15	217/6	Apollonopolites (Edfu)	1	2				3	
P. Eheverträge 25 + P. Berl. Spieg. p. 7 no. 3075	*210*	*Thebes*		*10*				*10*	

Table 6.11: Standard One-Time Payments in Annuity Contracts (cont.)

Text	*Date*	*Location*	*šp n sḫm.t (deben)*	*Divorce Penalty (deben)*	*sᶜnḫ (deben)*	*ḥḏ n ỉr ḥm.t (deben)*	*φερνή (bronze drachmas)*	*Total Monetary Divorce Payment, Including Other Woman (deben)*	*ỉnw-Cloth (deben)*
P. Hauswaldt Manning 14	208	Apollonopolites (Edfu)	1	1				2	
P. Eheverträge 27 + P. Berl. Spieg. p. 17-18 no. 3145	201	Dios Polis (Thebes east)	2	10				12	
Enchoria 21 (1994), p. 45-46 no. 46	(199-30)	Pathyris							370
Enchoria 21 (1994), p. 47-48 no. 47	(199-30)	Pathyris							One for 300, one for 10
Enchoria 21 (1994), p. 54 no. 52	(199-30)	Pathyris							400
Bulletin of the Center of Papyrological Studies (BACPS) 26 (2009), p. 158-159 no. 4	(2nd cent.)	Gebelein?							1100
O. Leiden Dem. 276	(199-1)	Thebes							100
P. Äg. Handschr. 63 descr.	(about 198-118)	Aswan?							50
P. Eheverträge 28	198	Aswan	3	5				8	30
P. Eheverträge 31 + Acta Orientalia 23 (1958), p. 126 no. A	195/4	Fayyum				100 deben (ḥmt 24 r qt.t 2)		100	
P. Eheverträge 29	191	Thebes	1‡	5				6	
P. Tor. Botti 39	*(189-100)*	*Deir el-Medina*						*100*	*250*

Table 6.11: Standard One-Time Payments in Annuity Contracts (cont.)

Text	*Date*	*Location*	*šp n sḫm.t (deben)*	*Divorce Penalty (deben)*	*sᶜnḫ (deben)*	*ḥḏ n ỉr ḥm.t (deben)*	*φερνή (bronze drachmas)*	*Total Monetary Divorce Payment, Including Other Woman (deben)*	*ỉnw-Cloth (deben)*
Enchoria 21 (1994), p. 48 no. 48	(187-88)	Gebelein							400
Journal of the American Research Center in Egypt (JARCE) 2 (1963), p. 114	186	Deir el-Ballas			5				0.6
P. Eheverträge 30 + Acta Orientalia 23 (1958), p. 123-124 no. B	186	Philadelphia				90 deben (ḫmt 24 r qt.t 2)		90	
P. Eheverträge 30 + Acta Orientalia 23 (1958), p. 123-124 no. B	186	Philadelphia				90 deben (ḫmt 24 r qt.t 2)		90	

These data reveal that the price of a marriage, and even more so of a divorce, increased between 332-186 BCE. A quick visualization of these increases might be helpful (Figures 6.4 and 6.5).

Figure 6.4: Total Monetary Penalty for Divorce

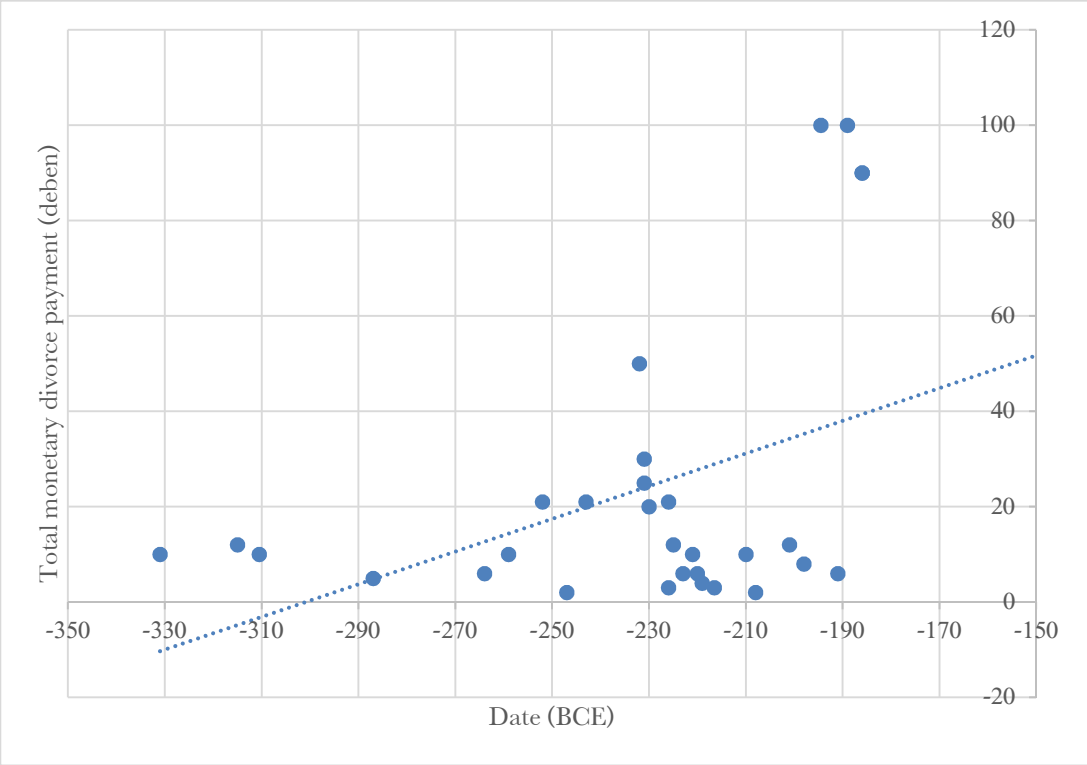
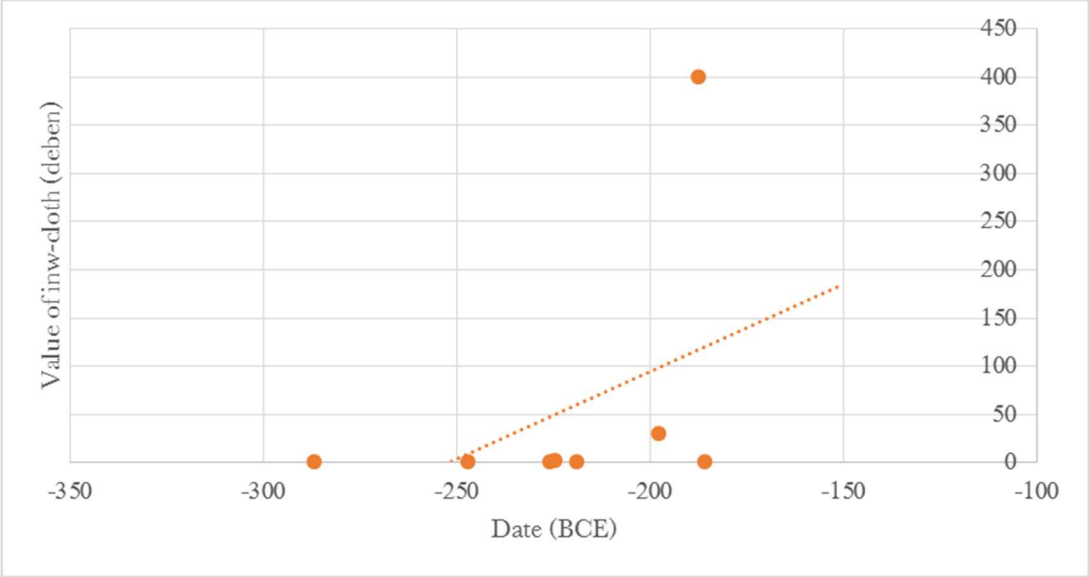


Figure 2.5: Value of the *inw*-Cloth in Lists of Woman's Property, 332-186 BCE



The values for both the monetary penalties for divorce and the value of the *ỉnw* cloth both increase over time, which indicates that these values were not merely traditional formalities but did actually change in response to other economic changes. However, some distinctions in trends between the two can be noted.

In the case of the total divorce penalty, small values persist even as higher-priced penalties began to appear toward the end of the third century BCE, and different trends seem to have occurred regionally. From the beginning of the period, total penalties around 10-12 deben were common, but penalties twice as high (20-21 deben) begin to appear as well starting in 252 BCE (although the lower values do not disappear). An example as high as 50 deben is noted from either after 232 or after 206 BCE, depending on the dating of the text (based on this value, the later date seems to make more sense)—but this value represents a conversion from the Greek, and all three of the Greek texts included in Table 6.11 were from the Fayyum. The early-second century major price increase expected based on the other indicators (here, about 10x) can be noted in two texts, from 195/4 and 186 BCE—but both those texts also came from the Fayyum. Southern texts from the time of the Great Revolt (206-186 BCE) do not display the same increase in divorce penalties. This data might lead to the conclusion that prices stayed flat in Upper Egypt during the Great Revolt, perhaps because the region was cut off from the macroeconomic trends of the rest of Egypt at this time.

However, the data concerning the *ỉnw*-cloth values complicate that idea. After two initial low values (2 and .6 deben, respectively) dating from 225/4 and 219 BCE, *ỉnw* values increased significantly. Some of the dates for these texts are uncertain, but there is a clear value of 30 deben from all the way south in Aswan in 198 BCE.[112] The reasons behind one extremely pricey outlier

[112] In Figure 6.5, though, I excluded values from texts without clear dates.

(400 deben) from Gebelein around 187-188 BCE remain obscure. What is clear, however, is that while divorce penalties stayed flat in the south during the revolt, *ỉnw* values did rise, even in the south. Moreover, while the increases in divorce penalties that do appear seem to have occurred in a stepped pattern, the increase in *ỉnw* valuations was rather linear, starting around 198 BCE. It is possible that their values were closer to market prices than were divorce penalties, since divorce penalties moved in a more rigid, stepped manner.

The reason for the different trends in Upper Egyptian divorce penalties and *ỉnw* valuations remains difficult for me to ascertain precisely. There may have been some social difference in how contracts of different types were used, and it is possible that the stated divorce penalties were written in an archaic manner. Further research on regional differences in pricing, especially during the revolt, might reveal more insights into these dynamics.

These standard payments known from Ptolemaic annuity contracts provide another window into the monetary trends of the period. In the future, more such social payments could be included, although to do so here would have added unnecessarily to the length of the present dissertation. Other relatively standard documents include penalty clauses, such as the penalty one would pay for refusing to swear an oath, or the penalty owed if a party in a contract did not hold to the terms of that contract. An analysis of the changing values of tangible things, commodities or otherwise, can only be enriched by comparison to changes in the quantified value of these less tangible concepts.

6.2.7 Conclusion

This analysis of five different indicators of inflation allows for some general observations. With the exception of taxes and Upper Egyptian divorce penalties, most prices tended to increase

over the course of the period, as expected based on previous studies. Since Reekmans' work, it has been clear that prices increased, in our period, in 221-216 BCE and 211-210 BCE, with the next major price increase occurring in 183-182 (and thus outside the scope of this dissertation).[113] The data I have presented here likewise show price increases that generally fall in line with those dates. Nonetheless, the dearth of precisely dated texts leads me to be wary of pinpointing exact years in which the increases occurred. The increase also did not operate in exactly the same way for all five of the indicators, which illustrates that the actual dynamics of the price increase were probably more complex.

Still, I do see some general trends (Table 6.12). Keep in mind that these increases are approximate and could have occurred any time within the noted date windows. At all periods, there was a great deal of variation in prices; this variation is the subject of Chapter 7.

Table 6.12: Summary of observed price increases, approximate

Date of increase	Magnitude of increase	Indicator
~250s	Slight, gradual (<30%)	wheat
254	Decrease, 33-50%	salt tax
~250s-240s	Slight, gradual (<30%)	wine
243	Decrease, 33-50%	salt tax
Between ~260-230	~1-2% annually	income of a server tax
Between ~250-235	~2-3x	wheat
Between ~240s-220s	~2x	divorce penalty
Between ~240-225	~50%	wine
~250-210	~72x	wages
Between ~235-195	~20-30x	wheat
Between ~218-206	~2x	wine
Between ~220s-186	~2x	divorce penalty
~210	~2x	deben per sack of emmer in *ʿq-ḥbs*
Between ~212-190	~2x	wheat
~195	~4x	deben per sack of emmer in *ʿq-ḥbs*
Between ~206-186	~20x	wine

[113] See 3.3.2 "Review of Literature on Ptolemaic Prices" and references there.

In Table 6.12, we can make some generalizations. In the mid-third century, there were slight, gradual increases in the price of wheat and wine, paired with a series of decreases in the salt tax. The more dramatic price shifts happened in the late third and early second centuries, although we cannot assume they took place as a series of precise steps. Between around the 240s to 220s, divorce became twice as expensive, as did wine and wheat. Then, sometime between 235 and 195, the price of wheat skyrocketed by around 20-30x, and between 250-210, wages rose by ~72x. Ultimately, there were price increases, but these were not simultaneous for all goods and services, and there was plenty of variation in the magnitude of the shifts. My broad study of Ptolemaic prices thus corroborrates the price increases that previous scholars observed—these did occur—but complicates the picture: the increases did not happen universally or simultaneously. Quantitative data, by their seeming factuality, can be difficult to interpret in isolation. It is crucial, therefore, to analyze these trends from multiple dimensions to arrive at a more accurate picture of these dynamics. Likewise, since these data are spotty and imperfectly dated, it is very difficult to determine to what extent they are representative of the actual dynamics on the ground. Ancient quantitative methods are intriguing and have potential, but they are nowhere near as accurate as modern economic studies with representative data sets.

Likewise, Ptolemaic price increases did not necessarily represent inflation. In the next section, I will overlay this mapping of price increases with a more comprehensive exploration of Ptolemaic economic, social, and political history in order to explore the possible causes of these general price increases.

6.3 The Causes of Price Rises

6.3.1 Introduction

The five economic indicators discussed above show that prices rose in a complex, muddy way, perhaps doubling around 220-215 BCE and then rising more dramatically, by about 10-20x, roughly between 211-195 BCE. These price increases alone do not necessarily demonstrate the existence of inflation in Ptolemaic Egypt. It is necessary, then, to probe the possible causes of the price increases. In this section, I investigate the possibility of each of the three sorts of inflation—monetary, demand-pull, and cost-push—in turn. Next, I consider the possibility that these price increases did not actually represent real inflation but rather changes in the accounting units used to express prices.

6.3.2 Monetary Inflation

The first type of inflation is monetary. There is no way to conclusively demonstrate the historical existence of monetary inflation, given the problems with ancient data, but circumstantial evidence might indicate that such inflation might have been possible. Since monetary inflation is a result of increases in the available quantity of money, and previous studies of Ptolemaic coinage and credit regimes have indicated those periods when more money was produced, it will be possible to compare the times of those known increases in production with the times when prices increased. If prices rose around the same time when the state was increasing the money supply, then monetary inflation might be a possibility. In this section, I will consider the possibility of the existence of each of the three drivers of monetary inflation—an expansionist fiscal policy, an expansionist monetary policy, and a rise in the value of foreign currencies--in a Ptolemaic context.

Monetary inflation can be caused when a state engages in an expansionist monetary policy, meaning the state produces more money. In Ptolemaic Egypt, 'money' could take many forms, as many payments could be paid either in coins and in kind (particularly grain). For that reason, when we consider the possibility of the production of more 'money' in the Ptolemaic period, even if the focus of the analysis is on coins, it is important to keep in mind that even an increase in agricultural outputs (i.e., an increase in the supply of wheat) could be considered a sort of expansion of the money supply.

Theoretically, since grains did serve as a sort of currency in Ptolemaic Egypt, an increase in the supply of wheat could lead to a drop in the value of wheat as a currency, meaning more wheat would need to be paid in cases of exchange made in kind. In theory, the state could devote more land to farming staple grains as a way to increase the supply of those grains (although of course the vicissitudes of climate and farming would imply less control over the amount of grain-money produced as opposed to coined money). Likewise, the state could have released more grain from its granaries, again increasing supply. To track the exact wheat production figures or agricultural yields across Egypt in this period would be beyond the scope of the present project. However, as discussed previously in this chapter, it is clear that the price of wheat actually rose over the course of the period. In an expansionist fiscal policy based on wheat as currency, the price of wheat would have fallen. Thus, it seems relatively clear that monetary inflation driven by a drop in the value of wheat should be excluded from the set of possible inflations considered here.

The coin supply, on the other hand, definitely increased over the course of the early Ptolemaic period. As was discussed in Chapter 4, the first Ptolemies introduced a full system of coinage to Egypt and began minting coins in Egypt as early as 312/11 BCE.[114] Already in the

[114] See 4.4.8 "Monetization and the Money Supply"

fourth century, Ptolemy I was manipulating the standard on which Ptolemaic coins were minted (distancing Egypt from the Attic standard), all in an effort to produce more coins.[115] Under Ptolemy II, a system of physically massive bronze coins was introduced, again increasing the coin supply.[116] As Lorber has demonstrated, silver virtually disappeared from the Egyptian chora under Ptolemies III and IV, as a result of a deliberate policy towards shifting the coins in circulation towards bronze.[117] With the shift towards the more readily-available bronze, there was an increase in the supply of coins produced in Egypt, especially in the early and mid-third century BCE.

Aside from an increase in coin production, more coins could have entered the Egyptian economy through an increase in state spending. Cadell and Le Rider used this line of reasoning to argue for the existence of real inflation after the end of the Fourth Syrian War (221-217 BCE).[118] Since their argument focuses on the state's *spending* of coins (in wages paid to soldiers, plus donations after the victory) rather than coin *production*, this potential influx in the available money in the Egyptian countryside is better understood as demand-pull inflation rather than monetary-inflation. For that reason, I will evaluate Cadell and Le Rider's argument in greater detail in the following section on demand-pull inflation.

While it is clear that the amount of coins did increase in the early Ptolemaic period, even this rising number of coins might not have been able to meet the demand for coins. In other words, although the coin supply was rising, it was still an under-supply. The many manipulations of coinage carried out by the early Ptolemies imply that the supply of coins remained lower than the demand for coins. Von Reden has argued convincingly that the shortage of physical coins

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[115] von Reden, *Money in Ptolemaic Egypt*, 38.
[116] Ibid., 58.
[117] C. Lorber, "Overview of Egyptian Silver Hoards under the First Five Ptolemies," in *Egyptian Hoards I: The Ptolemies*, eds. Thomas Faucher, Andrew Meadows, and Catherine Lorber (Paris: IFAO, 2016), 35-40.
[118] Cadell and Le Rider, *Prix du blé*, 74-76.

encouraged the introduction of transactions carried out on paper through the banks, as was discussed in Chapter 4.[119] The rise of credit can also be seen as a response to the dearth of coins, she argues. Even more, despite the Ptolemies' push for monetization, a high proportion of workers were still paid in kind, another sign that coins were in a state of constant undersupply.[120] The many coin manipulations of the early Ptolemies further created a sense of uncertainty and anxiety about the value of coins, which led people to hoard older, more pure issues: this hoarding behavior diminished the supply of coins even further.[121] Even if the first Ptolemies' fiscal policies were expansionist, there is no evidence that the production of coins expanded intensely enough to lead to an actual over-supply of money.

Even if the rise in coin production had been significant enough to lead to over-supply, the timing of this fiscal expansion does not align with the timing of known price increases. The greatest expansion in coin production in the early Ptolemaic was probably the increase in production of bronze coins under Ptolemy II in the 260s and the introduction of new taxes to spread those coins throughout the countryside.[122] However, the inflationary indicators discussed in the first half of this chapter do not demonstrate a clear, concurrent rise in price levels in the 260s or 250s. The major price increases only occurred decades later, starting only around 220 BCE. Moreover, rates for the salt tax—the very tax that has been argued to have caused the injection of coinage into the countryside—actually decreased twice (in 254 and 243 BCE) before the tax was eliminated in 217 BCE. The lack of temporal alignment between the major times of

[119] von Reden, *Money in Ptolemaic Egypt*, 275-286. For discussion, see 4.4.7 "Granaries and banks."
[120] Cf. Muhs, *Ancient Egyptian Economy*, 240-41.
[121] von Reden, *Money in Ptolemaic Egypt*, 43-46 ; Muhs, "Literacy, Law and the Economy in Ancient Egypt," 2.
[122] von Reden, *Money in Ptolemaic Egypt*, 58-59.

new coin production and those of significant price increases further precludes the possibility of monetary inflation driven by an expansionist fiscal policy in Egypt.

Moving on to the second driver of monetary inflation, in an expansionist monetary policy, the state increases the availability of credit (in a modern context, the state lowers interest rates). Even if the amount of physical money stays constant, there is more 'money' available to spend because there is more to borrow on paper. Essentially, debt could have allowed the pool of available 'money' to be larger than the total pool of coins. In an ancient context, we must consider the possibility of an expansionist monetary policy through a different lens from that used by modern economists today. Modern central banks today set minimum "prime" interest rates in an effort to manipulate the total money supply. While it is true that the Ptolemies did set some controls on interest rates, they focused on maximum interest rates rather than prime rates; that is, their efforts were to prevent and punish predatory lending practices rather than to manipulate the money supply and/or to prevent inflation (this was 'consumer protection' rather than macroeconomic policy)..[123] Still, as was discussed in Chapter 4, there is evidence of increasing use of credit in the Ptolemaic period, along with the development of the banking system.[124] It is therefore worth considering the extent and timing of this new availability of credit in order to better understand whether it could have led to monetary inflation.

As was discussed in Chapter 4, Ptolemy II instituted the network of royal banks starting in 265 BCE to facilitate state payments and credits, much like the royal granaries.[125] Later, other types of banks developed as well: concessionary banks, money-changing banks, and private banks. All types of banks were able to make loans. The loans made by royal bankers were rare exceptions

[123] For more on Ptolemaic interest rate controls, see P. W. Pestman, "Loans Bearing No Interest?" *Journal of Juristic Papyrology* 16/17 (1971): 7-29.
[124] See 4.4.7 "Granaries and Banks."
[125] See 4.4.7 "Granaries and Banks."

to the normal purview of those banks, however, and existed mainly in cases in which the banker was giving a favor to a personal contact.[126] Other banks, too, were not anonymous institutions but rather required some sort of knowledge or personal connection between bankers and patrons. These other banks could make loans, but they required security for those loans and therefore did not raise the amount of money through the creation of credit.[127] Aside from banks, individuals could obtain loans for personal and commercial purposes primarily through their personal network of friends, family, colleagues, and patrons. If an individual wanted to borrow money, he would have had an easier time borrowing from a wealthy protector or a private association of which he was a member rather than from a bank.

The development of banking institutions, private associations, and relationships of patronage in Egypt in the Ptolemaic period did increase the potential for borrowing behavior. However, it is unlikely that these developments could have led to an oversupply of credit, especially not on a magnitude that could cause massive monetary inflation due to an expansionist monetary policy.[128] Credit was used, but probably only by a small portion of the Egyptian population. The majority of people would not have had personal relationships with bankers or wealthy patrons from whom to borrow. The scale of the use of credit, while increasing, was still not particularly high.[129] Likewise, most loans required collateral and were thus not productive of new money. Moreover, while the development of these credit-issuing institutions is hard to date, they did not all arise and dramatically flood the market with credit at the end of the third century,

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[126] von Reden, *Money in Ptolemaic Egypt*, 283-286. For further discussion, see 4.4.7 "Granaries and Banks."
[127] Geens, "Financial Archives of Graeco-Roman Egypt," 134, n. 4 ; von Reden, *Money in Ptolemaic Egypt*, 287. For further discussion, see 4.4.7 "Granaries and Banks."
[128] For references and discussion, see 4.4.7 "Granaries and banks." In particular, note that while royal banks at times made loans to individuals they knew to finance business activities, these loans seem to have been rather exceptional. See von Reden, *Money in Ptolemaic Egypt*, 282-286.
[129] von Reden, *Money in Ptolemaic Egypt*, 288-289.

when we witness the increase in prices. Only in that case could a rise in credit have led to monetary inflation. For these reasons, it seems highly unlikely that an expansionist monetary policy and an increase in lending could have caused monetary inflation at the end of the third century.

The final driver of monetary inflation is a rise in the value of foreign currencies, which implies a drop in the relative value of the domestic currency, coupled with a rise in the price of imports. The Ptolemies actively manipulated their currency to have a low value relative to foreign currencies.. As was discussed in Chapter 4, already at the beginning of Ptolemy I's reign, Ptolemy, facing a lack of domestic silver mines and therefore a dearth in this metal, decreased the standard weights of his coins relative to those of earlier coins and to foreign coins minted on the Attic standard.[130] The result was hoarding behavior: following Gresham's Law, people held onto their older coins as well as their foreign coins, as they were considered more valuable than the new coins.[131] Since Ptolemy I needed the metal in those coins in order to produce more new coins, he needed to encourage people to release their hoards. He did so by banning exchanges using the better, more valuable coins—for example, by outlawing the use of foreign coins within Egypt.[132] Periodically during the reigns of Ptolemy I and II, decrees would be issued that required people to bring their old heavy coins to the bank to be reminted, as was discussed in more detail in Chapter 4.[133] In what is referred to as the 'closed currency system,' the circulation of foreign coins in Egypt was likewise banned; ships were required to exchange their foreign coins into Egyptian money

[130] See 4.4.8 "Monetization and the Money Supply."
[131] von Reden, *Money in Ptolemaic Egypt*, 43-46.
[132] Ibid., 43-48. For further discussion, see 4.4.8 "Monetization and the Money Supply."
[133] See 4.4.8 "Monetization and the Money Supply."

upon arrival at the port.[134] By the end of the fourth century, foreign coins disappear from Ptolemaic coin hoards and were likely no longer circulating within Egypt.[135]

These regulations on the circulation of foreign currency within Egypt show that Egyptian currency was less valuable than foreign currencies and might indicate that monetary inflation caused by a decrease in currency values relative to foreign currencies could have been possible. Still, for the increase in prices circa 220-215 and 211-195 BCE to have been caused by rising foreign currency values, I would expect foreign currencies to have risen in value soon before or simultaneously to the price increase. The low value of Egyptian currency, however, was a known factor essentially from the very beginning of the Ptolemies' rule: it was not a new development that correlated temporally with the price increase.[136] For that reason, it is unlikely that the price increase was due to a rise in foreign currency values.

A decrease in the value of a currency relative to the increasing value of foreign currencies can drive monetary inflation domestically by pushing up the price of imports. Thus it is necessary to ask whether the price of imports was pushed up in Ptolemaic Egypt. As ships arrived in Ptolemaic harbors, merchants were forced to exchange their valuable foreign coins for cheaper, lighter Egyptian ones if they wanted to use the coins for exchange within Egypt.[137] They thus operated at a loss upon arrival at the port and would need to recoup that loss by charging effectively higher prices for the goods they brought to sell in Egypt. Even more, the Ptolemies maintained very high customs duties, as was discussed in Chapter 4.[138] Imported goods must have

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[134] von Reden, *Money in Ptolemaic Egypt*, 43-48. For further discussion, see 4.4.8 "Monetization and the Money Supply."
[135] von Reden, *Money in Ptolemaic Egypt*, 46.
[136] The reduction in the weight of Ptolemaic coins began already under Ptolemy I. See von Reden, *Money in Ptolemaic Egypt*, 43-48.
[137] von Reden, *Money in Ptolemaic Egypt*, 43-48
[138] See 4.4.9 "Taxes."

been incredibly expensive in Ptolemaic Egypt. However, this high costs of imports was not a new development in the late third century; the 'protectionist' fiscal regime began in the late fourth century, and high customs duties are known from very early in the period.[139] This lack of a dramatic increase in the price of imports at the same time as the increase in prices more generally represents further evidence for the lack of monetary inflation in the early Ptolemaic period.

In the end, the three possible drivers of monetary inflation—the production of more money, an increase in the availability of credit, and a rise in the relative value of foreign currencies—were all present in early Ptolemaic Egypt. I argue, nevertheless, that they did not actually serve to drive any sort of monetary inflation at this time. These developments did not take place concurrently with the known price increases, and did not occur at as rapid a rate as those price increases. Therefore, even if there were some corroborating factors that influenced monetary inflation, they did not occur on a large enough scale to explain the price rises of the early Ptolemaic period on their own.

6.3.3 Demand-Pull Inflation

Just as it is possible to analyze the correlation between periods of known increases in the production of money with those periods when prices rose, similar analyses may be done in order to estimate the likelihood of the existence of demand-pull inflation. As discussed above, demand-pull inflation is caused by an increase in the demand for goods and/or services. In the case of Ptolemaic Egypt, it is possible to use our current knowledge of history to identify those times and places when and where demand-pull inflation would have been most likely, that is, when we

[139] While our knowledge of high customs duties is restricted to the reign of Ptolemy II, Ptolemy I was already devaluing his coinage. This currency manipulation could be considered the beginning of the 'protectionist' fiscal regime of the Ptolemaic dynasty.

might expect to have seen unusually high demand. If the dates of these periods of potential demand increase correlated with those periods of price increases, then demand-pull inflation may have been a possibility, even if it is not possible to establish a direct causal link. Ultimately, though, the results of this analysis indicate a misalignment of these factors, and show that demand-pull inflation is very unlikely to have played a role in the early Ptolemaic price increases.

An increase in demand (i.e., a cause of demand-pull inflation) can itself be caused by two different types of factor: spending could be up either because people *need more* (as in times of war, or state spending on major projects) or because people *have more to spend* (as in times when wages are high or more money is flowing into the country from external territories). Thus demand-pull inflation can be analyzed both at the level of state spending—whether because of an increase in revenues, spending out of reserves in the treasuries, or deficit spending by demanding contributions from the population—as well as at the level of changes to the income and spending of individual people or households. Let us consider each of these in turn.[140]

Aside from the Ptolemaic state's usual expenses, we may search for unusually high spending on major building projects and wars. The first two Ptolemaic kings were the biggest spenders of the early Ptolemaic period, as was discussed in Chapter 4. Ptolemy I moved the capital of the central administration from Memphis to Alexandria by 311 BCE and heavily invested in developing Alexandria's infrastructure and cultural milieu (for example, by building the Alexandrian Museion). Nonetheless, the cost of this investment should not be overestimated. While certainly the state would have spent money on royal palaces and temples in building Alexandria, much of the city was built privately by individuals who worked within the state administration, temples, or in the royal navy and shipyards. Ptolemy I also founded the city of

[140] For more detail on all the historical factors mentioned here, see Chapter 4.

Ptolemais Hermaiou to serve as a center of power and Greek-speaking influence in Upper Egypt. Likewise, his son Ptolemy II was highly engaged in the efforts to reclaim the Fayyum for settlement, including massive irrigation projects and the construction of Lake Moeris. However, as with the investments made during his father's reign, Ptolemy II did not finance this development entirely on his own. In fact, he financed much of the Fayyum reclamation project through land grants to officials, who were the ones incentivized to actually develop the land. More than infrastructural development, Ptolemy II did invest extremely high amounts of money into his navy, with the result that he was able to found the League of Islanders by 281 BCE.[141] He also instituted the spectacular festival known as the Ptolemaia, which occurred every four years between 279/80 and 233/32.[142] While Ptolemy III did invest in building the Library of Alexandria, during his reign in general there was a significant decrease in state spending. As wars and military needs died down, Ptolemy III demobilized great chunks of his military forces, bringing soldiers home and settling many of them as farmers throughout the Egyptian countryside. Ultimately, while absolute spending was highest under the first two kings of the Ptolemaic dynasty, much of that spending was outsourced to officials or incurred outside Egypt. Of these expenses, therefore, only infrastructural investment within Egypt—on the part of the state and other parties combined--would have been high enough to have the potential to be inflationary.

In general, the early Ptolemies were embroiled in several wars, especially in Syria, that involved a great deal of state spending.[143] These included Ptolemy I's War of the Successors (303-301), followed by Ptolemy II's First Syrian War (274-271), Chremonidean War (267-261), and

[141] Fischer-Bovet, *Army and Society in Ptolemaic Egypt*, 71-72.
[142] Fischer-Bovet, *Army and Society in Ptolemaic Egypt*, 74-75.
[143] Fischer-Bovet estimates that military expenditures consumed between half and all of the state's revenues annually. See Fischer-Bovet, *Army and Society in Ptolemaic Egypt*, 45-114.

Second Syrian War (260-253), then Ptolemy III's Third Syrian War (246-241), and, under Ptolemy IV, the Fourth Syrian War (219-217), Fifth Syrian War (202-195), and Great Revolt in Upper Egypt (206-186 BCE). Military spending was likely at its highest in the conflicts during the reigns of Ptolemies I and II, who were more eager to invest in military campaigns than were Ptolemies III and IV, especially after the end of Ptolemy III's fighting in the Third Syrian War in 241 BCE.[144] While total military spending was highest in absolute terms under Ptolemy I and Ptolemy II, much of that spending was put into garrisons and navies in foreign territories—this spending, therefore, would not have caused demand-pull inflation within Egypt. On the other hand, a higher proportion of military spending of Ptolemy IV occurred within Egypt during the Fourth Syrian War, since so much Ptolemaic territory abroad had already been lost. Especially in the period 221-217 BCE, then, I expect spending on mustering military resources within Egypt would have spiked. This 4-year window is one I cannot yet rule out for demand-pull inflation.

Wars necessitated high spending on the part of the state, but victory could entail great financial rewards, in the form of both booty and ongoing revenues. In the 290s, Ptolemy I secured control over many territories around the Mediterranean, including Cyprus, Lycia, Pamphylia, Sidon, and Tyre, along with the revenues generated through taxing those regions. Much of the recurring tax revenue from conquered regions was likely spent in the external territories themselves—otherwise, the territories would have been drained of money.[145] However, some money did also flow back to Egypt in the form of booty after most military victories. For example, during the Third Syrian War Ptolemy III's forces plundered the treasury of Cilicia and brought its

[144] For more discussion of military spending and events in this period, see 4.4.3 "The Ptolemaic Military: War, Spending, and Booty."
[145] For more on this logical concept in a Roman context, see Keith Hopkins, *Conquerors and Slaves* (Cambridge: Cambridge University Press, 1978).

contents—which P. Gurob records as high as 1500 talents—back to Egypt.[146] According to Saint Jerome, the booty from the rest of the campaign amounted to 40,000 talents—likely an exaggerated figure, but still substantial.[147]

The revenues from external territories began to drop off around 221 BCE, when Antiochus III invaded Coele-Syria and stopped the transport of revenue from that region to Egypt.[148] The lack of revenues from Coele-Syria would have reduced Ptolemy IV's ability to raise armies and navies in this region, so he was likely forced to direct a greater share of his military spending to access resources from within Egypt. Control over Coele-Syria was regained through the Egyptian victory in the Fourth Syrian War around 217 BCE; as I will discuss in more detail below, Cadell and Le Rider have suggested the rewards from this win may have led to inflation.[149] However, the victory did not last long. Most of the Ptolemies' territories outside Egypt were lost in the Fifth Syrian War, between 202-195 BCE. During the Great Revolt of 206-186 BCE, the Ptolemies were unable to collect taxes even from what was ostensibly domestic territory: Upper Egypt itself.[150]

Thus, demand on the basis of major building and military projects was probably at its absolute highest in the reigns of Ptolemy I and II. While spending on infrastructure was high (on the part of the state itself, officials, and other incentivized parties) and potentially inflationary, much of the military spending occcurred outside Egypt and would not have caused domestic

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[146] For more discussion of military spending and events in this period, see 4.4.3 "The Ptolemaic Military: War, Spending, and Booty." See especially Fischer-Bovet, *Army and Society in Ptolemaic Egypt*, 66-70, for more details on the magnitude of this booty.
[147] Fischer-Bovet, *Army and Society in Ptolemaic Egypt*, 66-70.
[148] For more discussion of military spending and events in this period, see 4.4.3 "The Ptolemaic Military: War, Spending, and Booty."
[149] Cadell and Le Rider, *Prix du blé*, 78-79.
[150] For more discussion of military spending and events in this period, see 4.4.3 "The Ptolemaic Military: War, Spending, and Booty."

inflation. After the end of the Third Syrian War, military spending and income from war plunder generally decreased. Domestic spending spiked again for the Fourth Syrian War (221-217 BCE), and the Great Revolt (206-186 BCE). If spending on major projects were possibly to have caused demand-pull inflation, it would have had to occur either gradually over the course of the early third century (when infrastructure investment was high) or in spikes from 221-217 and/or 206-186 BCE.

Thus far I have analyzed the possibility of demand-pull inflation based on trends of revenues and expenses related to major projects in infrastructure and wars, but it is also important to consider the everyday income and expenses of the Ptolemaic people. Just as demand would increase when the state was spending more money, demand would likewise increase when the people of Egypt had more money to spend. In theory, the people would have more money to spend either when they were earning more money or when their expenses were lower. They could earn more money both because of an increase in employment levels (i.e., when more people were working and earning—an increase in aggregate earnings) and because of an increase in average wages (i.e., when those who were working earned more per person).[151]

In addition to seasonal peaks in demand for labor during harvest and planting times, it is likely that, in Ptolemaic Egypt, year-over-year employment would have been at its highest during times of war and times of massive state-sponsored projects. Obviously such endeavors would have employed many men directly, but the lack of these men at home would have also increased the employment of previously unemployed people at home (i.e., their replacements). These factors that would keep employment high are also clustered in the reigns of the first two Ptolemies. Likewise, the early Ptolemaic period was characterized by high immigration, particularly from

[151] It is of course crucial to remember that in the ancient world, most people were employed in agricultural work, much of which was not wage labor but which was oriented towards subsistence.

Greek-speaking parts of the Mediterranean.[152] This immigration, which would have increased the overall supply of labor, was at its peak during the early Ptolemaic period and dropped off significantly by the mid-third century BCE.[153] Although immigration was at its highest in the late fourth and early third centuries, the papyrological evidence even from these years seems to indicate that the supply of labor was often still too low to fully meet the demand for labor.[154] Thus it seems reasonable to expect that employment levels would have been relatively high in the early Ptolemaic period. Still, Ptolemy III's military demobilization efforts after 241 likely increased the supply of men in the Egyptian countryside around those years, leading to some frustration over employment and the management of resources.[155] Taking all these factors into account, it seems most likely that there was an increase in the employed population of Egypt from the beginning of the Ptolemaic period until sometime in the mid-third century BCE. This high—and likely increasingly high--population of employed people would imply an increase in the demand levels of the Egyptian populace in the late fourth and early third centuries.

Even if more people were working, it is still also necessary to understand how much these people were earning (i.e., the unit price of labor). The potential rise in the unemployed population after Ptolemy III's demobilization efforts would seem to imply a concurrent decrease in wage levels. However, as discussed above, there was actually a dramatic *increase* in the wages paid for unskilled labor at some unclear time between 250-210 BCE. Since the prices of other goods all

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[152] See 4.2 "The People : Demographics, Information, and Cities" and references there for more information on immigration.
[153] Christelle Fischer-Bovet, "Counting the Greeks in Egypt: Immigration in the first century of Ptolemaic Rule," in *Demography and the Graeco-Roman World: New Insights and Approaches*, ed. Claire Holleran and April Pudsey (Cambridge: Cambridge University Press, 2011).
[154] See 4.4.11, "The Organization of Labor."
[155] See Fischer-Bovet, *Army and Society in Ptolemaic Egypt*, 66, as well as 4.4.3 "The Ptolemaic Military: War, Spending, and Booty."

seem to have increased in the few years before 210 BCE, it is less likely that the wage increase represented a real increase in purchasing power and was more likely inflationary or due to a change in accounting practices. Given the increase in the supply of labor (and the increase in unemployment) at this time, it seems that this increase in wages could not have been a result of demand-pull inflation but rather either an accounting change or inflation of a different sort (i.e., cost-push inflation). In any case, it seems that the purchasing power of individual wage earners in Ptolemaic Egypt was not on the rise, so demand did not increase on an individual basis because of changes in wages.

Still, individual Ptolemaic households might also have had more money to spend at times when these households had lower expenses--especially when they were being taxed less. As discussed above, Ptolemaic tax levels did not follow one clear trend: some were flat, some increased, and some decreased. But it is perhaps relevant to note here that the rate of the salt tax—the early Ptolemaic capitation tax paid by almost all individual adults—decreased twice, in 254 and 243 BCE, in the reigns of Ptolemies II and III, respectively, before being eliminated altogether by Ptolemy IV in 217 BCE.[156] It might seem, then, that Ptolemaic households had more money to spend as this tax decreased and ultimately disappeared. However, at the same time that the salt tax decrease, other taxes on specific classes of individuals increased, so overall taxes might not have changed that dramatically. Likewise, the highest salt tax rates, between 263-254 BCE, were still only 1.5 drachmas (for men) and 1 drachma (for women) per year. Since Maresch's data on wages indicate that at this time, unskilled labor was paid an average of about 1.125 obols per day, one man's salt tax burden would be equivalent to 8 days of work[157.] In other words, if we assume a man labored 300 days a year, his salt tax burden would be only 2.7% of his annual earnings.

[156] For further discussion and references on taxes, see 4.4.9 "Taxes."
[157] Maresch, *Bronze und Silber*, 191-193.

Even if he only worked 100 days a year, his tax burden would still be only 8% of his earnings: far lower than income tax rates in the United States today. Even more, the salt tax was a flat tax per individual, so these rates based on the wages of unskilled labor are really the highest possible effective salt tax rates per person (i.e., higher earners would pay the same 1.5 drachmas, effectively a lower percentage of their earnings). For that reason, it would be dangerous to overestimate the impact of the decreases in and elimination of the salt tax on the purchasing power of the people of Ptolemaic Egypt.

To sum up, while individual households did not experience a rise in their purchasing power in the early Ptolemaic period, all in all, there was more money being spent during the reign of the first two Ptolemies. Overall spending on military engagements and construction projects was massive in these years (with spending on domestic infrastructure as a major driver, unlike the military, which was directed abroad) and dropped off around the time of Ptolemy III's demobilization in 241 BCE. Likewise, the 290s BCE witnessed a major increase in Ptolemaic revenue as numerous external territories were acquired, although they were lost by the late third century BCE. The wars of 303-241 BCE brought with them great amounts of war booty: money and goods brought back to Egypt. The early decades of the Ptolemaic period also saw an increase in population numbers due to immigration, and that population increase, coupled with concurrent state spending, meant that there was a high amount of people working either in or for Egypt. Still, individual employed people likely did not see a major change in their wages over the course of the period.

Taking all these factors into account, an increase in demand seems likely between roughly 311 (with the move of the capital to Alexandria) and 241 BCE (with Ptolemy III's military divestment). Gradual demand-pull inflation might thus have been possible in those first decades of

the period. In the late third and early second centuries, spending in Egypt was generally lower, except for two spikes, during the Fourth Syrian War and the Great Revolt, when Ptolemy IV was forced to spend but could no longer draw on resources from external territories. It is my assertion, then, that demand-pull inflation could only be considered a realistic interpretive option between about 311-241 BCE or in the spikes between 221-217 and 206-186 BCE.

Do these possible period of demand-pull inflation align with concurrent price increases in the beginning of the period? Not really. Unfortunately we suffer from a lack of clear data from the very beginning of the Ptolemaic period, so the early fourth century is difficult to understand with certainty. In general, the price increases outlined earlier in this chapter did not occur between 311-241 BCE, when absolute demand would have been at its peak. Instead, prices increased in the last years of the third century—during precisely the period when demand would have been at its lowest. While certain of the price increases could not be dated securely—for example, the rise in labor prices could be dated only to sometime between 250-210 BCE—the window of Ptolemy IV's spending spike for the Fourth Syrian War (221-217) does fall within this rough range. It is reasonable to consider some demand-pull inflation during this short period of time, but that war alone cannot explain the general rise in prices in the late third century because it was not sustained and because the spending levels still would not have been high enough to generate a massive inflation on their own. I assert, therefore, that demand-pull inflation was unlikely to have caused the early Ptolemaic price increases on its own, although a spike in spending from 221-217 may have been a contributing factor.

Nevertheless, I still must contend with Cadell and Le Rider. Cadell and Le Rider's argument in favor of the existence of early Ptolemaic inflation includes an element of demand-pull inflation, although they do not use this term. They reason that Ptolemy IV mustered a massive

army to fight Antiochus III in 221 BCE, and when this army returned to Egypt in 217, Ptolemy rewarded his soldiers, as well as temple and civic personnel, with incredible amounts of money.[158] Citing Polybius 5.107, 1-3, as well as the Raphia Decree, they estimate about 6 million drachmas flooded the Egyptian countryside as a result.[159] After the end of the Fourth Syrian War, then, there were more people with more money in the countryside, and this liberality led to demand-pull inflation.[160] This explanation of high spending aligns with the window of high spending I note, but while I focus on domestic spending to muster resources for the war, Cadell and Le Rider focus on celebratory spending following the war.

Von Reden disagrees with this assessment for three major reasons. First, she notes that Cadell and Le Rider's figures regarding the size of the military force of the Fourth Syrian War and the donations Ptolemy IV made afterward come from Polybius and should not be trusted as perfectly accurate.[161] Even if the numbers are accurate, she reasons, there is no historical reason why this military force should have been more expensive than any other Ptolemaic army, and there is no evidence for an increase in the production of coins in this period.[162] The great donations to the Egyptian people and priests after the war were lauded in the Raphia Decree, to be sure, but von Reden reasons that it is quite unlikely that one donation could cause massive inflation.[163] Second, she further points out the ambiguity in the metal used to pay the army: while Huß took the Raphia Decree's Greek text literally to mean each solider received gold coins, von Reden reasons that a chrysous could have just been a reference to the deben unit, without a

[158] Cadell and Le Rider, *Prix du blé*, 78-79.
[159] Ibid., 79.
[160] Ibid., 79 – although they do not explicitly call this inflation "demand-pull."
[161] von Reden, *Money in Ptolemaic Egypt*, 76-78.
[162] Ibid., 76-77.
[163] Ibid., 77.

specification of the type of coin used.[164] Therefore she argues that there is no strong link between Ptolemy IV's payments and inflation of bronze coinage.[165] Finally, she points out that the Egyptian countryside did not rely on coinage for its regular exchanges, so the supply of coins in the countryside remained scarce.[166]

I am more convinced by von Reden's logic in this case; the points of contention she puts forth are all quite sound and reasonable. The main problem with the logic of Cadell and Le Rider, in my view, is that they do not adequately contend with and explain the exceptionality of these periods (220-215, 211-195 BCE). It is certainly true that Ptolemy IV made donations after the end of the Fourth Syrian War and that he spent domestically to muster resources to fight that war, but that exceptional wartime spending only would have occurred for short periods and would not have single-handedly caused an inflation of this magnitude that would have lasted for the centuries to come. If sustained spending were to have led to demand-pull inflation in the early Ptolemaic period, I would expect that the high overall costs of the Fayyum reclamation project, the development of Alexandria and Ptolemais Hermaiou, or other domestic infrastructural investments--on the part of the state and others--in the fourth and third centuries would be far more likely to have caused sustained inflation. Thus while there may have been a wartime spike in prices that could have contributed to a brief demand-pull inflation from 221-217, demand-pull inflation was likely not the cause of the sustained, general price increases observed in the early Ptolemaic period.

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[164] Ibid., 77; Werner Huß, *Untersuchungen zur Außenpolitik Ptolemaios' IV. Münchner Beiträge zur Papyrusforschung und Antiken Rechtsgeschichte 69* (Munich, Beck: 1976).
[165] von Reden, *Money in Ptolemaic Egypt*, 77.
[166] Ibid., 77-78.

6.3.4 Cost-Push Inflation

Cost-push inflation consists of a rise in prices due to a decrease in the supply of certain key goods and services. A decrease in supply in some particular sectors of the economy leads to a rise in prices in those sectors.[167] Because those sectors are so important to the functioning of other sectors, the increase in prices is contagious and leads to general inflation throughout the economy. To investigate the possibility of cost-push inflation in Ptolemaic Egypt, then, we must first identify the sectors of the Ptolemaic economy that would be most likely to impact other sectors in a contagious way. Then we can use our understanding of Ptolemaic history to search for times when supply in those influential sectors might have dropped.

One might assume that the most important goods to analyze in this case would be staple commodities—those basic goods used by a large swathe of the Ptolemaic population. However, the key factor in cost-push inflation is that trends in the price of the good would affect trends in the price of other goods. Not all staples would fit this criterion. Most goods at the end of the supply chain would be unlikely to affect the price of other goods. For example, wine was a staple good, at least for the wealthier pockets of the Greek-speaking population. If the price of wine rose dramatically one year, perhaps the cost of labor—when paid in wine—would rise, yes, but not much labor was paid for in wine. I would not expect this price increase to dramatically disrupt the Egyptian economy. Likewise, other commodities may have been influential but only at a local level. For example, donkeys played a key role in local transportation of goods, so a rise in the price of donkeys (or in the fee to rent donkeys) would also lead to an increase in transportation costs. But since, to my knowledge, donkeys were not being traded and themselves shipped over long distances (at least not with the sort of frequency that could lead to major economic disruptions), it

[167] A classic modern example of cost-push inflation is the OPEC crisis of the 1970s, when a rise in oil prices spilled over throughout the rest of the economy, leading to a more general inflation.

is unlikely that a big shock to donkey supply coupled with an increase in donkey prices in one town would correlate with a regional or Egypt-wide increase in donkey prices, nor that it would lead to a rise in prices overall in other towns. For these reasons, I propose two key criteria for identifying commodities that could cause cost-push inflation: (1) that these commodities would play a key role in the production, transportation, or trade of goods in multiple other sectors—i.e., that they fell at the beginning or in the middle of the supply chain--and (2) that these commodities would themselves be a part of larger integrated markets, at least within Egypt. On the production side, these commodities could include labor and the important raw materials used to make other things. In terms of transportation, these goods could include any raw or manufactured goods used to move things over distances greater than village to village. Finally, commodities directly related to trade and money, such as the raw materials that were used to produce coins, could have a potential impact on inflationary trends.

The supply chain begins with energy, as the cost-push inflation triggered by rising oil prices in the 1970s made clear. In the ancient world, the primary source of energy used to produce things was alive: humans and animals. Shocks to the supply of this living energy could have caused increases in the price of this labor, and cost-push inflation could have resulted in turn. Immigration to Egypt in the beginning of the Ptolemaic period would have increased the labor supply in general, with a tapering off in the mid-third century. Aside from the predictable swings in the demand for agricultural labor based on seasonal shifts, it is reasonable to assume that t here may have been shocks to the supply of labor in times of war, when more men were away from home. When soldiers were professionals, sending them away would have posed less of a shock to the domestic labor force, but the demobilization and de-professionalization of the Ptolemaic military under Ptolemy III might have created the conditions for greater shocks to the labor

supply during later conflicts, such as the Fourth Syrian War of 219-217 BCE. This de-professionalization of the military, coupled with the simultaneous drop-off in immigration to Egypt, leads me to expect to find more shocks to the labor supply after the mid-third century, particularly in times of military conflict (i.e., because the potential supply of military labor was less liquid). It is clear that the price of labor generally rose in this period, as discussed above in this chapter. However, gaps in the data do not allow for a more precise understanding of the timing of this increase in wages; I can only see that wages rose at some time between 250-210 BCE. This lack of data on the precise nature of the change in the price of labor precludes me from drawing conclusions about the effects of the labor supply on general price levels.

Animals also served as laborers in Ptolemaic Egypt, and changes to the supply of animals, especially donkeys, could have impacted the price of many goods. However, since livestock were not commonly transported and traded over long distances, shocks to supply are likely to have been only localized. These local shocks could not have brought about inflation across Egypt, so I am leaving aside an analysis of the supply of livestock here.

More broadly, changes in the price of the commodities needed to keep these human and animal laborers alive can also be seen as changes in energy prices. It is indisputable that the core sector of the Ptolemaic economy (and any ancient economy, really) was agriculture. In particular, staple grains formed the foundation of Ptolemaic life, and high grain prices would have a serious effect on the cost of living in Egypt. In part because large portions of the population were paid wages in kind, a dramatic rise in the cost of staple grains—especially wheat—could have spurred a rise in the cost of labor. A rise in the price of labor could lead to an increase in the price of all other goods and services, since labor was a necessary component in the production of them all. Shocks to the supply of wheat thus had the potential to create cost-push inflation. The grain supply could

have dropped in years of bad harvests; although I am currently unable to identify particular years of poor harvests, perhaps future research into grain yields over time might shed more light on this issue.[168] Since grain was also redistributed, political challenges within Egypt could have decreased the ease of transportation from region to region and likewise lowered supply. The key questions regarding the potential impact of wheat on cost-push inflation are the following: When did wheat prices rise? Were those price rises correlated with times when supply may have been low? If low supply did lead to high wheat prices, then do we see a spread in price increases to other sectors, such as labor?

As discussed above, wheat prices doubled between around 220 and 215 BCE, followed by an even more dramatic increase of about 15-20x around 200 BCE. The first price increase (220-215 BCE) is particularly interesting, since this increase happened slightly earlier than the well-known increase of essentially all prices that occurred around 211-195 BCE. This begs the question of what was happening in Egypt between 220-215 that could have led to a doubling of wheat prices. The most significant historical circumstance around those years was probably the invasion of Antiochus III into Ptolemaic territory in Coele-Syria; between 221-217, the Ptolemies were unable to collect revenue from this wealthy region. Perhaps if Coele-Syria had been shipping grain to Egypt, the loss of this grain would lead to a supply shock within Egypt and a resultant price increase around 220-215. To my knowledge, though, almost all grain consumed in Egypt was grown domestically. It is also possible that during the Fourth Syrian War (the result of Antiochus III's invasion of Coele-Syria), Ptolemy IV was shipping wheat out of Egypt to supply his troops, since he had lost most territories outside Egypt. Since the military was no longer a professional

[168] Francis Ludlow and J. G. Manning, "Revolts under the Ptolemies: A Paleoclimatological Perspective," in *Revolt and Resistance in the Ancient Classical World and the Near East: In the Crucible of Empire*, eds. John J. Collins and J. G. Manning (Leiden: Brill, 2016), 154-174.

force and had to be mustered from among the population of farmers, it is possible that the production of wheat waned during the war, as Cadell and Le Rider have suggested (I will engage with their argument in more detail at the end of this section).[169] The Fourth Syrian War could thus have decreased the supply of wheat at home and raised its price in turn. Within Egypt, poor harvests in these years could cause prices to rise, but price rose so much—doubling—that such hypothetical poor harvests would have had to have been truly exceptional in their devastation. The exact causes of the doubling in the price of wheat in 220-215 remain uncertain, but I will venture to suggest that the increase could have been the result of a decrease in supply due to the provisioning of troops during the Fourth Syrian War. Perhaps even more likely than a persistent lack of food due to sending food to troops or experiencing recurrent bad harvests, the decrease in supply may have been caused by hoarding and speculation in the face of an imminent invaseion of Egypt by Antiochus III.[170]

In any case, the rise in wheat prices circa 220-215 did not necessarily lead to a proportionate increase in other prices. Of all the prices that I used as indicators above, only wheat went through the clear, dramatic doubling of prices during these years. Cost-push inflation based on rising wheat prices cannot be ruled out entirely, since the lack of an increase in these particular years is due rather to a lack of concretely dated evidence rather than strong evidence to the contrary.

The even higher increase in wheat prices around 200 BCE was correlated with the Great Revolt of Upper Egypt (206-186 BCE), when grain shipments between the north and the south

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[169] Cadell and Le Rider, *Prix du blé*, 78-79.

[170] This idea was suggested to me by Brian Muhs, personal communication, April 2, 2017. For more on the idea that in the ancient world, most food shortages were the result of hoarding rather than a true lack of supply, see Peter Garnsey, *Famine and Food Supply in the Graeco-Roman World: Responses to Risk and Crisis* (Cambridge: Cambridge University Press, 1988).

were almost certainly disrupted. While grain was grown throughout the Egyptian countryside—not only in the south, it is possible that the loss of shipments from the south could have cut the supply of grain in the north. However, for such a supply shock to be the entire cause of the increase in prices by 15-20x, the supply would have needed to drop by a similar factor. A drop in supply of this magnitude seems unlikely, since Upper Egypt did not produce 15-20 times more grain than the rest of Egypt. Rather, numerous economic challenges around 200 probably contributed to the rise in prices of wheat and essentially everything else.

It is certainly possible that political disruptions around 220 and 200 BCE impacted the supply of wheat negatively, and this drop in supply may have played a role in the increases in the price of wheat around these times. However, the price increases were much more dramatic than the supply shocks are likely to have been, so the role of these supply shocks in causing the price increases could only have been small. The first increase in wheat prices (220-215 BCE) is not correlated with a definite increase in prices in other sectors, but the second increase (around 200 BCE) occurred at a similar time to other known price increases.

The key question regards whether these wheat price increases could have caused wage increases, and unfortunately that question is not presently answerable. As discussed above, the price of labor increased by roughly 72x at some time between 250-210 BCE, but that period was also one for which little data remains. Thus it is unclear whether the labor price increases occurred around the same time or slightly after the wheat price increases. Still, the increase in wheat prices was of a lower magnitude than the increase in wages (a total of 30-40x vs. 72x), so even if wheat impacted the price of labor, its increases would only have been a contributing factor in wage increases rather than the sole cause.

This living energy was combined with raw materials to produce things, and if the price of key raw materials rose dramatically, cost-push inflation may have resulted. Some common raw materials included linen, wool, rope, papyrus reeds, livestock, fish and other wild animals, stone, mud, and clay. However, most of the most important raw materials in ancient Egypt were not involved in large integrated markets but were rather collected and used locally; for that reason, these raw materials are unlikely to have had a strong effect on macroeconomic trends. Of course, there were some raw materials transported over long distances and traded via integrated markets, such as certain precious stones, metals, spices, and dyes. These more exotic commodities were very expensive and therefore, for the most part, not very common and not very impactful in macroeconomic terms. Still, two key materials may have made a greater impact: wood and silver.

Transportation beyond the local level in Egypt was normally carried out via barges along the Nile, and transportation between Egypt and other states via the Mediterranean and Red Sea was done with ships.[171] Barges and ships were made of wood, so shocks to the supply of wood would presumably have affected the price of new transportation vehicles, and thus the cost of shipping in general. A rise in the price of wood could thus have led to cost-push inflation that affected especially those goods that were shipped rather than just consumed locally—i.e., those goods that were a part of integrated markets. Egypt is not rich in trees, so most wood would have been imported, particularly from Lebanon. Interstate warfare would likely have impacted the ease with which wood could be transported between these wood-producing regions and Egypt. Thus I would expect that the price of wood would rise during these periods of war, discussed above and in Chapter 4, particularly during the four Syrian Wars and after the loss of these territories (Coele-

[171] For more discussion on transportation, see 4.3.4, "Shipping: Technology and Infrastructure."

Syria 221-217, all others by around 202-195 BCE).[172] The resulting increase in shipping costs would have had the potential to cause cost-push inflation: a contagion starting with the cost of imports and other goods that needed to be transported over long distances. Unfortunately, there are too few extant data points on the price of wood to enable a clear calculation of pricing trends for this commodity. Surviving texts do discuss the price of shipping, but the complexities in unraveling the distances covered and other factors that could impact the price (e.g., who owned the ship, etc.) make an analysis of shipping costs outside the scope of the present project. Nonetheless, increases in the price of shipping in the years following the loss of wood-rich territories seem very possible and may have caused increases in the price of goods commonly transported via ships and barges. Currently the minimal state of our knowledge of wood prices precludes any determination of cost-push inflation caused by changes in the wood supply.

Included among these shipped goods were precious metals. A rise in the price of precious metals could have led to cost-push inflation because Ptolemaic coins were made out of these metals. In the early Ptolemaic period, the crucial metal in this regard was silver. Egypt has no native sources of silver, so all silver used to produce Ptolemaic coins had to have been imported at some point. Silver resources thus included either newly imported silver (either raw or manufactured, for example, into foreign coins) or silver that had previously been imported. While it might seem that the supply of the latter would be mainly constant, or at least controllable, the practice of hoarding silver could have kept supply artificially low, especially during times of monetary uncertainty. The supply of newly imported silver was also susceptible to fluctuations based on the state of the relationship between the Ptolemaic state and Egypt's trading partners. For example, it has been suggested that the First Punic War, which was fought in Carthage and

[172] For more discussion on wars in the Ptolemaic period, see 4.4.3, "The Ptolemaic Military: War, Spending, and Booty."

Sicily between 264-241 BCE, could have impacted the supply of silver imports in Egypt.[173] Even though Egypt was not directly embroiled in the conflict, Egypt's trade relationships with Carthage and Magna Graecia were weakened in this time of war. Likewise, if silver mines had run dry, silver prices could have risen and led to cost-push inflation in turn. However, I do not know of any silver mines' drying up in this period. In any case, the shift in currencies from silver towards bronze in the 260s BCE seem to suggest there may have been a decrease in the supply of silver imports to Egypt in the 260s BCE or slightly beforehand.

This dearth of silver could have played a role in Ptolemy II's fiscal innovations of the 260s BCE, particularly his shift toward the minting of large bronze coins in place of silver. As bronze came to play an even more important role in Ptolemaic trade, trends in the price of the component metals of bronze—copper and tin—should be considered.[174] Of these two metals, copper was easier to find. With copper mines located in Sinai and in Egypt, to my knowledge there were no major shocks to the supply of copper in this period. Tin was generally difficult to source, although Egypt may have had some minor tin mines. The precise source of the tin used in Ptolemaic bronze coins has not yet been investigated, to my knowledge, but sources were known in the Iberian peninsula, as well as Crete and Cyprus. It seems possible that tin imports could have diminished during the Punic Wars as well as during the loss of Ptolemaic territory in Cyprus and Syria-Palestine in the late third century.

There was probably a decrease in the supply of silver and tin during the many wars the Ptolemies fought throughout the third century (the War of the Successors, the four Syrian Wars,

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[173] Michel Rostovtzeff, "Foreign Commerce of Ptolemaic Egypt," *Journal of Economic and Business History* 4 (1932): 728-769; M. M. Austin, "Hellenistic kings, war and the economy," *CQ* 36 (1986): 450-466; Maresch, *Bronze und Silber*; H. C. Noeske, "Zum numismatischen Nachweis hellenisticher Stiftungen am Beispiel ptolemäischer Geldgeschenke," in K. Bringmann, *Schenkungen hellenistischer Herrscher an griechische Städte und Heiligtümer* vol. 2.1. Berlin, 221-248; ; von Reden, *Money in Ptolemaic Egypt*, 61.
[174] von Reden, *Money in Ptolemaic Egypt*, 60.

and the Chremonidean War), the First Punic War happening to the west (264-241 BCE), and the loss of the Ptolemies' external territories at the end of the third century (Coele-Syria in 221-217, the rest between 202-195 BCE). It is difficult to tell whether the price of these metals rose in response, since it is so complicated to untangle the price of metals as raw materials from the value of coins themselves. Still, manipulation of the metallic content of coins under Ptolemy II and his successors hints that silver was becoming more expensive. Likewise, the general preference for receiving payment in silver rather than bronze, and the agio required for payments in bronze, imply that silver was becoming more valuable, at least relative to bronze.

If the diminishing supply of silver and resultant rising price of silver were to have caused cost-push inflation, that rising price of silver would have to be correlated temporally with rising prices in multiple sectors of the Egyptian economy. However, the evidence of the rising price or silver dates to an earlier period in the third century than the broader price increases known from around 211-195 BCE. The weight standards used for Ptolemaic coins—and thus the weights of silver needed for those coins—were reduced as early as 312/11 BCE.175 Ptolemy II shifted his energy away from silver and towards the mass production of bronze coins in the mid-260s BCE.[176] The agio due on payments made in bronze was likely introduced around the same time.[177] Given this temporal distance between the problems with the silver supply and the rise in Ptolemaic prices more broadly, I argue that the rise in the price of silver probably could not have caused cost-push inflation in the third century.

Thus far, I have explored the possibility of cost-push inflation caused by a dramatic decrease in the supply of goods in certain fundamental sectors of the economy, but it is also

[175] Ibid., 45.
[176] Ibid., 58.
[177] Ibid., 58-59.

possible to consider cost-push inflation from the standpoint of a quick but general shock to supply caused by a major event like a natural disaster or war. For example, after the 2004 tsunami, inflation in Indonesia's Aceh province rose as high as 41% in November 2005 due to the sharp decrease in the supply of virtually all basic commodities.[178] Ptolemaic Egypt did not experience any natural disasters of anywhere near the scope of the 2004 tsunami. Still, the loss of the Ptolemies' foreign territories starting around 221 BCE, followed by the twenty-year loss of control over Upper Egypt and the revolts in that macro-region of the country, certainly would have caused general shocks to supply. The loss of the external territories likely caused a drop in the supply of imports, and the loss of Upper Egypt caused a drop in the supply of domestic goods that could have normally been transported from region to region. In particular, the essentially simultaneous occurrence of the loss of Upper Egypt (206-186 BCE) and the loss of Ptolemaic territories outside Egypt in the Fifth Syrian War (202-195 BCE), in my view, would indeed have been a dramatic enough constriction of resources for the Ptolemaic kingdom to have caused a more general cost-push inflation in Egypt in these years.

The presence of cost-push inflation in early Ptolemaic Egypt is almost impossible to determine with any certainty. If it were present, I would expect to see that a shock to supply (either of one key commodity or generally) led to a rapid increase in the price of the commodity facing the supply shock, which then led to a broader trend of price increases. Working backwards, the major increases in prices happened at the end of the third century, between about 211-195 BCE. If these price increases were caused by cost-push inflation, then there would have had to be a supply shock immediately preceding those increases. The loss of external resources from Coele-

[178] Harry Masyrafah and Jock MJA McKeon, "Post-tsunami aid effectiveness in Aceh: proliferation and coordination in reconstruction," *Wolfensohn Center for Development at Brookings, Working Paper* 6 (2008): 14. < https://www.brookings.edu/wp-content/uploads/2016/06/11_aceh_aid_masyrafah.pdf> (accessed March 16, 2017).

Syria in 221-217, coupled with the need to support the military forces sent to battle Antiochus III, would have impacted the supply both of imports and of the basic needs given to the troops (such as wheat). The question remains, though, of how great this impact would have been—i.e., to what extent it could have caused the price increases occurring a few years later. The potential impact of the Fourth Syrian War on supply, leading to cost-push inflation, cannot be entirely ruled out. I think it is possible that the Fourth Syrian War could have led to a decrease in the supply of wheat, and therefore an increase in the price of this commodity.

Cadell and Le Rider's argument for early Ptolemaic inflation involves an element of cost-push inflation based on this explanation.[179] In addition to the influx of money into the countryside following the soldiers' return from the Fourth Syrian War around 217, they write, "il est probable, d'autre part, que les produits de consommation courante, comme le blé, devinrent moins abondants."[180] Essentially, there was a dramatic decrease in the supply of basic staple commodities. This supply shock occurred twice: first in the latter half of 221, when the soldiers left and cereal production thus waned (cost-push inflation), then again in 217 when the returning veterans were buying all the staples up with their new riches (essentially demand-pull inflation that led to cost-push inflation). Cadell and Le Rider reason further that this inflation may have been one of the reasons for the unrest following the Battle of Raphia, and that in addition to the simultaneous demand-pull and cost-push inflation they propose, there may also have been other inflationary factors, both material and psychological.[181]

[179] Cadell and Le Rider, *Prix du blé*, 78-79.
[180] Ibid., 79.
[181] Ibid.

Von Reden also argues against Cadell and Le Rider's take on cost-push inflation.[182] She emphasizes the lack of exceptionality for the decrease in farming activity during the Fourth Syrian War, writing: "the agricultural strain arising from warfare was a perennial problem in ancient societies, but would not have been exceptional in this case."[183] The only possible cause would be if an unusually high portion of the military came from the farming portion of the population. Von Reden uses Polybius' estimate of the phalanx numbers, coupled with Rathbone's population estimates, to reason that the loss of 20,000 men to fighting out of a population of 1 million adult male farmers would not have made a huge difference.[184]

Von Reden's logic makes sense. However, if we consider the rise in wheat prices during the Fourth Syrian War not necessarily as a broad, multi-sector price increase but rather as just an increase in wheat prices, then that increase might be easier to explain than would a widespread cost-push inflation caused by the war. The cost-push side to Cadell and Le Rider's argument seems more plausible to me than the demand-pull side of their reasoning. The donations made after the Battle of Raphia likely did not flood the countryside with enough money to lead, in the end, to the 10-20x inflation of the end of the third century. In my view, it seems less of a reach to argue that wheat prices, at a minimum, doubled during the Fourth Syrian War, especially since this was the first major war the Ptolemies fought since the military was de-professionalized by Ptolemy III in 241 BCE. There is no way to determine with certainty what caused the increase in wheat prices, but the correlation of that increase with the simultaneous fighting of the Fourth Syrian War, with recruited soldiers, is thought-provoking. It is possible that the price increase may have been caused by the perception of the Fourth Syrian War as an existential threat to the

[182] von Reden, *Money in Ptolemaic Egypt*, 77.
[183] Ibid.
[184] Ibid.

Ptolemaic kingdom—in the face of this threat, those with resources may have hoarded their grain, leading to an artificial shock to supply.[185] Ultimately, I do not think there is enough concrete evidence to conclusively demonstrate that this increase in wheat prices was contagious and led to an increase in prices across economic sectors in these years. Nonetheless, the very gravity of the Fourth Syrian War, as such a significant threat to a weakened Ptolemaic kingdom, coupled with Ptolemy IV's lack of resources to draw on from external territories, made this war different from those fought by the first two Ptolemies. On the one hand, supply from Egypt mattered more than ever before, and on the other hand, the thread might have made those with resources hold back from spending them. Prices could certainly have risen as a result, but it is still less clear to me whether this spike in prices during the war would have led to sustained inflationary price levels for decades to come.

Other possible time periods for cost-push inflation, were during the years when the Ptolemaic kingdom shrank: during the loss of external territories in the Fifth Syrian War (202-195 BCE) and the Great Revolt of Upper Egypt (206-186 BCE). I contend that the simultaneous occurrence of these massive losses of territory, combined, would have led to a serious shock to the general supply of goods, at least to the rest of Egypt, at this time. The pricing dynamics in Upper Egypt are likely to have differed from those in Lower and Middle Egypt during the revolt (e.g., the different dynamics in the price of divorce penalties noted above). It is possible, although by no means certain, that the exceptional supply shocks due to the constriction of Egyptian territories between 206-186 BCE could have contributed to the price increases of these years through cost-push inflation – although the length of time these increases would have lasted is still less certain

6.3.5 Inflation vs. Changes in Accounting Practice

[185] This idea was suggested to me by Brian Muhs in a series of conversations in May 2017.

Even if it were certain that cost-push inflation was a factor starting in 206 BCE, that explanation would still not cover the five years previous, when the most massive increase in prices began. I argue, then, that the primary cause of the apparent increase that began circa 211 BCE was a change in accounting practices. It is crucial to distinguish between a rise in prices that represents real inflation and one that is simply a nominal change in how prices were written. The debate between these two possible explanations has entirely dominated studies of Ptolemaic inflation, with most authors explaining the rise based primarily on accounting, and only Cadell and Le Rider in favor of real inflation.[186]

In the end, there is no way to determine with quantitative certainty whether the rises were only accounting changes. However, it is possible to interpret the price changes qualitatively. In particular, changes in how prices were expressed might indicate the possibility of changes in accounting. If the units were expressed, for example, primarily in obols at a certain date, followed by a switch to drachmas, then a change in prices might have been based on a change in the units used. The precise multiples by which prices increased are a further source of information in this regard. If these multiples aligned with known monetary denominations, then a change in accounting might have been more likely. That is, if prices increased by a factor of 10 (the ratio of qite per deben) or 6 (the ratio of obols per drachma), then an accounting-based increase would be more likely. Thus I initially expected that I could analyze accounting changes by searching for the multiplications involved in the Ptolemaic data—not to determine certainly whether the changes were shifts in accounting—but rather to provide greater insight into the general likelihood of such accounting changes.

[186] For further discussion of this divide, see 3.3.2 "Review of Literature on Ptolemaic Prices." For the argument for real inflation, see especially Cadell and Le Rider, *Prix du blé*, 78-79

However, problems with this approach quickly arose. In a set of data that includes random gaps in time, some longer than others, those very gaps can suggest stepped rather than gradual increases. What appear to be dramatic increases in prices may have really been more gradual, if all the data from the time between the very low and very high price were extant. The price increases did not occur in the same manner, to the same degree or with the same multiples, from indicator to indicator. This lack of precise correspondence between indicators might seem to be evidence that this was not a series of stepped changes in accounting practice, but the imperfect nature of the data could also explain much of this lack of correspondence.

As was discussed in Chapter 3, earlier scholars—namely Reekmans, Gara, Hazzard, and Maresch—have argued that the price increases of the Ptolemaic period were a result of accounting changes.[187] Reekmans argued that the doubling of 221-216 BCE was caused by a nominal doubling of the value of bronze coins in response to the dearth in supply of physical bronze coins.[188] The second increase, around the turn of the 3rd to 2nd century BCE, was due to a shift in accounting from the silver to the bronze standard.[189] Gara agreed with Reekmans' distinctions between money as physical medium of exchange and as a unit of account; she thought the price increases were caused by the Ptolemies' experimentation with the relationship between silver and bronze, shifting from accounting based on physical media to accounting that was more abstract.[190] Hazzard thought the accounting change was one of convenience, fixing the previous annoyance of conversions between drachmas and obols in a ratio of 1:6 by moving towards an

[187] The following is a condensed version of the summary I presented in 3.3.2 "Review of Literature on Ptolemaic Prices."
[188] Reekmans, "Monetary History and the Dating of Ptolemaic Papyri"; Reekmans, "The Ptolemaic Copper Inflation."
[189] Ibid.
[190] Gara, "Limiti strutturali dell'economia nell'Egitto tardo-tolemaico."

accounting ratio of 1:10.[191] Maresch emphasized the Ptolemies' shift from the use of the silver standard to the bronze standard, which essentially split the silver and bronze coinage from each other (i.e., the bronze and silver coins were distinct systems of coinage).[192] Thus both sets of units of account (silver and bronze) each had a counterpart in both the bronze and silver systems of coinage, leading to the existence of four different accounting units. What appears to be an increase in prices was really just a change in calculation from the silver to the bronze standard. Maresch thought Ptolemy IV switched from the silver to the bronze standard because of the low supply and high price of physical silver.

These arguments concerning the shift to the bronze standard are highly plausible explanations for the price increase of 211-195 BCE. While there is no way to determine absolute causation in this case, the price increase is correlated with the dramatic proliferation of new ways to express value in Demotic that were described in Chapter 5.[193] The need to distinguish between these various units, especially the distinction between "real silver" and "silver" as a unit, is strong evidence that this period was one of changes in how value was tabulated. The price increase of 211-195 BCE was certainly exceptional, so an explanation of its cause must also hinge on some other exceptional development of the time. The flowering of all these new linguistic expressions constitutes this major other exceptional development and thus could help explain what was unique beginning around 211 BCE.

The earlier price increase, circa 220-215 BCE, occurred before the development of these new Demotic phrases and was thus less likely to have been an accounting change. That price

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[191] Hazzard, *Ptolemaic Coins*, 83-84.
[192] Klaus Maresch, *Bronze und Silber: Papyrologische Beiträge zur Geschichte des Währung im ptolemäischen und römischen Ägypten bis zum 2. Jahrhundert n. Chr.* (Cologne: Westdeutscher Verlag, 1996), 1-18.
[193] For further discussion, see especially 5.2.2, "The Egyptian System of Deben and Qite."

increase is securely known to have occurred for wheat. There were other increases in prices in the late third century generally, but they cannot be pinpointed to exact steps and dates; as outlined above, the price increases were more complex than most scholarship on stepped accounting changes can explain.It is possible that this doubling of the price of wheat during the Fourth Syrian War may have been specific to wheat.

6.3.6 Conclusion

I argue, therefore, that while monetary and demand-pull inflation are unlikely to have occurred in the early Ptolemaic period, there were price increases starting in 211 BCE that can be explained primarily as accounting changes, but perhaps with cost-push inflation based on the loss of Ptolemaic territory as a contributing factor. In 220-215 BCE, wheat prices clearly doubled, but there is no conclusive evidence that this increase spread to other sectors. Although there is no way to determine the cause of the wheat price increase with certainty, it may have been related to the simultaneous Fourth Syrian War. Thus cost-push inflation thus may have been a factor in these price increases of ~220-215, a point raised previously by Cadell and Le Rider, although I do disagree with their suggestion of concurrent demand-pull inflation post-Raphia caused by donations to soldiers..

Then in 211-210 BCE, Ptolemy IV switched from the silver to the bronze standard. Due to the concurrent explosion of new Demotic phrases used to explain which accounting unit was intended, I agree with Maresch's explanation for the changes to accounting units that began in this time as a result.[194] These changes were the main cause of the apparent price increase that began around 211 BCE. The change in accounting practices was not necessarily adopted

[194] Maresch, *Bronze und Silber*, 1-18.

simultaneously across Egypt, so this change was not universal and immediate. Then between 211-195 BCE, it is also possible that the loss of the Fifth Syrian War and the loss of Upper Egypt during the Great Revolt, could have contributed an element of actual cost-push inflation to the price increases.

6.4 Conclusion

The nuanced differences made apparent in the five indicators of inflation I have analyzed illustrate the difficulty of working with incomplete ancient data. However, von Reden's resignation, that there is no way to determine the existence of ancient inflation conclusively, is overly pessimistic.[195] My analysis of five inflationary indicators based on the three core forms of inflation, in addition to accounting changes, does contribute to our understanding of the relative likelihoods of inflation of these different types. The focus on accounting, since Reekmans's study of the Ptolemaic prices decades ago, has proven very useful in understanding the general surge in Ptolemaic prices that began around 211-210 BCE, and Maresch's model of the accounting changes fits the data best.[196]

However, von Reden's recent arguments against Cadell and Le Rider's claims of actual inflation in the early Ptolemaic period no longer hold together.[197] She reasoned that "real inflation cannot explain why, as noted previously, prices inceased rhythmically and in recognizable steps over a period of 100 years"—but her reasoning was based on her assumption that penalty prices,

[195] von Reden, "Grain prices in the eastern Mediterranean (c. 420-30 BC)," 169.
[196] Reekmans, "Monetary History and the Dating of Ptolemaic Papyri"; Reekmans, "The Ptolemaic Copper Inflation"; Maresch, Bronze und Silber.
[197] Sitta von Reden, "Grain prices in the eastern Mediterranean (c. 420-30 BC)"; von Reden, *Money in Ptolemaic Egypt*, 76-78; vs. Cadell and Le Rider, *Prix du blé*, 78-79.

which did move in rhythmic steps, reflected 'normal prices' on the ground.[198] I have demonstrated here that the stepped increases of penalty prices did not correlate with the market prices, which did not move in steps and were more volatile (this variability will be the subject of Chapter 7). This distinction, that market prices did not move in steps, highlights the problem with von Reden's logic. Moreover, the exceptional losses of territory starting around 206 BCE, and perhaps even during the Fourth Syrian War, when Egypt was cut off from Coele-Syria, cannot be discounted. The loss of territory may have had a strong enough impact to further add an element of cost-push inflation to the accounting change that caused an apparent increase in prices beginning five years earlier. This cost-push inflation was previously noted by Cadell and Le Rider, although they mistakenly emphasized the penalty prices as well and argued for concurrent demand-pull inflation, for which I do not see strong documentary evidence.[199] If, as I would argue, it is fair to suggest that Ptolemaic inflation did exist, then, it came about because of a constriction of supply rather than general economic growth.

One of the initial purposes of this chapter was to precisely quantify periods of inflation and rates of inflation so that I could then adjust the commodity prices in Chapter 7 for inflation. However, the shift from the silver to the bronze standard, perhaps exacerbated by some cost-push inflation, did not come about in a straightforward manner, at one clear time and one precise rate. The complexity of the price increase prevents me from adjusting the prices of the next chapter for inflation. Instead, I will note the units used to express the prices, so the reader can see the possible changes in accounting units throughout this time period, and expect that the reader will keep the general price increases observed in Table 6.12 in mind.

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[198] von Reden, "Grain prices in the eastern Mediterranean (c. 420-30 BC)," 169.
[199] Cadell and Le Rider, *Prix du blé*, 78-79.

CHAPTER SEVEN

Commodity Price Variability in the Ptolemaic Period

"See to it, also, that the goods for sale not be sold at prices higher than those prescribed. Make also a careful investigation of those goods which have no fixed prices and on which the dealers may place what prices they like; after having put a fair mark-up on the goods being sold, make the dealers dispose of them."

-Instructions from the Dioiketes to the Oikonomos (P. Tebt. 3 703), 258 BCE

7.1 Introduction

The major theoretical question of this dissertation regards the likely causes of price fluctuations in Ptolemaic Egypt. For decades, scholars have known that Ptolemaic prices did indeed fluctuate. Prices were not fixed based on traditional understandings of value or any other cultural factor of the sort that Polanyi and the 'primitivists' would understand to be different from modern price formation processes. Even intervention of the Ptolemaic state did not fix prices absolutely. Therefore, the question of *whether* prices fluctuated has already been answered. What remains, and what is thus the topic of the present chapter, are the questions of *how* and *why* those prices fluctuated.

This chapter approaches the question of how and why prices fluctuated in Ptolemaic Egypt; in particular, I aim to understand the degree to which prices were variable vs. fixed, then to explain the possible causes of price variability and/or rigidity as a result of shifts in supply and/or demand. Several factors could have caused prices to vary, ranging from large scale events to specific, direct price setting:

At a macro level, certain factors would have impacted supply and demand broadly throughout the Egyptian economy. It is reasonable to assume that weather would have had the greatest impact on supply (and therefore prices). Likewise, an influx of a large amount of people theoretically would have pushed up demand broadly.

If we examine price variability one level deeper than these macro shifts, certain goods would have been more or less susceptible to potential shocks to supply and demand than others. On the supply side, for example, more delicate crops could fail more easily than heartier crops, and the supply of goods that had to be imported to Egypt would have been more affected by political shifts than Egyptian products. The demand for products favored by certain subsets of the population theoretically could have been more susceptible to shocks if those products were non-staples or luxury products (i.e., things more likely to go in and out of favor).

If we move one level deeper in the analysis, aside from actual shocks to supply and demand, certain goods may have been more or less able to respond to to those shocks. High price variability can often be caused by inelasticity of supply and/or demand. When supply levels cannot adjust quickly to meet a rise in demand, for example, prices can shoot up. On the other hand, prices can also rise quickly if demand cannot adjust in response to a shock to supply; for example, if one crop fails and people are unable or unwilling to switch to consume a different crop instead, then the price of the preferred crop can rise dramatically.

What factors might have impacted the *elasticity* of a good's supply? The degree to which a good could be produced, stored up, or transported would have affected people's ability to bring more product to market if the usual supply dropped or demand rose unexpectedly. For example,

more of certain products, like mudbricks, could have been quickly produced in response to a rise in demand, whereas others, like wine, would take years to produce from scratch. In additon, grain could be stored in reserve, at least for a couple years, so it would have been theoretically possible to compensate for one bad harvest by drawing grain from silos and maintain stable prices. However, fruits like pomegranates would spoil more quickly, so if pomegranates came into high demand all of a sudden, it may have been more difficult to produce enough supply quickly, and prices could rise in turn. Likewise, easily transportable products, such as papyrus, theoretically could have been brought in from other villages or regions if the local supply were unable to keep up with demand. However, it would have been more difficult and expensive to ship large animals or unwieldy goods from village to village or region to region.

Price variability could also be caused by inelastic demand in response to shocks in supply. In general, demand is more elastic when there exist more potential substitutions for a good—that is, when people are able and willing to switch to a different product when their preferred product is unavailable—or when people do not really need the good and are able and willing to simply not buy it if the price rises too high. In a Ptolemaic context, I might expect that most staples were considered necessary but also had subsitutions. In theory, if the wheat harvest were poor, people may have been willing to eat other grains instead for a short time.

Thus far, I have discussed the *potential* elasticity of supply and demand (e.g., the possibility of making supply elastic by storing of grain reserves in silos). However, supply and demand would only be elastic if people actually responded. For example, grain was a good that could be stored without spoiling for a couple years, so theoretically its supply would be relatively more elastic than that of pomegranates, as discussed above. But if no one actually stored grain, then the supply of grain would lose its elasticity advantage. Moreover, even if people were storing

grain, if during famine they hoarded the grain rather than tapping into their reserves, the potential elasticity of grain would have been squandered. Therefore hoarding behavior could have impacted the *actual* elasticity of supply and made prices more variable than we would otherwise expect.[1] Access to information (or a lack thereof) could similarly have made supply artificially inelastic. After all, if there were a shock to the supply of an easily transportable product in one region relative to another region, but no one in either region knew of the difference, the product might not actually have been transported to respond to the shock. On the demand side, even if substitutions to a product were available theoretically, the degree to which demand would have been *actually* elastic would depend on the degree to which people *actually* made the substitution and/or chose to go without their preferred product. For these reasons, even if goods' supply and demand had high potential elasticity, their actual elasticity may have been lower.

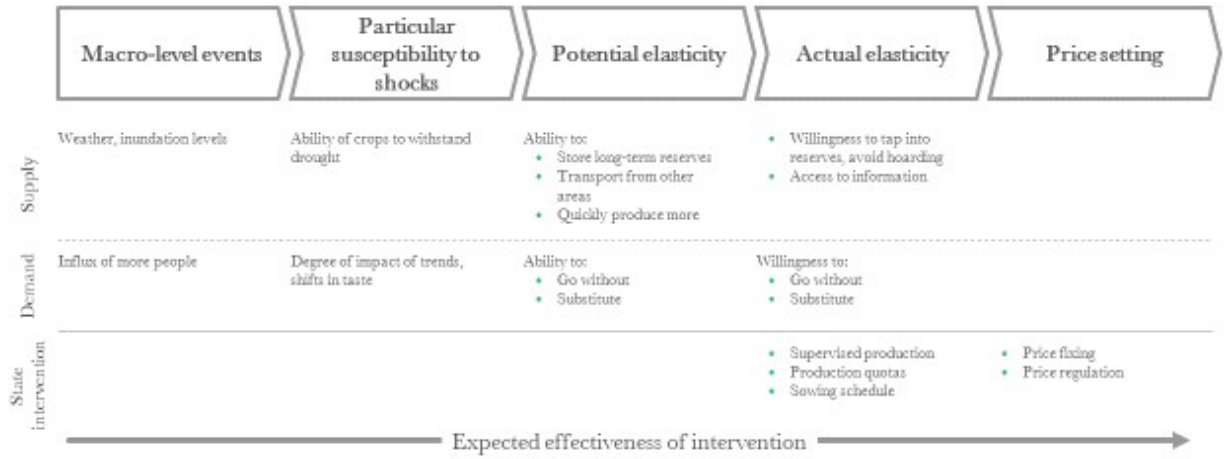
As we turn to the historical context of this dissertation, the Ptolemaic state ostensibly made efforts to intervene and stabilize prices. I will discuss these efforts in more detail below; for example, the Revenue Laws regulated the prices of goods like seseame oil, supervised the production of other goods, and set quotas for production levels on others. Set against the factors contributing to price variability outlined above (macro-events, particular susceptibility to supply/demand shocks, potential elasticity of supply/demand, and actual elasticity of

[1] Garnsey's arguments about the management of famine in Greek and Roman societies might be particularly relevant as we unravel the question of hoarding behavior. He argued that in Greece, elites were encouraged to save large hoards of food, then empty their reserves during famine as an act of euergetism that raised their socio-political status. In Rome, however, such a situation of powerful elites was viewed as dangerous, so the state instituted its own system of food distribution (the annona) to prevent elites from doing just that. In the end, his argumetn is that most food crises were the result of speculation, not actual famine. Even if supply were potentially elastic, potential elasticity did not match actual elasticisity due to this speculatory behavior. I expect that the Ptolemaic state managed grain reserves more like the Romans than the Greeks, but I will engage with Garnsey's argument more fully and directly in Chapter 8. Peter Garnsey, *Famine and Food Supply in the Graeco-Roman World: Responses to Risk and Crisis* (Cambridge: Cambridge University Press, 1988).

supply/demand), the state's efforts to stabilize prices generally focused on regulating both the actual elasticity of supply and demand as well as the direct setting of prices. For example, the state intervened to make the supply of certain goods actually more elastic by supervising production and establishing sowing schedules to ensure that supply would stay high, especially for goods that could be stored for the future. The state also intervened directly in price variability by actually fixing or regulating the acceptable prices for certain crops.

My overarching question for this chapter is: Was the state able to successfully override price variability that otherwise would have existed because of inelastic supply and/or demand by discouraging artificial inelasticity? I have outlined my approach to this quesiton in Figure 7.1, below. In this dissertation, because of my focus on state intervention, I will not be attempting to identify macro-level events (like bad harvests) or the relative susceptibilily certain commodities had to shocks (e.g., whether wheat or emmer was a more resilient grain), although these factors played a critical role in price fluctuations. Instead, I am focused on the state's ability to either regulate prices directly or to bring actual elasticity closer to potential elasticity so as to make prices less volatile. If the state were successful in stabilizing prices, then I would expect that the closer the state's intervention fell on the value chain in Figure 7.1 towards the actual setting of prices, the more effective the state's interventions would have been. I will test the hypothesis that the state was successful by dividing commodities into four degrees of state regulation (from price fixing to no regulation at all) and analyzing the extent to which the more directly regulated prices varied, as compared to those left unregulated.

Figure 7.1: Theoretical approach to Ptolemaic price variability (not exhaustive)



7.2 Outline of the Problem and Methodology

7.2.1 Scope of the Analysis: A Classification of Goods

To better understand relative levels of price variability in Ptolemaic Egypt, it will be helpful first to structure the analysis by dividing up all the various goods for which there are extant price data into categories based on the degree to which I expect their prices would have been variable based on the theoretical approach outlined above. The goods included in this chapter are sorted into four key categories based on the degree to which their production, sale, and pricing were regulated by the Ptolemaic state: (1) monopolized commodities, (2) commodities under price regulation, (3) commodities under production quotas, and (4) unmanaged commodities. My hypothesis is that the less regulated a commodity was, the more its price would have varied.

First, it is clear that all four of these categories refer only to commodities, as defined by economists. A commodity is a good that is not unique or individual; a category within which all goods are treated as the same. For example, a sack of wheat was the same as any other sack of wheat. Of course there might be slight differences in the quality of one sack of wheat vs. another, but in general, the price of a sack of wheat did not change as a result of any such slight difference. The price of non-commodities, by contrast, changes based in part on those differences. So a cloak with embroidery deemed beautiful would be more expensive with a cloak with coarser, less pleasing embroidery. It is crucial to distinguish between commodities and non-commodities because the reasons behind price fluctuations for the two types of goods would naturally be very different. In this dissertation, I am restricting my analysis to the prices of commodities and excluding unique goods.

The four mutually exclusive, collectively exhaustive categories will be defined in more precise detail in the section outlining my results later in this chapter. A brief explanation, however, is still presently in order. Essentially, the state could be involved in regulating commodities in a few different ways: did the state dictate the prices at which they could be sold? Did the state control which parties were allowed to produce, sell, and buy these things? Did the state manage production of these things? What I am calling 'monopolized commodities' are those commodities for which the state dictated prices and restricted sales. The category of 'commodities under price regulation' includes those things that could be bought and sold by anyone, but for which the state still mandated fixed prices. Then 'commodities under production quotas' could be bought and sold by anyone, without any direct state control of prices, but the state did manage production to a certain extent (e.g., by issuing sowing schedules for core grain crops in order to ensure their steady supply). In this category, the state did not fix prices but did have some control over supply.

The final category, 'unmanaged commodities' includes essentially everything else, with the only restriction being that only commodities are included. I expect the prices of these unmanaged commodities to have varied the most, since the state did not mandate prices directly or control them indirectly by managing supply.

7.2.2 The Variability of Prices: Four Dimensions

Since the goal of this chapter is to measure and explain price variability in Ptolemaic Egypt, it is of course necessary to begin with an explanation of that concept. 'Price variability' on its own is an amorphous concept. In order to pinpoint those aspects of variability that will be the most impactful in determining how and why prices fluctuated and what those changes demonstrate about economic decision-making in the Ptolemaic period, I am approaching variability from a set of four dimensions: geographic price variability, price volatility, the speed of price changes, and price uncertainty.[2]

Before I can compare the relative variation prices across sets of data (e.g., how barley prices moved differently from myrrh prices), it is first necessary to understand the degree of *geographic price variability* within these data groups, controlling for time. For example, if the price of, say, pomegranates differed wildly from town to town even during the same period of time, those differences would not be apparent if I merely calculated the median price of pomegranates in a given year. The high variation in pomegranate prices (in this still hypothetical scenario) could imply that there were drastic differences in the supply of or demand for pomegranates from region to region. More simply, such a result would imply that pomegranates were not traded in an integrated market—i.e., that people were not transporting pomegranates

[2] There is no clear rule for how to split up price variability; this theoretical framework is my own, based on the questions I am seeking to answer.

from region to region to engage in arbitrage, that is, to take advantage of the price differences. Essentially, then, there would not have been a price-making market for pomegranates, at least not across the whole of Egypt. If possible, with such a result, I could narrow in further to see if perhaps pomegranate prices were more similar within a given region. If only people in the Fayyum really liked pomegranates, for example, then pomegranate prices might have been very high in the Fayyum but low in Thebes. Across the whole of Egypt, there would be a great deal of variation in pomegranate prices, but perhaps within regions, prices did trend together. The results of this analysis will shed light on the geographic scale of the trade of these various things.

In addition, from a practical standpoint, the goal of this within-group analysis of price variation, comparing prices geographically within the same period of time, is to identify the proper scale for the rest of the analysis. To return to our hypothetical pomegranate example, it might be inappropriate to consider all pomegranate prices together as one mass, but it would make much more sense to split 'Fayyum pomegranates' and 'Theban pomegranates' into two separate groups as I move forward with analyzing the other dimensions of price variability.

Ideally, one would collect accurate prices for all goods in all places, or if it were possible to collect even a representative sample of those prices, one would analyze the geographic variability of prices by calculating their standard deviation, based on a normal distribution (a bell curve). The papyrological evidence, however, preserves too few data points to support such calculations. The sample of data that survives is not random or even a representative sample; there are excesses of data from certain collections (like the Zenon archive) and gaps in the data for other periods (like the early third century). Instead of calculating standard deviation, I will calculate the percent difference between the extremes of the price on the high and low end. In other words, I will first identify the highest and lowest reliable prices within a given period of time and find the difference

between them (in order to determine the breadth of the range of price differences). It is still crucial to adjust that difference for the size of the prices in general (because, for example, a general range of $100 difference in the price of houses would be tiny, but the same $100 difference for gallons of milk would be huge). To make that adjustment, I will divide the difference by the median price and convert the result into a percentage by multiplying by 100. The formula for percent price difference can be summed up as follows:

percent price difference = [(High price – Low price)/Median price] x 100.

I will able to determine the proper groupings of data by coupling the percent price difference calculation with a qualitative assessment of the similarity of prices across space. I expect that the price of some goods will need to be analyzed on a regional level (as in the case of the hypothetical pomegranates above). If the price of a certain good varied wildly even within the same village at the same time, then it would not be logical to continue with analyzing the other dimensions of price variability treating those prices as a group. In such cases, it will suffice to say that either the extant data are incredibly unreliable or that the prices of that good did not relate to any sort of market activity.

Goods for which the prices did move mainly together as a group can then be analyzed based on the other three dimensions of price variability. The first of these is *price volatility*. Price volatility is typically defined by economists as "the extent to which a price fluctuates," that is, the degree of change in a price over a given period of time.[3] It is thus not a measure of the *absolute* change in prices but rather an attempt to measure how *changeable* prices were.[4] I hypothesize that the Ptolemies would have wanted to keep the volatility of prices low, especially

[3] John Black, Nigar Hashimzade, and Gareth Myles, "Price volatility," in *Oxford Dictionary of Economics*, 5th ed. (Oxford: Oxford University Press, 2017), 410.

[4] In quantitative terms, price volatility is calculated as the standard deviation of the natural logarithm of the ratio of prices in period t and t-1 (log returns). Ibid.

for important, staple goods. Stable prices mean that people could more readily plan their economic lives and be able to afford the things they needed. Moreover, while a high rate of price volatility (i.e., a high level of risk) leads to a high return on investment for a certain good, a low rate of price volatility (i.e., a low level of risk) implies a low return on investment in that category. If the Ptolemies kept the prices within certain categories stable, they could thus keep the return on investment in those categories low and therefore prevent speculation. If producers thought the likely return on investment in their category could be high, they might be incentivized to withhold supply in order to keep prices artificially high and to be able to capitalize on any major rise in prices in their category.

Price volatility can be measured by first finding the median price within a set of price data (e.g., all the prices within a given period of time, within a certain location, etc.). Then it is possible to track the percent change in the price from time to time or location to location. The result is a list of percent changes from each period/location to the next. When using modern data, economists today usually follow the calculation of this list of percent changes by calculating the standard deviation of this set of percent changes. However, the calculation of the standard deviation of the changes assumes they fit a normal distribution, which is unlikely to be the case with the Ptolemaic price data. It is of course possible that, given all the prices that actually existed back in that period, the distribution could have been normal. The extant data, however, are too patchy to make any assumptions regarding their distribution. For that reason, it would be inaccurate in this case to calculate the standard deviation of the price changes. Modern calculations of price volatility entails multiplying the standard deviation by the square root of the number of times the price could change (e.g., the standard deviation of the percent changes in a closing stock price from day-to-day in a given year would be multiplied by the square root of the number of days the stock

market was open for trading within that year). Because of the lack of reliable data regarding the standard deviation of Ptolemaic price changes, an attempt to calculate price volatility, proper, in the ordinary, modern way would not be accurate. Instead, I will approach this question of the *relative magnitude* of price changes by calculating the median percent change in the price of each good from one period of time to the next and from location to location.

Price volatility measures the degree to which prices fluctuated, but not how quickly those changes came about. If the prices of two goods changed by the same magnitude, but one underwent that change over the course of a year where the other took 10 years to increase the same amount, the price of the former good was more variable. The *speed of price changes* is thus a necessary component for understanding the variability of Ptolemaic prices. If Ptolemaic price changes came about quickly, then people would have needed to be able to adapt to those changes readily. For example, people affected by rapidly changing prices may have saved more of their assets in a liquid form. In addition to the quickness of a given change in prices, it is also important to consider *how often* prices shifted. A one-time change, even if drastic, might not have affected economic decision making as much as frequent shocks would, even if those shocks were each of a smaller magnitude. In general, I will analyze the overall rhythm of the timing of price changes in this section.

The *speed of price changes*—my own conceptual approach to breaking down this problem—could be calculated as what modern economists would call 'rate of return'—a calculation of the percent change in prices over a given period of time.[5] As discussed above, price volatility—the magnitude of a change in prices—is already being measured as a percent change (i.e., how big is the price increase from year to year or decade to decade?). Rather than investigate

[5] See John Black, Nigar Hashimzade, and Gareth Myles, "Rate of return," in *Oxford Dictionary of Economics*, 5th ed. (Oxford: Oxford University Press, 2017), 434.

the same metric (percent change) merely through a slightly different lens, I will investigate the speed of price changes instead by working out the specific time dynamic of the movements of the price of each good. To analyze how quickly prices changed, I will first see if it is possible to identify particular periods of change. In other words, I will determine whether prices increased within the bounds of clear intervals (i.e., a stepped increase over time) or they increased gradually, within no identifiable intervals. If intervals can be identified, I will then compare the relative *duration* of these intervals of change (i.e., how quickly prices changed). I will also compare the relative *frequency* of the intervals and the duration of the periods of stability in between (i.e., how often prices changed). The resulting understanding of how prices fluctuated over time will provide new insights into how quickly and often people had to respond to new economic realities, which in turn will shed light on their adaptability, both as a possibility and a skill.

While the speed of price changes and price volatility measure the quickness and the relative magnitude of changes in prices, they do not provide insight into how predictable those changes were. What might appear to be a very fast change might not actually have been very difficult for people to manage if that change were predictable (for example, with the seasonal fluctuations of prices of agricultural produce). Likewise, a large change in prices that was easy to expect would have a different effect on prices than would a change of the same size that came out of the blue. To distinguish between the two sorts of change, I am also investigating the variability of prices through the dimension of *price uncertainty*. Price uncertainty is generally defined as "the conditional volatility of a disturbance that is unforecastable from the perspective of economic agents."[6] During periods of high uncertainty (such as times of political or economic unrest), people would have been less able to plan for the future; as a result, they could have decreased or

[6] Kyle Jurado, Sydney C. Ludvigson, and Serena Ng, "Measuring Uncertainty," *American Economic Review* 105.3 (2015): 1177-1216, esp. 1177.

stopped their investment or spending in certain areas. This decrease could come about if people were trying to avoid spending money they could not get back, if they wanted to save in case of prolonged or worsening uncertainty, or if they faced a decrease in their own available resources.[7] Uncertainty does not just apply to certain periods of time but also, potentially, to certain categories of good. For example, if the price of barley and of wool encountered changes of the same magnitude, but the changes in barley prices were more regular and predictable, I would expect people to be willing to invest more in farming barley than in raising sheep (assuming they had the freedom to do so). Price uncertainty can also be taken into account geographically. If geographical difference in price were regular and predictable, then people would have been more likely to engage in arbitrage and to create wider-ranging markets. For example, if the price of clothing were reliably much higher in Alexandria than in Memphis, a clothing producer in Memphis would have the incentive to produce more clothing than could be sold in Memphis alone and to transport it to Alexandria for sale at an even higher profit there. However, if geographic differences in price were due to local developments that people in other regions could not anticipate well, such transportation of goods for sale would be less reliably profitable.

How might it be possible to calculate such price uncertainty, especially given the nature of ancient price data? As Jurado, Ludvigson, and Ng noted, "no objective measure of uncertainty exists."[8] For that reason, they advocated avoiding a reliance on any one economic indicator with which to calculate uncertainty. They built multiple metrics into their formula for uncertainty,

[7] Ibid., 1177.
[8] Ibid., 1178.

most of which will not be possible to estimate given an ancient data set.[9] For example, they employ historical price forecasts and assess how accurate those forecasts were, but the Ptolemaic data do not include such forecasts (at least not enough to analyze with any accuracy). Thus a precise, quantitative calculation of price uncertainty will not be possible, but a qualitative analysis will take its place. I will analyze the regularity of price increases and decreases as might have been predictable based on known factors, such as seasonality and geography, to attempt to find a rhythm or pattern in these shifts. Likewise, I will compare price changes with discussions of economic matters in letters and other texts. If the price of a certain good were much higher or lower than expected, people did at times indicate their surprise and concern in their letters and petitions. Modern economists who measure uncertainty do something similar, for example, when they analyze news headlines for mentions of the predictability of prices and track these mentions alongside the actual price changes.

Price variability is clearly a multi-faceted calculation, so I am measuring it based on these four dimensions: geographic price variability, price volatility, the speed of price changes, and price uncertainty. These dimensions are summarized in Table 7.1, below.

[9] Jurado, Ludvigson, and Ng use the following calculation of price uncertainty:

$$\mathcal{U}_t^y(h) \equiv \text{plim}_{N_y \to \infty} \sum_{j=1}^{N_y} w_j \mathcal{U}_{jt}^y(h) \equiv E_w\left[\mathcal{U}_{jt}^y(h)\right]$$

; Jurado, et. al, "Measuring Uncertainty, " 1179. However, the necessary indicators to calculate their index are not available in the Ptolemaic price data.

Table 7.1: Dimensions of Price Variability

Measure	Insights Provided	Calculation
Geographic Price Variability	Degree to which prices of the same thing at the same time varied from place to place • Proper scale of analysis of that thing geographically (Across all Egypt? Regionally?) • Extent to which markets were integrated geographically	• Percent price difference = [(high – low)/median] x 100 • Qualitative assessment
Price Volatility	Relative magnitude of price changes (*How big* were the price changes?)	• (Simplified) Median of percent changes from time period to time period and/or from location to location • Standard deviation of $\ln(p_t/p_{t-1})$, where p is the price and t is a given period of time[10]
Speed of Price Changes	Time component of changes in price (Were changes sudden or gradual? *How quickly* did changes come about? *How often* did prices change?)	• Stepped vs. gradual change? • Duration of intervals of change and of stability; • Frequency of intervals of change
Price Uncertainty	Degree of error in price forecasts (*How predictable* were changes?)	• Qualitative analysis of patterns in increases and decreases; • Comparison of known price changes with discussions of surprising prices in texts

Each of these components of price variability provides a different sort of description of how Ptolemaic prices moved and, therefore, the price changes that the people of Ptolemaic Egypt needed to respond to and that the Ptolemaic state needed to manage.

[10] Black, Hashimzade, and Myles, "Price volatility," 410.

7.2.3 Methodology

In the following section, I present the data on commodity prices that I collected following the methodology outlined in Chapter 1 and Appendices 1 and 2. Prices for goods that were almost certainly not commodities—i.e., those goods which were unique or differentiable from each other, the prices of which would vary based on those qualitative differences—were excluded from the present analysis and are not included here. The commodity prices are presented in tables, with each commodity in its own table. Within each table, the prices are organized chronologically. Prices from texts that could not be securely dated were sorted based on the earliest possible date suggested for the text. For that reason, some prices that seem to be clearly of a later date because of their extreme size are at times mixed in with earlier prices quantified before the change in accounting standards. I hope the reader will tolerate this potential inconvenience due to the consistency in sorting that it allows. While I have included prices of uncertain dates so as to create as complete a corpus of data as possible for future scholarship in this field, it is the more securely, precisely dated texts that are relevant for my analysis—I highlight these as I discuss price variability for each commodity in turn.

Each table includes a column for the original price given in the text as well as for a unit price which I have calculated, wherever possible. In order to make prices comparable across texts that may have used different units of volume measurement, I converted these various units into a common standard. For most dry goods, this standard was the artaba, and for most liquids, I used the metretes. Conversions across volume units should always be taken with a grain of salt, since these units were not of consistent volumes even in antiquity. For that reason, if most prices used a unit other than the artaba or metretes, I allowed the unit prices to stay in their more common native unit. More detail concerning my conversion methods is discussed where appropriate as this

chapter unfolds. Goods that had naturally clear units (such as bricks or animals) were given a unit price as the price of one item or animal.

In calculating unit prices, I often also needed to convert the value units into a common standard, the drachma. This issue was particularly relevant in comparisons of prices written in Greek and in Demotic, since Demotic texts employed the deben and qite; Demotic did not even have a word for drachma. More detail on these conversions and on the history of the various value units can be found in an entire chapter on the topic, Chapter 5.

While I was generally able to convert the volume and value units into standardized versions for this 'unit price' column, not all prices were possible to standardize. For example, many grain prices come from rent agreements in which rents were to be paid in kind; since these rents could be paid in the crop sown (e.g., emmer) or in wheat, the most preferred grain of the period, the contracts regularly include 'conversion prices' of these varied crops in terms of their value in wheat. I did not distinguish between prices in money and prices in wheat in the construction of the price tables below, although the prices are not strictly comparable. I initially considered using contemporaneous wheat prices in money in order to convert prices in wheat into prices in money, but it soon became clear that wheat prices in money themselves showed too much variability for such a conversion to be at all reliable.[11] Still, it is possible to compare various prices in wheat to each other, so the lack of conversion of these prices does not render them useless.

[11] The state and people of Ptolemaic Egypt regularly kept their grain and money accounts separate. It is possible that this separation was a result of the volatility in commodity prices discussed in this chapter, or that the irreducibility of grain into money fueled that volatility: the value of wheat was not strictly tied to a money price. For the separation of accounts, see Muhs, *Tax Receipts*; Hazzard, *Ptolemaic Coins*. I must thank Brian Muhs for this suggestion (personal communication, February 18, 2018).

7.3 Results and Analysis

7.3.1 Introduction

In analyzing variability in the prices of commodities in Ptolemaic Egypt,I am attempting to test the hypothesis that the Ptolemaic state may have been able to override potential inelasticity of supply and demand through its management of key commodities' supply and/or through directly regulating their prices. To test the accuracy of this hypothesis, in this section, I present the prices and analyze their variability in order from those commodities ostensibly the most controlled by the state (the monopolized commodities of sesame and castor) to those commodities not managed by the state at all (what I am calling the 'unmanaged commodities').

7.3.2 Monopolized Commodities: Sesame and Castor

The most tightly regulated prices in Ptolemaic Egypt were the prices of those commodities under state monopolies. For the purpose of this analysis, a monopolized commodity is one whose production and sale were the exclusive purview of the Ptolemaic state. The Ptolemaic state maintained a monopoly on seed oils—specifically, sesame oil and castor oil.[12] The state organized the production and sale of these oils, and it was technically illegal to produce these types of oils for sale outside of the state's operation. The seed oil monopoly is described most extensively in the Revenue Laws Papyrus of Ptolemy II (259 BCE), usually referenced as P. Rev. This text demonstrates that the state did not necessarily manage these commodities directly—private contractors played a key role in this endeavor—but the Ptolemies did make a point of retaining the exclusive right to dictate how much of these seeds and oils were produced and sold, to determine

[12] For further discussion, see 4.4.10 "Private Contracting of State Commodity Monopolies."

which retailers could buy and sell the oils, and to issue guidelines on how they should be priced for sale.

Since the state held the most control over its monopolized commodities (at least relative to other goods being sold with less direction), if the state's attempt at regulation of supply and of market prices were successful, then it would be reasonable to assume that price variation for these commodities would be low. Private contractors who bought the right to the profits on oils purchased the seeds from cultivators at prices fixed by the state, so it would seem that seed prices should be constant across Egypt. After the seeds were turned into oil, state agents sold the oil to local dealers and retailers whom these agents had specifically chosen to gain the privilege of selling oil.[13] P. Rev. does not specify whether the retail price of oils was fixed, but circumstantial evidence from P. Tebt. 3 703 could indicate that it was indeed fixed. Thus it seems reasonable to expect that the price of these monopolized commodities would have shown little variation geographically. Even if the price was the same across Egypt, though, it could still change over time. It is less likely that a major shock could occur in the supply of seed oils because state officials, especially nomarchs, were held personally responsible for ensuring that the cultivators in their area produced seeds in accordance with the centrally-planned sowing schedule. Thus I do not expect wild changes in the price based on changes in supply. When the price changed, that change would have been issued by a state ordinance, at least in theory, so the change in the price of seed oils should have followed a stepped pattern rather than a gradual one. Since the price was planned and dictated in advance, it should have been very predictable. For these reasons, P. Rev. would lead me to expect that the price of monopolized commodities will have demonstrated minimal

[13] For the most part, oil sales were restricted to these designated agents. However, it is true that temples were allowed to produce oil for distribution to their personnel, and this oil could make its way to the open market. Likewise, oil could also be imported into Egypt—albeit with high import duties—and be sold outside of the restrictions on domestic oils.

geographic variability, with small, stepped, predictable changes in price over time. Of all the goods sold in Ptolemaic Egypt, the monopolized commodities should have been priced the most regularly.

The monopolized commodities in this analysis consist of sesame and castor seeds and the oils produced from those seeds.[14] These oils were used for cooking, lighting, and potentially medicine. While sesame and castor were cultivated by individual farmers (not directly by the state), these farmers did not have a choice in the matter. State officials devised a sowing schedule with production quotas for these seeds and other staple commodities.[15] Local officials were then tasked with ensuring that farmers in their area met those production quotas and were fined in case of a failure to do so. The state thus managed the production levels of these seeds.

Private contractors purchased at auction the rights to the profits from the sale of sesame and castor oils.[16] After the harvest, then, these contractors were the only ones allowed to purchase sesame and castor seeds from the farmers. Without this exclusivity, the private contractor's ownership of the rights to all profits from these seeds would have been essentially meaningless. Evidence for the monopolistic nature of these crops can be found in P. Rev., 39/20-21, which states directly and explicitly that the state held exclusive rights to sesame and castor seeds:

ἄλλωι δὲ μηθενὶ ἐξουσίαν ἐχέτωσαν οἱ γεωργ[οὶ] πωλεῖν μ[ήτε σή]σαμον μήτε κρότω[να].	The cultivators shall not have the power to sell either sesame or castor to any others.

This exclusivity of purchasing rights is what defines sesame and castor seeds as monopolized commodities.

[14] For discussion of other seeds and seed oils also included in P. Rev. (and why I have not included them here), see the following section, 7.2.3 "Commodities under Price Regulation."
[15] For further discussion, see 4.4.10 "Private Contracting of State Commodity Monopolies."
[16] Ibid.

When the seeds were produced into oils, state agents provided the place of manufacture as well as the means of oil production. This process was also supervised directly by the οἰκονόμος, the ἀντιγραφεύς, and the private contractor. Then state agents also had the authority to decide which oil dealers and local retailers could buy the oil, and state officials themselves even transported the oil to these resellers. The state also controlled the wholesale and retail prices of the oils.[17] The private contractor, having paid the state for the expected profits at the auction before the harvest, now received the actual profits from the sale of these oils in his local area. It is clear that the state thus worked in tandem with the private sphere, and private individuals could and did profit from these commodities. However, since the state held so much control over the production and sale of these oils—in particular, control over their prices—sesame and castor oils should be considered monopolized commodities. A list of the commodities considered under this heading, along with the Greek and Demotic terms for them, is presented in Table 7.2, below.

Table 7.2: Monopolized Commodities

Commodity	Greek	Demotic
sesame seeds	σήσαμον	*smsm, nḥḥ?*
sesame oil	σησάμινος, ἔλαιον	*nḥḥ*
castor seeds	κροτών	*tgm?*
castor oil	κίκιον	*tgm*

Some problems of identification arise, due to the fact that sesame oil was the most commonly mentioned oil in this period. Both Greek and Demotic regularly use more generic words for "oil" (ἔλαιον and *nḥḥ*, respectively) to represent sesame oil, in particular. When such generic words are used, sesame oil is often the best guess for which oil was meant, but the generic terms could be referencing any other type of oil as well. As early as 1896, Grenfell wrote that

[17] For further discussion, see 4.4.10 "Private Contracting of State Commodity Monopolies."

"Where ἔλαιον is found in the papyri of this period, meaning one kind of oil, the presumption is that sesame oil is meant"—most editors followed this presumption (with the exception of Rostovtzeff, Turner, and Tait) until the end of the 20th century.[18] However, Sandy noted in 1989 that ἔλαιον could be used either for sesame oil, safflower oil, olive oil, or "any oily substance" except castor oil, which was always distinguished as κίκιον.[19] Since ἔλαιον cannot be reliably, consistently assumed to be sesame oil, prices for ἔλαιον are separated here into their own table (Table 7.7). In Demotic, *nḥḥ* likewise served as the generic term for "oil" and commonly referenced sesame oil.[20] Examples can be found in which *nḥḥ* was used for other oils—for example, in P. Magical 5/5, the word refers to oil for a lamp, which almost certainly would not have been sesame oil. Since *nḥḥ*'s exact identification remains murky, I also separated *nḥḥ* prices into their own table, as I did with Greek ἔλαιον.

Moreover, Demotic does not consistently distinguish between the terms for the type of oil and the seeds used to make that oil. While in Greek, different units were used for dry and liquid volume measurements, in Demotic, the artaba and hin could be used in either case; thus the volume units cannot serve as criteria to distinguish between seeds and oil. For example, *tgm* was used for both castor seeds and castor oil.[21] I was only able to find one attestation of a price for *tgm* (P. Zen. Dem. 1 + PSI 9 1001), measured in artabas. In this example, the price seems to better fit the prices known for castor seeds than oil, but the determinative seems to be a pot-sign—a possible indication that the word meant to refer to the liquid form. The exact form of the castor is ambiguous, ultimately, so I included the example in the lists for both the seeds and the oil.

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[18] B. P. Grenfell and J. P. Mahaffy, *The Revenue Laws of Ptolemy Philadelphus* (Oxford: Clarendon, 1896), 132; Sandy, *Production and Use of Vegetable Oils*, 18-19.
[19] Sandy, *Production and Use of Vegetable Oils*, 19.
[20] CDD, "N" 04.1 (July 2004), 109-110.
[21] CDD, "T" 12.1 (July 2012), 323-325.

Even when the intended commodity can be clearly identified, the available data on sesame and castor prices come from a very small selection of particular texts and therefore should not be taken to be particularly representative. The great majority of the source texts were written in Greek and came from the Fayyum—Demotic evidence and evidence from other regions is in short supply. In the case of sesame oil, most of the Demotic evidence is from Thebes, whereas the Greek evidence is from the Fayyum; therefore differences in the prices between these two groups might have been merely regional. Among the sources, the one that yielded the most prices was P. Rev., but the prices included in P. Rev. were the fixed prices dictated by the state. These prices do not record actual exchanges. Other prominent sources include P. Lond. 7 1994, P. Lond. 7 1995, P. Lond. 7 1996, P. Tebt. 3 885, and P. Tebt. 3 891—these did record actual valuations but still all come from very similar collections of texts (e.g.., the Zenon archive and the Tebtunis collection).

Ultimately the data on the prices of monopolized commodities are so limited in scope that a full investigation of these prices across the four dimensions of price variability outlined above will not be possible. For most of the commodities, all the data come from the Fayyum, so these texts cannot shed light on the question of geographic price variability (i.e., price differences from region to region). Likewise, all the securely dated sources date to the 250s BCE; other sources exist, but cannot be dated precisely (or, in some cases, cannot be dated any more specifically than the Ptolemaic period). Therefore it is very difficult, if not impossible, to use these data to calculate price volatility in a meaningful way. While there might be price differences between texts, it is unclear to what extent these differences represent change over time, and in the absence of dates, the speed of those potential changes cannot be assessed.

Since the source material is so limited in scope, my approach to analyzing this particular group of data had to be revised. My expectation that this group would show little variability was

based on the control the state expressed over these commodities in the Revenue Laws papyrus (P. Rev.). I was able to use the data to explore the extent to which actual prices paid reflect the supposedly fixed prices the state issued in P. Rev. Furthermore, while the data are limited in their temporal and geographical ranges, making change over time and space often undetectable, I will analyze the extent to which prices varied within the same time and place. If the dictates of P. Rev. were actually followed exactly, after all, the data should reflect limited variation. The prices of sesame seeds, sesame oil, castor seeds, castor oil, and generic ἔλαιον are recorded in Tables 7.3-7, respectively, below.

The extant data on sesame seed prices (Table 7.3) indicate that the fixed prices presented in P. Rev. were not always followed in real transactions. P. Rev. dictates that sesame seeds should be sold at 8 drachmas per artaba. Two other texts records a sesame seed price in terms of money: P. Lond. 7 1996 (circa 250 BCE) and P. Tebt. 3 701 (from either 235 or 210 BCE). While the prices recorded in P. Tebt. 3 701 are close to P. Rev., at around 7-8 drachmas per artaba (variation of around 15%), the very existence of different prices within the same text shows that the price of sesame seeds was not fixed, strictly speaking. The price recorded in P. Lond. 7 1996 is only 6 drachmas per artaba—a 25% discount off the supposedly fixed price in P. Rev. Unfortunately, this account from the Zenon archive does not include any details or context that would clearly explain the low price. These artabas of sesame seeds are described as λοιπαὶ, so it is possible that they represented "leftovers" for which demand was low, but that suggestion is pure speculation.

The remaining sesame seed prices quantified those prices in terms of the value ratio between sesame and wheat; these data illustrate the existence of variation in sesame seed prices even in the same place at the same time. These prices come from two texts, P. Lond. 7 1994 and

P. Lond. 7 1995, both of which date to 251 BCE. Within the ten prices, two different values exist: 1 artaba of sesame seeds was equivalent to either 4 or 6 artabas of wheat (with the larger price having a value 50% higher than the smaller price). Especially given the fact that both values can be found in the same text, P. Lond. 7 1994, this difference does not represent a steady change over time but rather somewhat simultaneous variation. Presumably the difference was due to contextual factors. Both P. Lond. 7 1994 and P. Lond. 7 1995 are long accounts of deliveries of supplies to Herakleides, the chief farmer of Apollonios's estate, for various purposes. The value of each payment was tabulated in terms of wheat, and the author uses these wheat values to tabulate excesses and deficiencies in supply along the way and to total up the value at the ends of lists. Regarding the clear existence of two different value ratios between sesame and wheat, Skeat wrote, "there are some puzzling discrepancies in the ratios, and it is difficult to see how accurate accounting can have been achieved unless they were absolutely fixed and stable."[22] Rather than assume there were inaccuracies in accounting, however, it seems possible to me that perhaps there were actual differences in the value ratio between sesame and wheat either in different contexts or in the slightly different times parts of the text were written. As Skeat notes later on, there is a "lack of uniformity" in these accounts that "confirms the impression, obvious from the numerous corrections and deletions, that these accounts are drafts, and as such remained on Zenon's files."[23] While not enough detail was included in the accounts to fully explain the existence of two different sesame:wheat ratios, it is possible that the ratio changed from time to time or from situation to situation. In any case, even the price of sesame seeds, supposedly one of the most closely managed commodities in Ptolemaic Egypt, was not fixed.

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[22] T. C. Skeat, *Greek Papyri in the British Museum (Now in the British Library), Volume VII: The Zenon Archive* (London: British Museum Publications Limited, 1974), 97-99.
[23] Skeat, *The Zenon Archive*, 99.

Table 7.3: Price of Sesame Seeds

Date	*Location*	*Commodity*	*Unit Price (per artaba of sesame)*	*Original Price*	*Source Text*
259/8	Fayyum?	σήσαμον*	8 dr.	8 dr. per artaba of 30 choinikes	P. Rev. p. 4-36, 39/2-3, 53/16
251	Philadelphia (Fayyum)	σήσαμον	4 artabas wheat	286.875 artabas sesame = 1146.5 artabas wheat; 136.875 artabas sesame = 547.5 artabas wheat; 286.625 artabas sesame = 1146.6 artabas wheat; 1[3]6.875 artabas sesame = 547 artabas wheat; 30 artabas sesame = 120 artabas wheat; 6.5 artabas sesame = 26 artabas wheat; 1000 artabas sesame = 4000 artabas wheat	P. Lond. 7 1994, 137, 165, 190, 210, 344-345
251	Philadelphia (Fayyum)	σήσαμον	6 artabas wheat	7 artabas sesame = 42 artabas wheat	P. Lond. 7 1994, 86
251	Philadelphia (Fayyum)	σήσαμον	6 artabas wheat	111.0833 artabas sesame = 666.5 artabas wheat; 645.1667 artabas sesame = 3871 artabas wheat	P. Lond. 7 1995, 66, 329
(about 250)	Philadelphia (Fayyum)	σήσαμον	6 dr.	229.3333 artabas sesame = 1376 drachmas	P. Lond. 7 1996, 44
237	Fayyum	σήσαμον	12 dr. bronze/art.	4.5 art. sesame at a rate of 12 dr. bronze. per artaba = 54 (dr. bronze)	SB 18 14041, 6
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	σήσαμον	6.8571 dr./art.	7/8 art. sesame worth 6 dr.	P. Tebt. 3 701, 286-287
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	σήσαμον	7 dr./art.	and of the 20 art. of Psenithos son of Pokas = 140 dr. They themselves, being present and being asked about this, did not agree.	P. Tebt. 3 701, 281-282, 299-301
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	σήσαμον	8 dr./art.	and 7.75 (art. sesame were valued at) 8 (dr./art.) = 62 dr.; 15.5 art. (sesame) at 8 dr. = 124 dr.; he gave it to Phanesis, the grain-measurer, at 8 dr.(/art.) = 282 dr.; the 13.5 art. of the associations, the value was assessed at the rate of 8 dr./art.	P. Tebt. 3 701, 283, 285, 296, 297-298

* Fixed price for sesame purchased form cultivators (per artaba of 30 choinikes). This sesame is clean for grinding, but if it has not been cleaned, the cultivator must pay an additional 7% in kind.

Even greater variation is apparent in the data on sesame oil prices (Table 7.4), although the amount of meaning we may draw from the very limited data is dubious. The only prices explicitly labelled as "sesame oil" come from P. Rev. itself, so it is not possible to compare actual prices with those in P. Rev. (unless we compare to generic oil prices in Tables 7.7 and 7.8, below). However, the existence of different prices within the "laws" themselves does hint at the introduction of variability.

Table 7.4: Price of Sesame Oil

Date	*Location*	*Commodity*	*Unit Price (per metretes of sesame oil)*	*Original Price*	*Source Text*
259/8	Fayyum?	σησάμινος	48 dr. bronze	48 dr. bronze per metretes, 2 obols per kotyla	P. Rev. p. 4-36, 40/12, 40/15
259/8	Fayyum?	σησάμινος	29.5 dr.	29 dr. 3 ob. (crossed out: 31 dr. 4 ob. 2 chalkoi)	P. Rev. p. 4-36, 53/14

* Based on a metretes of 12 chous, as per P. Rev. 4-36, 40/12. 1 chous = 12 kotylai. D. Brent Sandy, *The Production and Use of Vegetable Oils in Ptolemaic Egypt*, BASP Supplement 6 (Atlanta: Scholars Press, 1989), 10. 1 chous had about the volume of 6 hin, based on the measurements in Chapter 5, p. 35.

Castor seed pricing (Table 7.5) followed a similar pattern to that of sesame seeds. The extant prices of castor seeds all come from the Fayyum, so nothing can be said regarding geographic variability in castor seed prices. Again, as with sesame seeds, the castor seed prices were recorded in terms of both money and wheat. P. Rev. dictates a price of 4 drachmas per artaba of castor seeds.

Curiously, P. Cairo Zen. 4 59787 records a much lower price of only 1 drachma per artaba of castor seeds. The text cannot be dated more precisely than the reign of Ptolemy II or III (although it is clear that it was from the latter half of the month of Thoth). The lower price might have been more expected at an earlier date, but even at its earliest (circa 263 BCE), it is not

muchearlier than the Revenue Laws. The context of the price is a note in the margin of a long account in the Zenon archive, which reads: (ὧν) παρὰ Διοφάντου κρότων(ος) ἀρ(τάβας) ρ (δραχμὰς) ρ "(of which) from Diophantos, 100 artabas of castor seed: 100 drachmas." The text's author is recording a payment Diophantos made to Apollonios' estate of 100 artabas of castor seeds, which were worth 100 drachmas (i.e., 1 drachma per artaba). It is unclear why castor seeds would hold only 25% of their official value within Apollonios' accounts. A Demotic text from Philadelphia only a few years after P. Rev., P. Zen. Dem. 1 + PSI 9 1001 (Phaophi 256 BCE), lists a price for *tgm* equivalent to 3 drachmas per artaba, only 25% lower than P. Rev.'s price. Thus the majority of the data on monetary prices for castor seeds show that the valuations actually used were 25-75% lower than the prices dictated in P. Rev. The only extant price that matches P. Rev.'s value came from decades later (223 BCE), in Chrest. Wilck. 304.

This variation between the fixed price recorded in P. Rev. and real prices from around the same time is similar for sesame and castor seeds; likewise, real castor prices, as with sesame, showed variation even within the same archive, at the same date. Two texts include prices for castor seeds in terms of wheat: P. Lond. 7 1994 and P. Lond. 7 1995, both from 251 BCE, and both discussed above for their sesame prices. The former text generally equates an artaba of castor seeds with 2 artabas of wheat, where the latter lists a value of 3 artabas of wheat. The value in P. Lond. 7 1995 is thus 50% higher than that in P. Lond. 7 1994, despite the fact that both texts date from the same year and were both from Philadelphia—both from the Zenon archive and involving the same individuals. The amount of data is extremely limited and cannot yield information on price changes over time, but these limited data points do show that there was variation in the price of castor seeds by up to 50%, even in the same time and place.

Table 7.5: Price of Castor Seeds

Date	*Location*	*Commodity*	*Unit Price (per artaba of castor seeds)*	*Original Price*	*Source Text*
(263-229), Thoth	Philadelphia (Fayyum)	κροτών	1 dr.	100 artabas = 100 dr.	P. Cairo Zen. 4 59787, 53
259/8	Fayyum?	κροτών	4 dr.	1 artaba of 30 choinikes = 4 dr.	P. Rev. p. 4-36, 39/3-5, 53/17
256, Phaophi	Philadelphia (Fayyum)	*tgm**	3 dr.	1.5 qite per artaba	P. Zen. Dem. 1 + PSI 9 1001, 11
251	Philadelphia (Fayyum)	κροτών	2 art. wheat	11.5 artabas castor = 23 artabas wheat; 6.5 artabas castor = 13 artabas wheat; 2[5].1667 artabas castor = 50.3333 artabas wheat	P. Lond. 7 1994, 132, 202, 348-349
251	Philadelphia (Fayyum)	κροτών	2.0910 art. wheat	11 artabas castor = 23 artabas wheat	P. Lond. 7 1994, 163
251	Philadelphia (Fayyum)	κροτών	3 art. wheat	3 artabas castor = 9 artabas wheat	P. Lond. 7 1995, 67
251	Philadelphia (Fayyum)	κροτών	3 art. wheat	18 artabas castor = 54 artabas wheat	P. Lond. 7 1995, 330
223, Pauni	Fayyum	κροτών	4 dr./art.	4 dr./art.	Chrest. Wilck. 304, 12

* The price in this example seems perhaps more appropriate for castor seeds than oil. While tgm could be used for castor in either form, the pot-determinative used here could indicate the liquid form. Because of this ambiguity, I am listing this example under both castor seeds and castor oil.

The castor oil prices are presented below in Table 7.6. Once again, the extant evidence regarding the price of castor oil is itself geographically limited (almost entirely in the Fayyum), so no claims can be made about variability in the price of castor oil from region to region. One letter (P. Col. Zen. 1 21) from the Zenon archive—and therefore found in Philadelphia in the Fayyum—may have been sent from Memphis and reflect pricing levels there. The price recorded in this text, 48 drachmas per metretes, is equivalent to the prescribed price in P. Rev.; based on this quite minimal evidence, it therefore seems that geographic variation, at least between the Fayyum and Memphis, was not so extreme as to preclude an analysis of this Memphite price in the same data set as the prices from the Fayyum.

The Revenue Laws list a few different prices for castor oil, to be paid at different moments in the oil production and sale process. P. Rev. dictates that cultivators should seal up castor oil in the countryside at a rate of 30 drachmas per metretes (40/13), a price which is corrected immediately below to read 48 drachmas per metretes (40/15). In Alexandria and Libya, castor oil should be sold at 48 drachmas per metretes (40/16). Some more complex clauses later in the document reference lower prices. If the contractors have excess supply, the oikonomos shall pay them the value of this excess supply at the rate of 20 drachmas per metretes of castor oil (53/15). The contractors shall later be paid 19.3333 drachmas (19 drachmas and 2 obols) in exchange for the oil that will be received from each nome for the storehouse in Alexandria (53/20). While different prices were paid in these various steps in the process of the monopoly, as dictated by P. Rev., it seems that the prescribed retail price of castor oil was 48 drachmas per metretes.

This fixed price actually matches a real price listed two years later in P. Col. Zen. 1 21 (257 BCE). The next year, in P. Zen. Dem. 1 + PSI 9 1001 (256 BCE), a price for Demotic *tgm* is listed at around 3 drachmas per metretes, but this value seems far too low to actually represent castor oil; the price is much more similar to castor seed prices of the time and should probably be excluded from the castor oil data set. Thus there is an example of a castor oil price tabulated in terms of money exactly matching the prescribed price from P. Rev.

However, two texts from Tebtunis (P. Tebt. 3 885 and P. Tebt. 3 891—neither of which can be dated securely) include four different prices for castor oil—so there was variation from P. Rev. All four prices for castor oil in these Tebtunis papyri were substantially higher than the 48-drachma price from P. Rev. (namely, 5,900%, 8,300%, 17,900%, and 14,900% higher). The dramatic nature of these price increases is likely due to the accounting changes discussed in Chapter 6, but since the texts cannot be precisely dated, there is no way to distinguish the portion

of these increases that was due to accounting and the portion that may have represented a change in the real price of castor oil.

What is clear, though, is that there was wide variation in the price of castor oil even within the same sources. The prices listed in P. Tebt. 3 885 (from around 200 BCE) are listed per kotyla of oil; if we assume that there were 12 kotylai in a chous and 12 chous in a metretes (as was discussed in Chapter 5), then a multiplication of these prices by 144 reveals the price per metretes. The prices are thus 2,880 and 4,032 drachmas per metretes: the higher price is a full 40% higher than the lower value. P. Tebt. 3 891 likewise includes two different values, which, based on context from the previous lines and the need to multiply by 12 for the math to work, represent drachmas per kotylai. This text has been dated broadly to the second century BCE and mentions different prices for each of two choes of castor oil:

εἰς τοῦτο ἔχω τιμὴν κίκιος χ(οᾶν) β, (ᾧν) χ(οὸς) α ἀν(ὰ) ξ ψκ, ἄλλου ἀν(ὰ) ν χ, (γίνονται) Ατκ	Towards this I have the price of castor oil, 2 choes, of which 1 chous at the rate of 60 (dr. per kotyla, making) 720 (dr.), the other at the rate of 50 (dr. per kotyla, making) 600, (totaling) 1320 (dr.)

Thus these two measures of castor oil were priced differently (one 20% higher than the other), with no explanation as to the reasons for the price difference. The fact that the two volumes and prices could even be added together might serve as even more evidence that there was no substantive qualitative difference in these portions of oil. Therefore the price of castor oil could vary fairly widely (20-40%) even for the same oil at the same time and place. These differences do not represent changes in prices but rather simultaneous variation. The texts provide no evidence regarding the cause of the variation, but it is possible that distinctions in the status of the buyer or in the relationship between buyer and seller might have affected the price paid.

Table 7.6: Price of Castor Oil*

Date	*Location*	*Commodity*	*Unit Price (per metretes of castor oil)*	*Original Price*	*Source Text*
(Ptolemaic?)	Egypt	*tkm*	220 deben per artaba?	what he gave for 1 (artaba of *tkm*-oil?) out of silver (deben) 220	Enchoria 30 (2006-2007), p. 47 no. 1 , 7
3rd. cent.	Fayyum	κίκι		castor oil = .75 ob.	P. Petrie 3 139a, 2/6
(263-229)	Memphis (Lower Egypt)	κίκι	1.75 dr./chalmaian	and (price of a chalmaian) of castor oil = 1 dr. 4.5 ob. (unit = χαλμαίας)	PSI 5 531, 8
259/8	Fayyum?	κίκιον	19.3333 dr.	19 dr. 2 ob. per metretes	P. Rev. p. 4-36, 53/20
259/8	Fayyum?	κίκιον	20 dr.	20 drachmas per metretes (crossed out: 1 dr. 2 ob. [per kotyla?])	P. Rev. p. 4-36, 53/15
259/8	Fayyum?	κίκιον	30 dr.	30 drachmas per metretes, 2 obols per kotyla (corrected to 48 dr.)	P. Rev. p. 4-36, 40/13
259/8	Fayyum?	κίκιον	48 dr.	48 drachmas per metretes, 2 obols per kotyla	P. Rev. p. 4-36, 40/15, 40/16
257	Memphis? (found in Philadelphia)	κίκιον	48 dr.	4 dr. per chous	P. Col. Zen. 1 21, 4
257, Choiak 2	Herakleopolis (Upper Egypt)	κίκι		castor oil: 13 dr. of bronze	P. Sorb. 1 16, 12
256, Phaophi	Philadelphia (Fayyum)	*tgm*†	3 dr.‡	1.5 qite per artaba	P. Zen. Dem. 1 + PSI 9 1001, 11
(mid-3rd c.)	Egypt	κίκι		castor oil = .25 ob.	SB 24 16067 Fragments g+i, 9
243, Mesore 4	Thebes (Upper Egypt)	κίκι		castor oil = 1 ob.	UPZ 2 158 A, 5/36, 9/62, 12/78, 15/102, 18/124, 21/142
(about 200)	Tebtunis (Fayyum)	κίκιον	4,032 dr.	28 dr. per kotyla	P. Tebt. 3 885, 22
(about 200)	Tebtunis (Fayyum)	κίκιον	2,880 dr.	20 (dr. per kotyla)	P. Tebt. 3 885, 36
(about 200)	Tebtunis (Fayyum)	κίκιον		42 (dr.)	P. Tebt. 3 885, 58
(2nd cent.)	Tebtunis (Fayyum)	κίκιον	8,640 dr.	1 chous at a rate of 60 (dr. per kotyla), making 720 (dr.)	P. Tebt. 3 891, 14
(2nd cent.)	Tebtunis (Fayyum)	κίκιον	7,200 dr.	1 chous at a rate of 50 (dr. per kotyla), making 600 (dr.)	P. Tebt. 3 891, 15

** For comparison, cf. Maresch's list of kiki prices in Bronze und Silber, 190.*

† While *tgm* could be used for castor in either form, the pot-determinative used here could indicate the liquid form. Because of this ambiguity, I am listing this example under both castor seeds and castor oil.

‡ As was discussed in Chapter 5, 1 artaba could have a volume of 30 or 40 liters, and 1 metretes was about 34.8 liters. In this case, I am treating the artaba and metretes as metrically equivalent for the sake of simplicity, although that calculation might not be fully accurate. The price in this example seems perhaps more appropriate for castor seeds than oil.

Similarly, simultaneous variation can be seen in the data regarding ἔλαιον (Table 7.7). Prices for ἔλαιον (generic "oil," possibly sesame or olive oil) can be found alongside the castor oil prices in P. Tebt. 3 885, as well as in O. Bodl. 1 307, although the latter text does not include a mention of quantity and is thus not useful for the present analysis. As was the case for castor oil, P. Tebt. 3 885 includes two different prices for ἔλαιον, both higher than the price of castor oil, with the smaller value for ἔλαιον at double the rate of the smaller value for castor oil, and the larger value for ἔλαιον at 78.5714% higher than the larger value for castor oil. This oil, whatever it was, was thus certainly more expensive than castor oil. The absence of securely dated sesame oil prices outside of P. Rev. makes it impossible to determine accurately whether these ἔλαιον prices represent sesame or some other type of oil prices. Still, it is certain that the difference in price between the two ἔλαιον values here is 20% (half the difference in the rate recorded by the same text for castor oil). The fact that the two prices for ἔλαιον differ less than the two prices for castor oil, even within the same text, seems evidence that the different values were not fixed to represent different sorts of payment. In any case, the evidence from P. Tebt. 3 885 shows variability of 20% in ἔλαιον prices in the same time and place, although the reasons for this difference remain obscure.

Table 7.7: Price of Generic Oil, Greek ἔλαιον*

Date	*Location*	*Commodity*	*Unit Price (per metretes of oil)†*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	ἔλαιον		oil = 4 ob.	P. Petrie 3 137, 1/4
3rd. cent.	Fayyum	ἔλαιον		oil = 4 ob.	P. Petrie 3 137, 1/9
3rd. cent.	Fayyum	ἔλαιον		oil = .5 ob.	P. Petrie 3 137, 1/14
3rd. cent.	Fayyum	ἔλαιον		oil = 4 ob.	P. Petrie 3 137, 1/16
3rd. cent.	Fayyum	ἔλαιον		4 ob.	P. Petrie 3 137, 1/21
3rd. cent.	Fayyum	ἔλαιον		oil = .5 ob.	P. Petrie 3 137, 2/4
3rd. cent.	Fayyum	ἔλαιον		oil = 4 ob.	P. Petrie 3 137, 2/10
3rd. cent.	Fayyum	ἔλαιον		oil = 4 ob.	P. Petrie 3 137, 2/16
3rd. cent.	Fayyum	ἔλαιον		oil = .25 ob.	P. Petrie 3 140a, 2
3rd. cent.	Fayyum	ἔλαιον		oil = .25 ob. 1 chalkous	P. Petrie 3 142, 6
(3rd c.)	Tebtunis (Fayyum)	ἔλαιον		oil: an obol	P. Tebt. 3 1078 descr. vo., 23
(3rd c.)	Tebtunis (Fayyum)	ἔλαιον		oil: 2 ob.	P. Tebt. 3 1078 descr. vo., 31
(263-229)	Memphis (Lower Egypt)	ἔλαιον	2.5 dr./chalmaian	price of a chalmaian of oil = 2 dr. 3 ob. (unit = χαλμαίας)	PSI 5 531, 7
(late 3rd - early 2nd c.)	Fayyum	ἔλαιον		Oil = 145 dr.	SB 22 15238, 2/21
230 or 205	Dios Polis (Thebes east)	ἔλαιον		3 ob.	O. Bodl. 1 307, 11
(before 210)	Ptolemais Hormou? (Fayyum)	ἔλαιον		oil = 1.5 ob.	SB 4 7451, 104
(before 210)	Ptolemais Hormou? (Fayyum)	ἔλαιον		oil = 1 ob.	SB 4 7451, 124
(about 200)	Tebtunis (Fayyum)	ἔλαιον	5,760 dr.	40 (dr./kotyla)	P. Tebt. 3 885, 35
(about 200)	Tebtunis (Fayyum)	ἔλαιον	7,200 dr.	50 (dr./kotyla)	P. Tebt. 3 885, 59

* For comparison, see Maresch's list of *elaion* prices in Bronze und Silber, 190-191.

† Based on a metretes of 12 chous, as per P. Rev. 4-36, 40/12. 1 chous = 12 kotylai. D. Brent Sandy, *The Production and Use of Vegetable Oils in Ptolemaic Egypt*, BASP Supplement 6 (Atlanta: Scholars Press, 1989), 10. 1 chous had about the volume of 6 hin, based on the measurements in Chapter 5, p. 35.

Prices for the Demotic version of generic oil, *nḥḥ*, are recorded in Table 7.8, below. As with ἔλαιον, it is possible that these represent sesame oil prices, but the identification cannot be certain. If they do represent sesame oil, then the Theban Demotic ostraca record prices far higher than those listed in P. Rev. The Revenue Laws dictate that the price of sesame oil should be 48 drachmas per metretes (when it is sealed up in the countryside, as well as when it is sold in Alexandria and in Libya). The contractors should receive a lower value, 29.5 drachmas per metretes, from the oikonomos for excess oil left behind. The values in the Demotic ostraca at Leiden are dramatically higher (about 86-450x higher). Part of this dramatic difference might be attributable to the calculations that were necessary to make the prices comparable, since the Leiden ostraca give these values in deben per hin rather than drachmas per metretes: such calculations can never be exact, given the variability in the exact measure of these volume units. It is also very possible that Demotic *nḥḥ* might have represented an oil other than sesame. Still, it is interesting, perhaps, that even some of these dramatically high prices still represent multiples of P. Rev.'s price (e.g., the price of 21,600 drachmas is exactly 450 times 48 drachmas). This clear multiplication might suggest that the variation is not merely a modern error introduced by conversion but perhaps due to ancient accounting differences. In any case, even the lowest price of *nḥḥ*, 4,196.5715 drachmas per metretes, is 8643% higher than P. Rev.'s price of 48 drachmas for the same volume. While it is technically possible that sesame oil sold for a drastically higher price than P. Rev. dictated, I think it is more likely that the Demotic ostraca date to a much later date, after the dramatic price increases of circa 211-196 BCE discussed in Chapter 6. An increase of this

magnitude in the real, experienced price of sesame oil seems quite unlikely in the absence of other evidence, as does a degree of geographic variability of this magnitude.

The Demotic values also differ from each other. Within one text, O. Leiden Dem. 177, values of 16,200 and 21,600 drachmas per metretes are recorded: a difference of 5,400 drachmas: the larger price is 33.3333% higher thant the smaller price. O. Leiden Dem. 177 is a fragmentary account, so no more can be said about the context of these different values. It is possible that *nḥḥ mɜʿ* "true oil" was an oil of a much higher quality than the fragmentary *nḥḥ […]* of the previous lines, or perhaps an entirely different type. Still, there seems to be evidence of variation in sesame oil prices even within the same time and place.

Table 7.8: Price of Generic Oil, Demotic *nḥḥ*

Date	*Location*	*Commodity*	*Unit Price (per metretes of sesame oil)**	*Original Price*	*Source Text*
(332-30)	Thebes	*nḥḥ […]*	16,200 dr.	4 hin oil = 45 deben (i.e., 11.25 deben/hin)	O. Leiden Dem. 177, 2/x+3 – x+4
(332-30)	Thebes	*nḥḥ mɜʿ*	21,600 dr. + 1 dr.	1.5 hin oil = 22.5 deben + .2 qite (i.e., 15 deben/hin + .5 qite)	O. Leiden Dem. 177, 2/x+5 – x+6
(332-30)	Thebes	*nḥḥ*	4,196.5715 dr.	35 hin oil = 102 deben (i.e., 2.914 deben/hin)	O. Leiden Dem. 96, 1/4
244, Epeiph 2	Polemonos Meris(?) (Fayyum)	*nḥḥ(?)*		oil(?) = 2 deben	Cahier de rech. de l'Inst. de pap. et égypt. de Lille (CRIPEL) 13 (1991), p. 40-41 & pl. 6-9, 25

* Based on a metretes of 12 chous, as per P. Rev. 4-36, 40/12. 1 chous = 12 kotylai. D. Brent Sandy, *The Production and Use of Vegetable Oils in Ptolemaic Egypt*, BASP Supplement 6 (Atlanta: Scholars Press, 1989), 10. 1 chous had about the volume of 6 hin, based on the measurements in Chapter 5, p. 35.

Since P. Rev. not only prescribed prices for sesame and castor but also described a heavy amount of state involvement in the production of these commodities. For this reason, if the Ptolemaic state were successful in generating a high level of supply elasticity, along with the fixed price, then the prices of these commodities should not display much variability. Since there are so

few surviving prices for these commodities, many of which cannot be dated securely, and almost all of which were from the Fayyum (an exceptional region within Egypt), the conclusions drawn here should not be generalized widely. Still, the few data points are valuable because of the variation these prices display, beyond what I would anticipate if the Ptolemaic state's interventions in pricing were effective.

The data demonstrate that the prices dictated in P. Rev. did not necessarily represent the reality of all exchanges. The prices of sesame and castor oils were many times higher than P. Rev.'s prices, but I expect that this difference is due more to the changes in accounting around the end of the third century rather than real price increases. The data on seed prices are more revelatory. In fact, sesame and castor seed prices were in reality 25-75% lower than the fixed prices listed in P. Rev., even in texts that date to around the same time or soon after the Revenue Laws were issued. There is no way to determine with certainty why real seed prices were lower than the prices prescribed by the state, but the reason may be in part that the goal of the Revenue Laws text was to ensure revenue. The state obtained this revenue through the private contractors who bid on the right to the sales of the seed oils; contractors would only bid on these rights if they felt that they could expect a return on their investment. When state agents fixed the retail prices of seeds and seed oils, they were essentially making a calculation of this return on investment more feasible. Moreover, since the laws fixed the prices in a way that was theoretically enforceable, the perceived riskiness of the investment would be minimized. It would be in the state's interest to make this monopoly as attractive as possible to potential investors. For that reason, if I may speculate, it seems possible that Ptolemaic state agents fixed the price of sesame and castor seeds at a level 25-75% higher than their actual market price in order to rate these investments as more lucrative and perhaps also as less risky than they may actually have been.

The price data presented in the tables above further demonstrate that there was wide variability in the prices paid for seemingly similar commodities even within one text. The prices of seeds varied by about 50%, even in the same text, while oil prices varied by about 20-40%, even in the same text, in the same place, roughly around the same time. I was unable to determine with any clarity or security *why* certain prices would be so much higher or lower than others; the texts do not provide enough detail on these matters. My speculative explanation is that differences in the context of payment or perhaps in the specific parties involved might have been the cause of this unexpected variability. The existence of this contemporaneous variation hints that the prices of even these tightly regulated commodities were less predictable than P. Rev. would seem to dictate.

7.3.2 Commodities under Price Regulation: Other Seed Oils and Myrrh

While sesame and castor were monopolized in the sense that only certain agents could buy and sell them at prices fixed by the state, there were other commodities over which the state exerted regulatory control concerning pricing but which were still bought and sold more freely—i.e., by and to whomever wanted to buy or sell them. I am calling these commodities 'commodities under price regulation,' since they were closely regulated but still not monopolized in the same way as were sesame and castor. The criterion that distinguishes what I am calling a 'monopolized commodity' from a 'commodity under price regulation' was whether the state exerted control over who was allowed to buy or sell that commodity. I expect that the price of these commodities under price regulation will have shown greater variability than the price of monopolized commodities. It seems reasonable to suppose that the price would be geographically stable and would also move in a stepped way, changing in response to new regulations. Since, technically

speaking, sellers did not have the power to set their own prices based on their own needs, prices would not have differed much from seller to seller. These prices should thus have been relatively predictable.

Which commodities fit into this category? First, let us consider the case of those seeds other than sesame and castor that were also discussed in P. Rev.: namely, safflower, colocynth, and flax seed. Their status is not immediately clear from the text. In most of P. Rev., these seeds and oils are listed along with sesame and castor. However, in P. Rev. 3/39, where the specific regulation on sales is written---"the cultivators shall not be allowed to sell either sesame or castor to any other person"—only sesame and castor have been explicitly mentioned.[24] Brent Sandy has suggested that all the others also fell under this same regulation but were just not all written out.[25] This sort of omission for convenience is common in Greek, and Sandy's reasoning is highly plausible. However, there is no way to determine with certainty whether these other seeds (safflower, colocynth, and flax seed) could fit into the one regulation where they are not specifically mentioned in the text. Therefore, it seems safest to disaggregate their price data from those of sesame and castor. If the rule were applied only to sesame and castor, then P. Rev. would have fixed the price at which certain other types of seeds could be bought from farmers but would not have regulated who could do such buying. Farmers thus may have had the freedom to sell to a wider variety of buyers, even though the price at which they could do so still should not have been able to deviate from the prices dictated by the state's notice.

In any case, After the seeds were produced into oils, P. Rev. states that the oils should be sealed up in the country; the oils regulated in this way were sesame and castor as well as safflower,

[24] P. Rev., 39/2-7.
[25] Sandy, *Production and Use of Vegetable Oils*, 4-6.

colocynth, and lamp oil (ἐπελλύχνιον).[26] Thus the state also exerted control over the supply of certain oils and could have manipulated their availability on the market to prevent shortages or perhaps price gouging.

As discussed in Chapter 4, the state also issued guidelines on the price of myrrh, so myrrh will also be included as a commodity under price regulation.[27] While the exact price of myrrh was not named, a maximum price was provided and enforced. It is likely that the maximum would have essentially served as a minimum as well, since sellers were in the power position and would want to earn as much as possible on the sale, subject to demand.[28] It must be kept in mind, however, that the guidelines discussed in Chapter 4 were explained in P. Tebt. 1 35, which dates to 111 BCE. I have not been able to find earlier evidence for controls over the price of myrrh, so it is presently uncertain whether similar controls were in place in the period before 186. The analysis of the price of myrrh, and a comparison of the dynamics of myrrh pricing against the pricing of other commodities under price regulation, may provide insight into whether the myrrh price regulations were in place before 111.

The commodities under price regulation in Ptolemaic Egypt are listed in Table 7.9, along with the Greek and Demotic terms used for each of these commodities. The commodities included in this section include safflower seeds and oil, colocynth seeds and oil, flaxseed, lamp oil, and myrrh. Identification of these items in Greek texts poses no real problems, although ambiguities do exist in Demotic. Demotic does not clearly distinguish between the seed and oil forms of safflower, colocynth, and flax, although perhaps the determinative could be of assistance, as was the case for

[26] P. Rev., 40/12-16.
[27] For further discussion and references, see under 4.4.10 "Private Contracting of State Commodity Monopolies."
[28] Ibid.

tgm "castor," above.[29] Likewise the problem of indeterminate *nḥḥ* "oil" resurfaces here—although usually used in reference to sesame oil, there are examples of *nḥḥ* used in lamps.. However, the potential problems with the Demotic evidence in this category are made moot, because I was not able to find Demotic prices for most of these commodities in the surviving textual material.

Table 7.9: Commodities under Price Regulation

Commodity	Greek	Demotic
safflower seeds	κνῆκος	*gḏ* or *gwḏ*
safflower oil	κνήκινος	*gḏ* or *gwḏ*
colocynth seeds	κολοκύνθη	*ḏyry* or *ḏr.t*
colocynth oil	κολοκύνθινος	*ḏyry* or *ḏr.t*
flaxseed, linseed	ἐκ τοῦ λίνου σπέρμα, λίνον	*mḥ*
lamp oil	ἐπελλύχνιον	*nḥḥ*
myrrh	σμύρνα, μύρον	*ꜥnṯ, ḥrꜣ*

Ultimately, of the commodities in this list, there is only enough price data to analyze for safflower seeds and oil. Even for safflower seeds and oil, the data are very limited: only one source beyond P. Rev. exists for the price of each form of the commodity. Along with P. Rev., these additional sources also come from the Fayyum region, so no analysis of geographic variability in prices can be outlined. In the case of safflower seeds, the additional source is P. Lond. 7 1994, an account from the Zenon archive that dates to 251: within a decade of P. Rev. The close temporal proximity of these data points for safflower seed prices precludes an analysis of changes in those prices over time. An even greater problem of comparison exists in the data on safflower seed prices, since P. Rev. quantifies the fixed price in money, while P. Lond. 7 1994 merely sets up

[29] There are no relevant examples in my price data. In theory, if these oils were written like *tgm* "castor oil," they may have been distinguished from seeds with a pot determinative. It should be noted that this suggestion remains highly speculative, but it is not necessary for the analysis below as it does not relate to any of the below examples.

value ratios between safflower seeds and wheat. The additional source for safflower oil luckily tabulates its prices in terms of money, like P. Rev., so comparison may be easier there. The text, P. Tebt. 3 997, dates a bit later in time, to circa 210-183 BCE, so some sense of change over time might be possible in that instance. Still, the fact that this text was written during the massive price increases discussed in Chapter 6, likely due to changes in accounting practices, means that distinguishing the accounting change from real deviation from P. Rev. adds an additional layer of difficulty. Given the paucity of data, it is not possible in the case of these commodities under price regulation to rigorously explore the four dimensions of price variability outlined at the beginning of the chapter. Instead, though, I will compare the few real prices that exist to those prescribed in P. Rev., and I will search for the sort of simultaneous price variability that was found in sesame and castor, above. The data are so limited here, and so unlikely to be representative, though, that the conclusions generated should not be generalized to any extent.

Since the sale of safflower seeds and oil was less tightly controlled than the sale of sesame and castor seeds and oil, at least according to P. Rev., my hypothesis is that safflower prices will show greater variation than the variation seen in sesame and castor prices. Still, given the limited range of the data--especially in the case of safflower seeds (with all the prices dating to the 250s BCE)—I do not expect safflower price variation to be dramatic. With only one source text other than P. Rev. for seeds and oil, respectively, the amount of variation possible is low. Nevertheless, since safflower was less regulated, my expectation is that safflower prices varied more than the prices of the commodities under monopolies.

The extant safflower seed prices are presented below in Table 7.10. Six prices survive: two from P. Rev. (259/8 BCE), and four from P. Lond. 7 1994 (251 BCE), one of the long accounts from the Zenon archive. The proximity of these texts geographically and temporally limits the

amount that can be said about geographic variability or change over time. However, the proximity does make a comparison between the ideal fixed prices of P. Rev. and the actual values of the Zenon account that much more appropriate. P. Rev. quantifies the value of safflower seeds in terms of money, with 1 artaba of seeds equivalent to 1.3333 drachmas (i.e., 1 drachma and 2 obols). This price is listed twice. In the first instance (39/5-6), this is the price the contractors shall pay to the cultivators for their seeds. In the second (53/17), this same price is what the contractors should receive from the oikonomos for any excess seed left behind. This setup is the same as was found for sesame and castor. Unfortunately, the actual recorded prices found in P. Lond. 7 1994 were all tabulated in terms of wheat rather than money, so it is impossible to directly compare these values to the money prices of P. Rev.

Particularly unexpected is the fact that the prices found in P. Lond. 7 1994 do not vary much from each other. Of the four values included in this text, two are identical (.6667 artabas wheat per artaba of safflower seeds). The other two values are lower (.5625 and .6154 artabas wheat), but the percent difference between these values and the more common value of .6667 artabas wheat is not particularly dramatic (15.6250% and 7.6900% percent lower, respectively). To compare the extent of this variability, in the same text, castor seeds all had the same value, but sesame seeds were equated to wheat in two different ratios, with either 4 or 6 artabas wheat per artaba of sesame: a 50% increase from the smaller to the larger value. Thus within this one source text, there was *less* variation in the price of safflower seeds than in the price of sesame seeds: the reverse of my initial expectation. Granted, this finding is based on only one source text and must be treated with extreme caution, but still, it indicates that sesame seed prices seem to have varied more than would be expected based on P. Rev. and even more than other seeds that were less regulated, officially.

Table 10: Prices of Safflower Seeds

Date	*Location*	*Commodity*	*Unit Price (per artaba of safflower seeds)*	*Original Price*	*Source Text*
259/258	Fayyum?	κνῆκος	1.3333 dr.	1 dr. 2 ob. per artaba of 30 choinikes	P. Rev. p. 4-36, 39/5-6
259/258	Fayyum?	κνῆκος	1.3333 dr.	1 dr. 2 ob. per artaba (crossed out: 3 ob.)	P. Rev. p. 4-36, 53/17
251	Philadelphia (Fayyum)	κνῆκος	.6667 artabas wheat	.25 artaba safflower = .1667 artaba wheat	P. Lond. 7 1994, 149
251	Philadelphia (Fayyum)	κνῆκος	.6667 artabas wheat	.25 artaba safflower = .1667 artaba wheat	P. Lond. 7 1994, 172
251	Philadelphia (Fayyum)	κνῆκος	.5625 artabas wheat + 6 choinikes	4 artabas safflower = 2.25 artabas wheat + 6 choinikes	P. Lond. 7 1994, 193
251	Philadelphia (Fayyum)	κνῆκος	.6154 artabas wheat	6.5 artabas safflower = 4 artabas wheat	P. Lond. 7 1994, 350-351

The four surviving safflower oil prices are presented in Table 11, below. Two prices are fixed prices from P. Rev., and two are from P. Tebt. 3 997, which cannot be dated precisely (only circa 210-183 BCE) but is at least fifty years later than P. Rev. Since both texts are from the Fayyum, they cannot be used to search for regional variability. The much later prices in P. Tebt. 3 997 date to the time of the known price increases discussed in Chapter 6, so their higher value must be understood to be related at least in part to the accounting changes of that time. Nonetheless, since both texts describe the prices in terms of money, it is still possible to compare them.

P. Rev. includes two different prices for safflower oil. When the safflower oil is sealed in the countryside, it should have the value of 48 drachmas in bronze per metretes—the same price as most other oils (40/12). Later on in the process, if the contractors leave behind excess oil, they shall receive a lower price of 17.1667 drachmas (i.e., 17 drachmas and 1 obol) per metretes (53/15). As was discussed already above, then, in this case of excess, seeds retained the same

value, but the price of oils dropped. However, the price of safflower oil excess represented a steeper drop (a 64.2361% decrease) than the decrease in the price of sesame oil (a 38.5417% decrease) or castor oil (a 58.3333% decrease).

The prices recorded in the later text, P. Tebt. 3 997, are much higher than those of P. Rev., as would be expected based on their later date. The Tebtunis papyrus includes two different prices for safflower oil: 2500 and 2160 drachmas per metretes (a 5100% and 4400% increase, respectively, from P. Rev.'s original price of 48 drachmas). These increases are dramatic, to be sure, but not out of line with the general increase in prices known from the accounting changes taking place around this time. Thus the seeming increase should not be taken to meaningfully represent a real change in the expense associated with safflower oil.

The existence of two real prices within the same text does indicate that there was simultaneous variability in the price of safflower oil. Within the Tebtunis papyrus, the higher price (2,500 drachmas) is 15.7407% higher than the lower price (2,160 drachmas). Unfortunately the text is quite short and includes no details to explain this price difference. Both prices are included in the same account, which records the receipt of quantities of various oils, some with values attached. In the absence of descriptors to indicate why some safflower oil cost more than other safflower oil, it is perhaps reasonable to expect that the difference was due to other contextual factors in the transaction, such as the precise timing of the purchases or the nature of the relationship between the trading parties. However, in the absence of evidence, these explanations are purely speculative.

In any case, the data do demonstrate that there was variability of over 15% in the price of safflower oil, even within the same text. It should perhaps be noted that this level of variability is lower than the intra-text variability in the price of sesame oil (33%) and castor oil (20-40%)—the

reverse of my initial hypothesis. The data come from only one text aside from P. Rev., so these findings should not be generalized or be assumed to be representative. Nonetheless, it is interesting that intra-text variability in safflower prices is around the same for both seeds and oil (both at a bit over 15%), and safflower seems to vary less than the commodities that were supposedly more tightly regulated.

Table 7.11: Price of Safflower Oil

Date	*Location*	*Commodity*	*Unit Price (per metretes of safflower oil)*	*Original Price*	*Source Text*
259/258	Fayyum?	κνήκινος	48 dr. bronze	48 dr. bronze per metretes of 12 choes	P. Rev. p. 4-36, 40/12
259/258	Fayyum?	κνήκινος	17.1667 dr.	17 dr. 1 ob. per metretes	P. Rev. p. 4-36, 53/15
(210-183)	Tebtunis (Fayyum)	κνήκινος	2,500 dr.	2,500 dr. per metretes	P. Tebt. 3 997 descr., 11
(210-183)	Tebtunis (Fayyum)	κνήκινος	2,160 dr.	2,160 dr. per metretes	P. Tebt. 3 997 descr., 8

All the extant prices for colocynth seeds and oil are presented in Table 7.12. There are two mentions of a colocynth price in P. Rev., plus five transactions in UPZ 2 158 A. Unfortunatetly, no quantities are listed in these transactions, so it is not possible to calculate unit prices and make comparisons to the priced established in P. Rev.

Table 7.12: Price of Colocynth

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
259/258	Fayyum?	κολοκύνθη	.6667 dr./art.	4 ob. per artaba	P. Rev. p. 4-36, 39/6
259/258	Fayyum?	κολοκύνθινος	30 dr./metretes	30 dr. per metretes, 2 ob. per kotyla	P. Rev. p. 4-36, 40/13
243, Mesore 1	Thebes (Upper Egypt)	κολόκυνθα		colocynth = 1/2 1/4 ob.	UPZ 2 158 A, 2/15
243, Mesore 3	Thebes (Upper Egypt)	κολόκυντα		colocynth = 4/26	UPZ 2 158 A, 4/26

Table 7.13: Price of Colocynth (contd.)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
243, Mesore 6	Thebes (Upper Egypt)	κολόκυντα		colocynth = 1/4 ob.	243, Mesore 6
243, Mesore 7	Thebes (Upper Egypt)	κολόκυντα		colocynth = 1/4 ob.	UPZ 2 158 A, 11/71
243, Mesore 9	Thebes (Upper Egypt)	κολόκυντα		colocynth = 1/2 ob.	UPZ 2 158 A, 12/80

The surviving prices for flaxseed are listed in Table 7.13, but unfortunately, not much substantive analysis of these prices is possible. Seven prices exist, one of which is from P. Rev. and represents a prescribed price. P. Rev. dictates that flax seeds should be sold at 3 obols (or .5 drachma) per artaba. None of the remaining prices is in a form comparable to that of P. Rev., either because it is a price in wheat (as in the case of the two examples from P. Lond. 7 1994), the volume unit is not well enough known to be convertible to artabas (as in the case of the δέσμη unit in BGU 7 1511), no volume unit is included at all (P. Tebt. 3 891), or the price comes on the other side of the change in accounting units (BGU 7 1523).

While it is not possible to determine if the price fixed in P. Rev. was followed, it is clear from P. Lond. 7 1994, an account from the Zenon archive, that there was contemporaneous variation in flax prices. This same account lists an artaba of flaxseed as equivalent to an artaba of wheat in one instance (lines 342-343), but earlier, on line 119, one artaba of flaxseed was less valuable, worth only .42 artabas of wheat. This change represents about a 138% increase in the relative price of flaxseed from line 119 to lines 342-343, with no clear difference in the quality of the flax that would justify such a price difference. Thus only about eight years after P. Rev., the price of flax was showing considerably more variability than the Laws prescribe.

Table 7.14: Price of Flaxseed

Date	*Location*	*Commodity*	*Unit Price (per artaba of flaxseed)*	*Original Price*	*Source Text*
Ptolemaic	Medinet Habu (Upper Egypt)	*mḥy*		price of flax (seed?) = 11 deben	Graff. Med. Habu 280
259/8	Fayyum?	ἐκ τοῦ λίνου σπέρμα	.5 dr.	3 ob. per artaba	P. Rev. p. 4-36, 39/7
251	Philadelphia (Fayyum)	λίνον	.42 art. wheat	1035 art.flaxseed = 435 art. wheat	P. Lond. 7 1994, 119
251	Philadelphia (Fayyum)	λίνον	1 art. wheat	1000 art. flaxseed = 1000 art. wheat	P. Lond. 7 1994, 342-343
(210-204) or (193-187)	Egypt	λίνον	8 dr./δέσμη	80 δέσμη = (640 dr.)	BGU 7 1511, 9
(210-204) or (193-187)	Philadelphia (Fayyum)	λίνον σπέρματος	340 dr.	10.5 art. = (3570 dr.)	BGU 7 1523, 2
(199-100)	Tebtunis (Fayyum)	λίνον		400 (dr.?)	P. Tebt. 3 891, 7

I was able to find only one surviving price for lamp oil (listed in Table 7.14). The price comes from P. Rev. and was thus a fixed price rather than evidence of a price paid in practice. Since there is only one data point to work with, no further analysis of lamp oil prices is possible.

Table 7.15: Price of Lamp Oil

Date	*Location*	*Commodity*	*Unit Price (per metretes of lamp oil)*	*Original Price*	*Source Text*
259/258	Fayyum?	ἐπελλύχνιον	30 dr.	30 dr. per metretes, 2 ob. per kotyla	P. Rev. p. 4-36, 40/13

Similarly, only one price survives for white oil (Table 7.15). Nothing can be said about variability for this commodity, therefore, but the price is included for the sake of completeness.

Table 7.16: Price of White Oil

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
259, Artemisios	Fayyum?	ἐλαίον λευκόν	30 dr./hemikadion	1 hemikadion = 30 dr.	P. Cairo Zen. 1 59012, 1/12

As mentioned previously, myrrh might also be worth considering as commodity under price regulation. Three prices for myrrh survive, but none include quantities that would make it possible to calculate unit prices. Unfortunately nothing can be said about myrrh price variability.

Table 7.17: Price of Myrrh

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
305, Tybi	Hermopolis (Upper Egypt)	*ḫrȝ*		price of myrrh: 1 deben 4 qite	P. Loeb 18, 7-8
224, Epeiph 26	Ghoran? Or Magdola? (Fayyum)	μύρα		myrrh = 10 drachmas	P. Coll. Youtie 1 7, 13
(late 3rd c.)	Fayyum	μύρον		2000 dr. as the price of myrrh	SB 18 14042, 6-7

In conclusion, the limited range of data on the prices of those commodities under price regulation prevent me from being able to draw reliable conclusions regarding the variability in these prices. Only the prices of safflower and flax could be analyzed at all, and even then, the conclusions drawn from only a few data points might not accurately represent the reality of these prices in general. The extant data seem to indicate that safflower prices varied less than the prices of sesame and castor seeds and oils, but the price of flaxseed varied more. Much of this conclusion might be due to the relatively more limited selection of price data for safflower, but still, it is possible that this commodity that I expected to show greater price variation than the monopolies actually showed less. Perhaps safflower, colocynth, and flax seeds were actually subject to the same regulations as sesame and castor, as Sandy suggested.[30] The paucity of data prevent a full understanding of the accuracy of these speculative explanations for speculative conclusions.

[30] Sandy, *Production and Use of Seed Oils*, 4-6.

Nonetheless, the extant data are beginning to show that Ptolemaic pricing dynamics were more complex than official texts like P. Rev. imply.

7.3.3 Commodities with Supervised Production: Wine, Agricultural Staples, Beer, and Cloth

The Ptolemaic state was involved, to some extent, in the production of other commodities, although there is no evidence that the prices of these commodities were fixed in a way comparable to the prices of the commodities discussed above. The Ptolemies also managed the production of other commodities, which I am calling 'commodities with supervised production.' Included in this category are wine, staple crops, beer, and cloth.

The nature and extent of state supervision of these different commodities varied. Wine was included in the Revenue Laws, since the apomoira tax on wine was contracted out in a similar manner to the revenues from seed oils; there was thus oversight of wine production even though its retail sale (including its price) was unregulated. Staple crops, especially grains, were managed by the state indirectly. The state issued guidelines regarding how much royal land should be sown with these various crops through what is known as the sowing schedule. Prices were not fixed and there was no regulation of sales of these crops, but the existence of the sowing schedule implies that the state exerted some oversight of the production levels of these crops. In the case of cloth and beer, there is evidence that the state was involved in producing these goods directly, but the production and sale of beer and cloth was not limited to state sponsored agents, as was the case for sesame and castor oil. Thus it seems that the state had some influence over the supply of cloth and beer even if retail trade was not regulated.

For all four groups of commodities with supervised production—wine, crops on the sowing schedule, cloth, and beer—state agents were involved in production and therefore supply

levels. The state's attempt to influence the production levels of these commodities might imply that the state was attempting to maintain a steady supply of them. I expect that if the state were able to successfully minimize shocks to actual supply, wild increases in prices due to shortages could have been likewise minimized. Many of these goods were agricultural in nature, and their price would probably fluctuate seasonally, but successful state regulation of production would mean that prices should have been somewhat predictable from year to year. State oversight of farming throughout the seasons meant that if the yield of a certain crop may have been poorer than expected in a given year, the state would have been aware of the problem ahead of time. Since the state had granaries—its own source of supply for these crops—theoretically the state could have intervened where necessary to maintain a predictable supply—essentially to make supply more elastic. If these interventions were effective, then I would expect the prices of these commodities to have varied less than the prices of completely unmanaged, unregulated commodities. However, prices were not fixed, so my hypothesis is that the level of variation in these prices would still be higher than that of the commodities in the first two categories discussed above. In the following pages, I will discuss the commodities with supervised production in four chunks: wine, crops on the sowing schedule, beer, and cloth.

Unlike the seeds and seed oils that made up our first categories of analysis, wine was not as closely regulated a commodity: anyone could buy and sell it, and its price was not mandated in P. Rev. Wine production was nevertheless discussed in P. Rev. because this production was still closely managed and encouraged. The right to collect the tax on vineyards (the apomoira) was sold at auction to private contractors in a fashion somewhat reminiscent of the sale of the rights to the commodity monopolies discussed previously. Farmers on vineyards and producers of wine

were registered and supervised in order to ensure high production levels and thus high revenue from the tax collected.

The primary difference between the revenues generated from the commodity monopolies and from the apomoira was that trade of monopolized seed oils was restricted to certain parties and/or the price was fixed to certain levels. The apomoira was a tax on the *production* of the wine industry; unlike seed oils, it was not revenue that came from the trade of wine.[31] Depending on the status of the parties involved, this represented a 1/6 or 1/10 tax on the produce of the vineyard, paid either in kind or in cash. The more wine that was produced, the higher the return on the apomoira. To pull in a high price for the rights to the apomoira at auction, the Ptolemaic state included in the revenue laws systems by which the production of wine could be monitored, assessed, and encouraged to grow. Still, once the tax was collected, legally wine could be sold by anyone, to anyone, at any price. Retail trade had no impact on the return on the apomoira.

Before analyzing the wine price data, I had a few general hypotheses regarding what to expect. First, since wine was a less tightly regulated commodity than seeds and seed oils, I would expect its price to be more variable than those commodities, although still less variable than those commodities that were entirely unmanaged. Second, as with any agricultural product, I would expect some seasonal rhythms to pricing. However, since wine did not spoil as easily as other agricultural products, supply was likely more durable throughout the year, and I would expect seasonal variation in wine pricing to be less intense than seasonal shifts for other crops. Third, the management of wine production outlined in P. Rev. was designed to keep wine production (and therefore wine supply) artificially high, so it seems reasonable to expect that the price of wine would drop over time. Especially since the apomoira could be paid in cash, the supply of wine

[31] For further discussion and references on the apomoira, see 4.4.9 "Taxes."

could theoretically outpace demand—the private contractors collecting the tax did not have to concern themselves with the price at which they could sell the wine, since they could be paid for the produce directly in money. Still, wine production could only be amped up so much—grapes for wine are not an easy crop to grow, and it takes years for these plants to mature and for a vineyard to be productive. For that reason, we cannot expect the drop in price to be quick or severe. My fourth hypothesis is based on the more likely scenario that the monitoring of the production of wine theoretically could have prevented a catastrophic supply shock. It seems unlikely that there would be a massive spike in wine prices as a result of poor production if that production had been so closely supervised along the way. Fifth, I expect wine prices to gradually drop as wine gained a greater foothold in Ptolemaic society. The Ptolemies encouraged a proliferation of vineyards; there was wine in Egypt before Ptolemaic rule, but not on a large scale. The land reclaimed in the Fayyum became a major region for wine production, but it took time for that production to develop, as the Fayyum itself developed. My expectation therefore is that wine prices would initially be quite high (especially if most early wine was imported and subject to high customs duties), but as domestic wine production developed, the price would have fallen over the course of the third century. Moreover, since vineyards were more of a regional crop, I would expect to see geographic variation in wine prices. Vineyards were primarily located near centers of Greek culture, such as the Fayyum and parts of Lower Egypt. It seems likely, then, that the supply of wine was lower in the south. Demand for wine might also have been lower in the south, since Egyptian-speakers generally preferred beer to wine. Even if wine were not more expensive in Upper Egypt, its price was still likely more volatile than in the north, due to the lower supply and lower volume of transactions concerning wine.

The wine I will be analyzing in this section falls into three primary types, which in Greek are οἶνος, γλεῦκος (also spelled γλυκύς), and ὄξος. The most general term for wine was οἶνος, for which the Demotic equivalent was *irp*. These terms were used for wine in general, occasionally with descriptors attached to specify imported wine or wine with particular characteristics (e.g., wine that was very old or wine that had a certain bouquet). Second, γλεῦκος is listed in the LSJ as "grape syrup" but more likely was a sweeter wine, probably with lower content of alcohol.[32] Finally, ὄξος is translated in the LSJ as "poor wine, 'vin ordinaire,'" and others have translated as "sour wine," but Bresson has convincingly demonstrated that ὄξος was probably simply vinegar, not wine at all.[33] This vinegar was, as Bresson says, "on the tables of the rich"—he is tempted to suppose that its price would be higher even than the price of high quality wines.[34]

Wine was among the most prevalent commodities of all early Ptolemaic prices, but analyzing the data is not simple. The critical problem with making sense of these prices is the question of volume units. A variety of units were employed; in addition to the familiar metretes and chous in Greek texts and the hin in Egyptian texts, we find various jars: the keramion, hemikadion, kotyla—and regional varieties, perhaps of amphoras: the Chion, Rhodion, and Knidion. In order to make the price data comparable to each other, I would need to convert all the prices in their diverse units into standardized unit prices. However, these jars themselves were not of standardized sizes, so a true calculation of accurate unit prices is impossible.[35] For example, in P. Cairo Zen. 3 59302, eleven different hemikadia-jars of wine were listed, along with their capacity in choes, followed by their value in drachmas. The capacity of the jars varied between 2.5-5.5 choes/hemikadion. Clearly, then, the hemikadion was not a clear, distinct, fixed volume

[32] Alain Bresson, "Wine, oil, and delicacies at the Pelousion customs," 81-86.
[33] Ibid., 86-87.
[34] Ibid., 87.
[35] Ibid., 79 and passim.

unit but rather the name of a common type of jar, the volume of which was not absolutely consistent. Nonetheless, Maresch made an attempt to calculate unit prices for wine, based on his assertion that the metretes and keramion were synonymous as units.[36] He further noted that a metretes could have either 6 or 8 choes, and that 1 chous was equivalent to 12 kotylai.[37] Bresson has calculated that a hemikadion may have had 1/3 the value (and, by extension, capacity) of a keramion. As was discussed in Chapter 5, one hin probably had a volume of around 6 choes.[38] Leaving aside the regional amphoras, then, the following conversions may be used:

Table 7.18: Units of Volume Measurement for Wine

Volume Unit	metretes	keramion	hemikadion	chous	hin	kotyla
Relative Capacity	1	1	3	6 or 8	36 or 48	72 or 96

The conversion chart in Table 7.17 is useful for calculating unit prices, but it should be imagined with giant question marks next to each number: i.e., please take this with a grain of salt.

Further problems with the data set arise. Many prices are not securely dated, unfortunately. Likewise, the data are not geographically representative of all of Egypt, with no prices from lower Egypt and a massive skew towards the Fayyum region.

The Revenue Laws handle wine from different places differently. In particular, the penalties expressed in P. Rev. for non-payment of the apomoira strongly suggest that wine prices in the north and south of Egypt should be analyzed separately. P. Rev. 30/20-31/16 includes a clause specifying this penalty by region:

[36] Maresch, *Bronze und Silber*, 187.
[37] Ibid.
[38] For further discussion and references, see 5.3.2 "Units of Volume Measurement."

ἀποκομίζε[ιν] τὴν ἀπόμοιραν.	Transport of the apomoira:
οἱ δὲ γεωργοὶ τ[ὴ]ν γινομένην ἀπόμοι[ρ]αν [τ]οῦ [- ca.7 -][- ca.18 - ἀπό]μοιραν εἰς τ[ὸ ἀποδόχι]ον .[....].[....]..[... ἀποτ]ινέτω το[ῖς τὴν ὠνὴν] ἔχουσι τῆς ἐνοφειλουμένης αὐτοῖς ἀπ[οκομιδῆς τὴν] τιμήν·	The cultivators [(shall transport)] the due apomoira of […]. [If any of them does not pay the apo]moira […] he shall pay to [the contractor the] value [of the tax which he owes]:
ἐμ μὲν τῆι Λιβύηι καὶ τῶι Σαίτ[ηι καὶ .....] πολίτηι καὶ Προσωπίτηι καὶ Ἀθριβίτ[ηι καὶ Μενε]λαΐδι καὶ Δέλτα τοῦ με(τρητοῦ) τοῦ (ὀκτά)χ(ου) [(δραχμὰς) .]·	in Libya, the Sait[e and …]polite, Prosopite, Athribit[e, the Mene]lite (nomes), and the Delta, [… drachmas] for the metretes of 8 choes;
ἐν δὲ τῶι Σεβεννύτηι καὶ Βουσιρίτηι [καὶ Μενδη-]σίωι καὶ Λεοντοπολίτηι καὶ Σεθρωίτ[ηι κα]ὶ Φαρβαιτ[ί]τηι καὶ τῆι Ἀραβίαι καὶ Βουβαστ[ίτ]ηι καὶ Βουβ[άσ]τωι καὶ Τανίτηι καὶ Μεμφίτ[ηι κ]αὶ Μέμ[φει] καὶ Λητοπολίτηι καὶ Ἑρμοπολίτηι κα[ὶ Ὀξ]υρυγχ[ί]τηι [κ]αὶ Κυνοπολίτηι καὶ τῆι Λίμνηι [κα]ὶ Ἡρακ[λεο]πολίτηι καὶ Ἀφροδιτοπολίτηι (δραχμὰς) ϛ·	in the Sebennite, Bousirite, [Mende]sian, Leontopolite, Sethroite, Pharbaite, Arabia, the Boubastite, Boubastos, the Tanite, the Memphite, Memphis, the Letopolite, Hermopolite, [Ox]yrynchite, Kynopolite, the Lake District, the Herak[leo]polite, and the Aphroditopolite, 6 drachmas;
ἐν δὲ τ[ῆ]ι Θηβαΐδι (δραχμὰς) ε.	in the Thebaid, 5 drachmas.
εἰσπραξάτω [δ]ὲ ὁ [οἰκο]ν[ό]μος τὰ[ς] τιμὰς παρὰ τῶν γεωργῶν κ[α]ὶ κ[α]ταχωρισάτω εἰς τὸ βασιλικ[ὸ]ν \ὑπὲρ/ τῆς ὠνῆς.	The oikonomos shall extract the prices from the cultivators and pay them back to the crown on behalf of the contractor.

The penalty on unpaid apomoira dues on wine from the Thebaid was at a lower rate than wine from other regions (at least 16.6667% lower than Memphis, for example). It therefore seems possible that wine prices may have varied regionally. Contrary to my initial expectation, it seems that wine may have actually been cheaper in the Thebaid than in other regions that produced and consumed more wine. The reasons for this discrepancy cannot be known beyond speculation; for example, perhaps the wine produced in the Thebaid was of a lower quality than the wines of the regions taxed at higher rates. I have separated the wine prices into two tables, with Table 7.18 including all the prices from outside the Thebaid (these data end up representing only the Fayyum), and Table 7.19 including prices from the Thebaid only.

P. Rev. thus records a penalty price of 6 drachmas per metretes for non-payment of the apomoira, due on wine from a variety of regions in Egypt and even Arabia (the penalty price may have been even higher in the Delta and elsewhere, but this penalty falls in a lacuna). However, the actual prices recorded for wine show great variability and volatility, and most are higher than this 6-drachma penalty price.

These prices show a great deal of contemporaneous variability. First we can look at those prices that seem to date before the shift in accounting standards and to be somewhat comparable to each other. Of the prices for regular wine, not imported or filtered, the modal price per metretes was 8 drachmas, with a median of 7.8332 and an average of 7.6496 drachmas. The prices do not show a normal distribution, but some statistics can nonetheless hint at how variable the numbers in each group were from each other. The standard deviation in wine prices outside the Thebaid before 210 was 2.4701 drachmas: 31.5% of the median. The lowest value was 2.7273, with the highest at 16 drachmas: an increase from low to high of 486.66%. The problem of the volume units remains, and not too much should be read into these extreme values. But it is clear that there was significant contemporaneous variation here, with a relatively high standard deviation. Price volatility seems to have escalated after the accounting changes of the late third century. In this later group of prices, the median and modal values were 500 drachmas/metretes, with an average of 482.8611. Although the prices do not display a normal distribution, their standard deviation was 207.7946: 41.5589% of the median (as opposed to a standard deviation 31.5% of the median in the earlier group). If we compare the extremes again, we find 110 drachmas and 1152 drachmas, an increase of 947.2727% from low to high (as opposed to 486.66% between the low and high extremes in the earlier group).

Thus the variability in the price of wine was indeed higher than variability in the price of the more regulated commodities discussed previously. It is impossible to determine the specific causes of this variability with certainty, but I can speculate about a few possible causes. For one, wine may have varied more in quality than did other commodities (i.e., it might not have been as commoditized). After all, imported wines were more expensive than domestic wines; this expense was likely due in part to the high customs owed on imports but also due to the higher perceived quality of imported wines. Since people were therefore able to perceive differences in various wines, it is possible that in the prices for which no descriptors were given, descriptors were still known. In other words, even if a set of texts all recorded the price of simple οἶνος, it is possible that not all οἶνος was of the same perceived quality, and variation in the price of οἶνος may have resulted from these qualitative differences that were not written down. Nonetheless, the higher variability in the prices post-210 BCE is still difficult to account for.

The increase in wine prices did not happen all at once, and there are a few prices that fall at a level intermediate between the earlier values and the very high prices post-210. While the median price level in the earlier group of prices was 7.8332 dr. per metretes, with a high value of 10 or perhaps as high as 12.8 dr. (depending on the conversion of volume units), in 218 BCE, there is one example of a value 14 dr./metretes. Then in 208-206 BCE, right after the accounting changes, there are prices of between 24 to 36 dr.—clearly these were calculated on the earlier value standard, but they are still two to three times higher than the highest previous known value. While the median after the accounting change was 500 dr., one value is also known of 110 dr. from either 206/5 or 189/8 BCE. Not much data exists from this intermediate period, but these few data points do hint at the possibility of an increase in wine prices that was not simply a clear stepped increase due to the accounting shift but rather something more gradual, perhaps even due

to changes in real price of wine in the decade from 210-200 BCE. The potential causes of this increase are too numerous to list; one possibility, however, is that imports became more difficult during the territorial losses at this time. Likewise, as wine became more popular over time, if supply were not able to keep up with the increase in demand, although gradual, prices may have risen in turn. That is, people became more willing to pay more.

Table 7.19: Price of Wine outside the Thebaid

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion, except where noted)*	*Original Price*	*Source Text*
(4th cent.)	Memphis (Lower Egypt)	οἶνος		wine: 5 dr.	SB 14 11963, 2/6
(4th cent.)	Memphis (Lower Egypt)	οἶνος		another wine: 6 dr.	SB 14 11963, 2/7
(4th cent.)	Memphis (Lower Egypt)	οἶνος		wine: 5 dr.	SB 14 11963, 2/8
(3rd cent.)	Fayyum	οἶνος		1 hemichous = 5 ob.	P. Petrie 3 135, 4
(3rd cent.)	Fayyum	οἶνος		wine = 2 dr. 2 ob.	P. Petrie 3 138, 1/5
(3rd cent.)	Fayyum	οἶνος		wine = 3 dr.	P. Petrie 3 138, 2/3
(3rd cent.)	Fayyum	οἶνος		wine, 1.5 choinix = 2 dr. .5 ob.	P. Petrie 3 140a, 7
(3rd cent.)	Fayyum	οἶνος		wine = 2 ob.	P. Petrie 3 142, 4
(3rd cent.)	Egypt	οἶνος		30 dr.	BGU 6 1495, 7
(3rd cent.)	Egypt	οἶνος	8 dr.	1 keramion = 8 dr.	P. Alex. 1, 6 p. 47
(about 270)	Egypt	οἶνος	8 dr.	7 keramia = 56 dr.	P. Hibeh 1 31, Fr. a, 6-8; Fr. b, 15-18
(263-229)	Fayyum?	οἶνος	6.5 dr.(?)	16 (keramia?) = 104 dr.	P. Cairo Zen. 4 59738, 3
(263-229)	Fayyum?	οἶνος	6 dr.(?)	30 (keramia?) = 180 dr.	P. Cairo Zen. 4 59738, 3
(263-229)	Fayyum?	(οἶνος)	4.3333 dr.	2 keramia = 8 dr. 4 ob.	P. Cairo Zen. 4 59739, 12
(263-229)	Fayyum?	οἶνος παλαιός (old wine)	11 dr. bronze	6 keramia = 66 dr. bronze	P. Cairo Zen. 5 59851, Fr. 2, 3
(263-229)	Fayyum?	οἴνου ἀνόσμου (wine without a bouquet)	8.4167 dr.	7 keramia = 58 dr. 3.75 ob.	P. Col. Zen. 2 108, 6

Table 7.18: Price of Wine outside the Thebaid (cont.)

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion, except where noted)*	*Original Price*	*Source Text*
(263-229)	Fayyum?	οἶνος	9 or 12 dr.	1 chous = 1 dr. 3 ob.	P. Lond. 7 2140, 21
(263-229)	Fayyum?	οἶνος	5 and 6 dr.	at 5 and 6 dr./(keramion)	PSI 6 620, 20
(263-229)	Philadelphia (Fayyum)	οἶνος	8 dr.	3 keramia = 24 dr.	SB 16 12811, 10
259, Artemisios	Fayyum?	Οἴνου Χῖ[α (Chian wine)	18 dr.	70 keramia = 1260 dr.; 61 keramia = 1098 dr.	P. Cairo Zen. 1 59012, 1/17, 1/22
259, Artemisios	Fayyum?	Οἴνου Χῖ[α (Chian wine)	9 dr./half-Chion	4 half-Chia = 36 dr.; 2 half-Chia = 18 dr.	P. Cairo Zen. 1 59012, 1/18, 1/ 23
259, Artemisios	Fayyum?	Θάσια (Thasian wine)	20 dr.	3 keramia = 60 dr.; 4 keramia = 80 dr.	P. Cairo Zen. 1 59012, 1/19, 1/24
259, Artemisios	Fayyum?	σηστός (filtered wine)*	12 dr.	1 keramion = 12 dr.	P. Cairo Zen. 1 59012, 1/9
259/8	Fayyum?	(οἶνος)	6 dr.	1 metretes of 8 chous = 6 dr.	P. Rev. p. 4-36, 31/13
(about 256-245)	Fayyum?	Οἶνος	7.2222 dr.	9 keramia = 65 dr.	P. Mich. Zen. 30, 1/5-7
(about 256-245)	Fayyum?	Οἶνος	3.9536 or 5.2715 dr.	75.5 choes = 49 dr. 4.5 ob.	P. Mich. Zen. 30, 3/11
255, Pachons (7-30)	Fayyum?	Οἶνος	12 or 16 dr.	3 kotylai = 3 ob.	P. Cairo Zen. 2 59176 + P. Lond. 7 2167, 110
(255-246)	Fayyum?	Οἶνος	8 dr.(?)	at 8 dr./(?)	P. Lond. 7 2053, 5
(255-246)	Fayyum?	Οἶνος	9 dr.(?)	at 9 dr./(?)	P. Lond. 7 2053, 6
254, Tybi 25	Fayyum?	Οἶνος	8 dr.	9.3333 keramia = 74.6667 dr.	P. Cairo Zen. 3 59499 Ro & Vo l. 85-102, 10
254	Philadelphia? (Fayyum)	οἶνος	7 dr.	2 keramia = 14 dr.	P. Lond. 7 1974 + PSI inv. 3038 Ro ined. (ined.), 37-38
(mid-3rd c.)	Fayyum	οἶνος		wine: 2 dr.	SB 12 10863, 6
(mid-3rd c.)	Egypt	οἶνος		wine = 2.5 ob.	SB 24 16067 Fragments g+I, 3
(mid-3rd c.)	Egypt	οἶνος		wine = 3.75 ob.	SB 24 16067 Fragments g+i, 7

Table 7.18: Price of Wine outside the Thebaid (cont.)

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion, except where noted)*	*Original Price*	*Source Text*
250, Thoth through Tybi	Fayyum	οἶνος	3.5 dr./ker.	a keramion of wine = 3 dr. 3 ob.	PSI 4 368, 1/17
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	6.6 or 8.8 dr.†	12 hemikadia jars = 37 choes = 37 dr. 3 ob.; 10 hemikadia jars = 30 choes = 33 dr.	P. Cairo Zen. 3 59302, 11, 12
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	6 or 8 dr.	5 hemikadia jars = 15 choes = 15 dr.	P. Cairo Zen. 3 59302, 13
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	5.7498 or 7.6664 dr.	4 hemikadia jars = 12 choes = 11.5 dr.	P. Cairo Zen. 3 59302, 14
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	6.4615 or 8.6153 dr.	19 hemikadia jars = 52 choes = 56 dr.	P. Cairo Zen. 3 59302, 15
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	6.1034 or 8.1378 dr.	8 hemikadia jars = 29 choes = 29.5 dr.	P. Cairo Zen. 3 59302, 16
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	2.7273 dr. or 3.6364 dr.	1 hemikadion jar = 5.5 choes = 2.5 dr.	P. Cairo Zen. 3 59302, 17
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	9.6 or 12.8 dr.	1 hemikadion jar = 2.5 choes = 4 dr.	P. Cairo Zen. 3 59302, 18
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	6.9882 or 9.3176 dr.	17 hemikadia jars = 42.5 choes = 49.5 dr.	P. Cairo Zen. 3 59302, 19
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	5.52 or 7.36 dr.	10 hemikadia jars = 25 chous = 23 dr.	P. Cairo Zen. 3 59302, 20
(late 3rd cent.)	Fayyum	(οἶνος)	300 dr.	1 keramion = 300 dr.	P. Harris 2 220, 14, 22, 23, 24, 26
(late 3rd cent.)	Fayyum	(οἶνος)	150 dr.(?)	2 keramia(?) = 300 dr.	P. Harris 2 220, 25
(late 3rd cent.)	Fayyum	(οἶνος)	315 dr.	1 keramion = 315 dr.	P. Harris 2 220, 27
(249-246)	Philadelphia (Fayyum)	οἶνος	5 dr. bronze	1 keramion = 5 dr. bronze	P. Cairo Zen. 3 59327, 44
(247-246)	Fayyum?	οἶνος	10 dr.	85 metretes = 850 dr.	P. Cairo Zen. 3 59341, 13-14
245, Thoth 17	Fayyum	οἶνος		if in need of wine, spend up to 200 dr.	PSI 4 386, 11-12
244, Thoth 13	Fayyum?	οἶνος	6 dr. bronze	at 6 dr. bronze/(?)	P. Cairo Zen. 3 59357, 26
(243-217)	Fayyum		10 dr.	600 metretes = 1 talent	P. Count 13, 3/69
242 or 241, Mecheir 15	Fayyum?	οἶνος	<.1667 dr or <.125 dr.	20 chous. < 1 dr.	P. L. Bat. 20 30, 7-8

Table 7.18: Price of Wine outside the Thebaid (cont.)

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion, except where noted)*	*Original Price*	*Source Text*
241, Phaophi	Fayyum	οἶνος	10 dr./ker.	[wine]: 19 keramia, value [at a rate of] 10 dr. [br]onze/[ker.] - Note that technically "wine" is in the break	PSI 4 396, 11-12
231 or 206, Hyperberetaios	Polemonos Meris (Fayyum)	οἶνος	.6667 dr. bronze or .5 dr. bronze	170 choes at a price per chous of 4 dr. bronze = 680 dr. bronze	CPR 18 5, 3-5
after? 232 or 206, Panemos	Theognis (Fayyum)	οἶνος	.6667 dr. bronze or .5 dr. bronze	750 choes at a price per chous of 4 dr. bronze = [3000] dr. bronze	CPR 18 30, 4-5
226, epagomenal day 5	Fayyum	οἶνος	15 dr./ker.	and 2 keramia of wine, which are worth 30 dr.	P. Sorb. 3 133, 7-8
(late 3rd - early 2nd c.)	Fayyum	οἶνος		Wine = 220 dr.	SB 22 15238, 2/23
(late 3rd - early 2nd c.)	Fayyum	οἶνος	1500 dr./keramion	Wine: from the sale of 16 keramia at 1500 (dr.) = 4 talents	SB 22 15238, vo., 2/39-41
(late 3rd - early 2nd c.)	Fayyum	οἶνος	1400 dr./keramion	wine: another 2 keramia at 1400 (dr.) = 2800 dr.	SB 22 15238, vo., 2/42-45
(late 3rd - early 2nd c.)	Tebtunis (Fayyum)	(οἶνος)	276 dr./Knidion	1 Knidion = 276 dr.	P. Tebt. 3 1079 descr., 12
(late 3rd - early 2nd c.)	Tebtunis (Fayyum)	(οἶνος)	222.0689 dr./Rhodion	29 Rhodia = 1 talent 440 dr.	P. Tebt. 3 1079 descr., 126
(late 3rd - early 2nd c.)	Tebtunis (Fayyum)	(οἶνος)	231.3220 dr./Rhodion	59 Rhodia = 2 talents 1648 dr.	P. Tebt. 3 1079 descr., 128
(late 3rd - early 2nd c.)	Tebtunis (Fayyum)	(οἶνος)	230 dr./Rhodion	1 Rhodion = 230 dr.	P. Tebt. 3 1079 descr., 2
(late 3rd - early 2nd c.)	Tebtunis (Fayyum)	οἶνος	.0606 dr. or .0808 dr.	66 choes(?) = 4 ob.‡	P. Tebt. 3 1079 descr., 23
(late 3rd - early 2nd c.)	Tebtunis (Fayyum)	(οἶνος)	230 dr./Rhodion	1 Rhodion = 230 dr.; 6 Rhodia = 1380 dr.	P. Tebt. 3 1079 descr., 3, 24, 46, 47
(late 3rd - early 2nd c.)	Tebtunis (Fayyum)	(οἶνος)	270 dr./Knidion	1 Knidion = 270 dr.	P. Tebt. 3 1079 descr., 5
218, Phamenoth 27	Kerkesoucha (Fayyum)	οἶνος	14 dr.	126 keramia at 14 dr./metretes of 6 chous	P. Enteux. 34, 4
(before 210)	Ptolemais Hormou? (Fayyum)	οἶνος		wine = 2.5 ob 2 chalkoi	SB 4 7451, 74
(before 210)	Ptolemais Hormou? (Fayyum)	οἶνος		wine from the Delta = 4.5 dr. 2 chalkoi	SB 4 7451, 75

Table 7.18: Price of Wine outside the Thebaid (cont.)

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion, except where noted)*	*Original Price*	*Source Text*
(210-204?) or (193-187?)	Philadelphia (Fayyum)	(οἶνος)	900 dr.	20 keramia = 3 talents; 14 keramia = 2 talents 1600 dr.	BGU 7 1516, 2, 9
(210-204?) or (193-187?)	Philadelphia (Fayyum)	(οἶνος)	500 dr.	2 keramia = 1000 dr.; 1 keramion = 500 dr.	BGU 7 1520, 4, 6, 8, 10
(210-204?) or (193-187?)	Philadelphia? (Fayyum)	(οἶνος)	500 dr.	1 keramion = 500 dr.; 2 keramia at 500 dr./ker.; 3 keramia at 500 dr./ker.	BGU 7 1537, 2, 3, 7, 19, 21, 22
208 or 191, Mecheir 24	Fayyum	οἶνος	700 dr. bronze	45 meteretes as payment for the apomoira, at a rate of 700 dr. bronze (χαλκοῦ πρὸς ἀργύριον) per metretes = 5 talents 1500 dr. bronze (χαλκοῦ πρὸς ἀργύριον)	P. Köln Gr. 5 220, 12-13
(208/7?) or (191/0?)	Tebtunis (Fayyum)	(οἶνος)	300(?) dr.	3.875 (metretes) at a rate of 300(?) (dr.) = 1170 (dr.)	P. Tebt. 3 1062 descr., 2-3
(208-206?)	Memphis? (Lower Egypt)	οἶνος	24 or 32 dr.	12 kotylai at a rate of 2 ob./(kotyla), making 4 dr.	UPZ 1 149, 12
(208-206?)	Memphis? (Lower Egypt)	οἶνος	27 or 36 dr.	16 kotylai = 6 dr.; 11 kotylai at a rate of 2.25 ob./(kotyla), making 4.75 (dr.)	UPZ 1 149, 15, 16
206/5? or 189/8	Philadelphia (Fayyum)	οἶνος	110 dr.	9 keramia = 990 dr.	BGU 7 1501, 6
206/5? or 189/8	Philadelphia (Fayyum)	οἶνος	400 dr.(?)	1 keramion(?) = 400 dr.	BGU 7 1501, 7
206/5? or 189/8	Philadelphia (Fayyum)	οἶνος	500 dr.	2 keramia = 1000 dr.	BGU 7 1506, 3
(about 200)	Fayyum	οἶνος	504 or 672 dr.	1.5 chous = 126 dr.	P. Tebt. 3 885, 18
(about 200)	Fayyum	οἶνος	432 or 576 dr.	4 kotylai = 24 dr.	P. Tebt. 3 885, 32
(2nd c.)	Fayyum	οἶνος		(Y) owes the price of the wine from the vineyard of Ammenemeus: 1 talent, 433 drachmas, 2 obols	ZPE 182 (2012), p. 263-264, 5-8
(early 2nd c.)	Egypt	οἶνος	270 dr.	For wine, a keramion = 270 dr.	SB 24 16004, 5

Table 7.18: Price of Wine outside the Thebaid (cont.)

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion, except where noted)*	*Original Price*	*Source Text*
(early 2nd c.)	Fayyum?	οἶνος	80 dr./chous	apomoira: 348 1/3 choes at a rate of 80 (dr./chous) = 4 talents, 3866 dr. 5 ob.; 251 choes at a rate of 80 (dr./chous) = 3 talents, 2080 (dr.); 86.5 choes = 1 talent, 920 dr.; 33.5 choes, at a rate of 80 (dr./chous) = 2680 (dr.)	P. Hels. 1 3, 1/7, 1/10, 1/12, 2/21
(early 2nd c.)	Fayyum?	οἶνος	60 dr./chous	200 (choes) at a rate of 60 (dr./chous) = 2 talents	P. Hels. 1 3, 2/37
(early 2nd c.)	Tebtunis (Fayyum)	(οἶνος)	432 or 576 dr.	2 kotylai = 12 dr.	P. Tebt. 3 889, 29
(early 2nd c.)	Tebtunis (Fayyum)	οἶνος	864 or 1152 dr.	2 kotylai = 24 dr.	P. Tebt. 3 889, 4
(before 190)	Fayyum	(οἶνος)	400 dr. bronze	231.5 metretes for the apomoira, at a rate of 400 dr. bronze (χαλκοῦ πρὸς ἀργύριον) for each metretes; at a rate of 400 dr. bronze (χαλκοῦ πρὸς ἀργύριον) for each metretes	P. Köln Gr. 5 221 Ro descr. + P. Köln Gr. 5 221 A-H Ro descr., 14-15, 18
(before 190)	Fayyum	οἶνος	400 dr.	at a rate of 400 dr.(/metretes)	P. Köln Gr. 5 221 Ro descr. + P. Köln Gr. 5 221 A-H Ro descr., 40
(before 190)	Fayyum	οἶνος	450 dr.	at a rate of 450 dr./metretes	P. Köln Gr. 5 221 Ro descr. + P. Köln Gr. 5 221 A-H Ro descr., B/10, H/3
(about 190)	Philadelphia (Fayyum)	οἶνος	5.4615 dr./ker.	6.5 keramia for 35.5 dr.	P. Yale 1 40, 20-22

I was also able to collect thirteen prices for wine from the Thebaid, and these prices are presented in Table 7.19, below. Of these, six prices were found on ostraca now at Leiden that cannot be dated more precisely than the Ptolemaic period. If the conversions between deben and

drachmas and between hin and metretes are correct, then the unit prices in these undated texts are extremely high, many thousands of times higher than the prices from the mid-third century BCE. Values this high likely date to after the period in question and are most likely the result of the periods of inflation known from the second century BCE. More interesting for the present purposes are the prices at the end of Table 7.19 that more certainly date to the third century. One of them, P. Rev., was quoted above and dictates that a penalty of 5 drachmas per metretes be paid in cases of non-payment of the apomoira. This value was lower than the 6 drachmas owed in other parts of Egypt, and I speculated that it might be due to a poorer quality of wine in the Theban region or perhaps a lower price because of a relatively low level of demand in this region. However, another Theban text from 243 BCE, O. Taxes 2 157, records higher prices, of perhaps 6 and 8.6667 drachmas per metretes (the units involved are not specified directly); the higher of these two values is 44% above the lower value. O. Taxes 2 150, which dates to sometime in the third century, likewise includes a price of 6 drachmas per metretes. Thus it seems that there was simultaneous variation in the price of wine in the Thebaid of up to 44%, and the penalty price of P. Rev. was about 16.67% lower than the market price of wine in this region 16 years later. Given the high variation recorded in O. Taxes 2 157, it is certainly possible that the price increased by 16.67% over the course of those 16 years (roughly 1% increase annually). It is also possible that wine prices simply varied a great deal depending on the context of the transaction.

Table 7.20: Price of Wine in the Thebaid

Date	*Location*	*Commodity*	*Unit Price (per metretes)*	*Original Price*	*Source Text*
(Ptolemaic)	Thebes (Upper Egypt)	*ỉrp*	36,000 or 48,000 dr.(?)	3 (hin?) = 150 deben	O. Leiden Dem. 201, 4
(Ptolemaic)	Thebes (Upper Egypt)	*ỉrp*		8 deben	O. Leiden Dem. 206, x+3

Table 7.19: Price of Wine in the Thebaid (cont.)

Date	*Location*	*Commodity*	*Unit Price (per metretes)*	*Original Price*	*Source Text*
(Ptolemaic)	Thebes (Upper Egypt)	*irp*	1152 or 1536 dr.	5 hin = 8 deben	O. Leiden Dem. 211 vo., 1/5
(Ptolemaic)	Thebes (Upper Egypt)	*irp*	2160 or 2880 dr.	1 hin = 3 deben	O. Leiden Dem. 213 vo., x+15
(Ptolemaic)	Thebes (Upper Egypt)	*irp*	32,400 or 43,200 dr.(?)	1 (hin) = 45 deben	O. Leiden Dem. 94, 2/3, 2/11
(Ptolemaic)	Thebes (Upper Egypt)	*irp*	6893.4857 or 9191.3143 dr. (if 7 hin), or 48,254.3999 or 64,339.2 dr. (if 1 hin)	7 hin (or 1 hin?) = 67 deben 1/5 qite	O. Leiden Dem. 94, 2/5
303, Hathyr 7	Elephantine (Upper Egypt)	*irp*	2 qite/*ḏp*	Send us 1 *ḏp*-measure of wine ...If we do not pay you in year 2, Pachons, then we will pay you 2 qite silver = 1 stater = 2 qite again, in year 2, Paoni	MDAI Kairo 15 (1957), p. 51, 7
(3rd cent.)	Upper Egypt	οἶνος	.2917 dr./kotyla	6 kotylai = 1 (dr.) 4.5 ob.	O. Strasb. 1 584, 2
(3rd cent.)	Thebes (Upper Egypt)	*irp*	6 dr.(?)	1 (metretes?) = 3 qite	O. Taxes 2 150, 1
260, Tybi 19	Elephantine (Upper Egypt)		20 dr./keramion	keramion (of wine?) = 20 drachmas of silver	UPZ 2 156, 11
259/8	Thebaid	(οἶνος)	5 dr.	1 metretes of 8 chous = 5 dr.	P. Rev. p. 4-36, 31/14
243, Pharmouthi 21	Thebes (Upper Egypt)	*irp*	6 dr.(?)	1 (metretes?) = 3 qite	O. Taxes 2 157, 3
243, Pharmouthi 21	Thebes (Upper Egypt)	*irp*	8.6667 dr.(?)	1 (metretes?) = 4.3333 qite	O. Taxes 2 157, 7

P. Grenf. 1 39 also records a price for wine, sweet oil, and myrrh all together (Table 7.20). Since all three goods are combined in one value, it is not possible to disaggregate the prices more precisely. Nonetheless, it is included here for its value as an order of magnitude and maximum price for each.

Table 7.21: Price of Wine, Sweet Oil, and Myrrh

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
193 or 180 or 169	Gebelein (Upper Egypt)	οἴνου κερ(άμια) υξ μύρον στεφαλίβανος (δραχμαὶ) π ι.		Wine: 460 keramia; sweet oil; myrrh: 80 + 10 (dr.)	P. Grenf. 1 39, 2/1-3

Two prices of sweet wine survive and are presented in Table 7.21, below. Of the three examples from P. Cairo Zen. 1 59012, two quantities were expressed in terms of hemikadia, and both unit prices were equivalent at 4 dr./hemikadion. Bresson suggests that the price might be consistent throughout the text, in which case 3 hemikadia would be equivalent to 1 keramion, and all three unit prices would be 12 dr./keramion.[39] Thus it is possible that this text records consistent prices for sweet wine. One other price dates to nine years later, in 250 BCE, from another text in the Zenon archive. This unit price is half as high as the prices from P. Cairo Zen. 1 59012 at only 6 dr./metretes. Luckily both texts can be dated to specific months, and it is possible that the difference in price may have been seasonal. The higher price is attested from the month of Artemisios on the Macedonian calendar, roughly during the month of April, towards the end of the flood season. The lower price occurred in Payni, roughly June, in the midst of the harvest. For most agricultural products, it would make sense for prices to be lower during the harvest, when supply was shooting up. However, that scenario seems unlikely for sweet wine, since wine would not immediately become more available during the harvest of grapes. I speculate, therefore, that there may have been a real drop in the price of sweet wine over the course of the 250s BCE; it may not have been a full 50% decrease in price, but a price drop nonetheless, in part in response to the increasing supply of wine as the Egyptian vineyards of the Fayyum region developed.

[39] Bresson, "Wine, oil, and delicacies at the Pelousion customs," 80.

Table 7.22: Price of Sweet Wine

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion)*	*Original Price*	*Source Text*
259, Artemisios	Fayyum?	γλεῦκος	12 dr.*	5 keramia = 60 dr.; 11 hemikadia = 44 dr.; 4 hemikadia = 16 dr.	P. Cairo Zen. 1 59012, 1/6, 1/7, 1/11
250, Payni 11	Fayyum?	γλεῦκος	6 dr. silver per 6-chous Arsinoic metretes	40 metretes of 6-chous at 6 dr. silver/metretes	P. Col. Zen. 1 55, 8

* Bresson suggested 3 hemikadia = 1 keramion based on his assumption that the price was consisted in this text. Cf. Bresson, "Wine, oil, and delicacies at the Pelousion customs," 80.

The data on vinegar prices are presented in Table 7.22, below. Twelve such expressions survive, although the intended quantity from P. Cairo Zen. 1 59012 was in a lacuna, and the quantity was not specified in seven other texts. With those examples excluded, we are left with one price at 3 dr. in a text that can be dated only to 263-229 BCE, another for 3 dr. from roughly to 260-200 BCE, a price of 2 dr. from around 259 BCE, and a very high price of 720 or 960 dr. from around 200 BCE, after the switch in accounting standards. The prices of 2 and 3 dr. were at least calculated on the same standard, and there seems to have been an increase of 1 dr. (or 50%) at some time in, or perhaps over the course of, the possible 60 years that might have separated the two texts. Given the lack of a concrete date, the speed of this possible change in price is impossible to pin down. If the volume supplied in the lacuna of P. Cairo Zen. 1 59012 is correct, though, then there may have been 50% variation in the price of vinegar in the Fayyum around 259 BCE. The price from P. Cairo Zen. 5 59851 Fr. 2, although it cannot be dated more precisely than 263-229, provides more evidence that a price of 3 dr. existed in the mid-third century, almost contemporaneously with the 2-dr. value from P. Mich. Zen. 2. Given the high levels of variation seen in all prices thus far, simultaneous variation of 50% does not seem unreasonable.

Table 7.23: Price of Vinegar

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion)*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	ὄξος		vinegar = 1 chalkous	P. Petrie 3 137, 1/10
3rd. cent.	Fayyum	ὄξος		vinegar = 1 chalkous	P. Petrie 3 140d, 5
(263-229)	Fayyum?	(ὄξος)	3 dr. silver	17 keramia = 51 dr. + agio of 5 dr. 1.75 ob. 1 chalkous	P. Cairo Zen. 5 59851, Fr. 2, 9
(mid-3rd c.)	Fayyum	ὄξος		vinegar: 1 chalkous	SB 12 10863, 2
(mid-3rd c.)	Fayyum	ὄξος		vinegar: .5 ob.	SB 12 10863, 15
(260-200)	Fayyum	ὄξος	3 dr.	1 ker. = 3 dr.	P. Lille Gr. 1 58, 4
259, Artemisios	Fayyum?	ὄξος	[3] dr.	[2 keramia] = 6 dr.	P. Cairo Zen. 1 59012, 1/10
(about 259)	Fayyum?	ὄξος	2 dr.	1 keramion = 2 dr.	P. Mich. Zen. 2, 9
244, Thoth 13	Fayyum?	ὄξος		2 dr. 3 ob.	P. Cairo Zen. 3 59357, 28
(late 3rd – early 2nd c.)	Tebtunis (Fayyum)	ὄξος		100.5 (keramia?) at a rate of(?) 1 talent 40 dr.	P. Tebt. 3 1079 descr., 34-35
(about 200)	Fayyum	ὄξος	720 or 960 dr.(?)	10 (dr./kotyla?)	P. Tebt. 3 885, 37
(early 2nd c.)	Tebtunis (Fayyum)	ὄξος		vinegar: 2 (dr.?)	P. Tebt. 3 1086 descr., 14

The data on wine prices demonstrate that there was a great deal of variation, even in contemporaneous texts, for the price of wines and vinegar. The greatest variation was apparent in generic οἶνος from outside the Thebaid—the largest group of prices—with some prices 4-9 times the value of others from around the same time, but variation of around 44-50% was also apparent in the prices of οἶνος from Thebaid, sweet wine, and vinegar. To compare, we have already seen contemporaneous variation levels of 50% for sesame seeds, 33% for sesame oil, 20-40% for castor oil, 15% for safflower seeds and oil, and 138% for flaxseed. Thus the contemporaneous variation visible in the prices of wine in the Thebaid, sweet wine, and vinegar, are only slightly higher than

the variation in the prices of these more regulated commodities. The outlier among all these things is wine outside the Thebaid—the extremely high variation for its prices, especially relative to the other commodities is striking and difficult to explain. It is possible, however, that the demand for wine could have been less elastic if it were perceived to be necessary and without easy subsitutions.

Thus I will leave wine aside for the moment and move onto a discussion of the prices of those crops over which the state supervised production levels. In the third century BCE, the early Ptolemies issued production guidelines for agricultural decision making in the form of the "sowing schedule" (διαγραφὴ τοῦ σπόρου). The dioiketes ordered each local topogrammeteus to devise this schedule as a plan for how much land should be sown with which crops.[40] The instructions of the dioiketes to an oikonomos (P. Tebt. 3 703, lines 49-60, from the late 3rd century) also show that the oikonomos was to inspect the crops after the sowing:

ὅταν δὲ διεξακθῇ ὁ σπόρος, οὐ χεῖρον ἂν γίνοιτο εἰ ἐπιμελῶς ἐφοδεύ- οις· οὕτως γὰρ τὴν ⟦τ⟧ ἀνατολὴν ἀκριβῶς ἐπόψει, καὶ τὰ μὴ καλῶς ἐσπαρμένα ἢ τὸ ὅλον ἄσπορα ῥαιδίως κατανοή- σεις, καὶ τοὺς ὠλιωρηκότας) εἴ [σει ἐκ] τούτου καὶ σοὶ γνώριμον ἔσται ⟦.⟧ [εἴ τινες] τοῖς σπέρμασι εἰς ἄλλα κατα[κ]έ- χρηνται. ἵνα δὲ καὶ τ[οῖ]ς κατὰ τὴν δια- γραφὴν τοῦ σπόρου γένεσιν ὁ νομὸς κατασπείρηται κείσθω σοι ἐν τοῖς ἀναγκαιοτάτοις·	When the sowing has been completed it would be no bad thing if you were to make a careful round of inspection; for thus you will get an accurate view of the sprouting of the crops and will easily notice the lands which are badly sown or are not sown at all, and you will thus know those who have neglected their duty and will become aware if [any] have used the seed for other purposes. You must regard it as one of your most indispensable duties to see that the nome be sown with the kinds of crops prescribed by the sowing schedule.

The goal for his inspections, as expressed in this text, was simply to know how well the sowing was done and to judge which farmers were not acting in accordance with the sowing schedule. There is no mention that the oikonomos should interfere in the way the lands were being farmed or

[40] Andrew Monson, *Agriculture and Taxation in Early Ptolemaic Egypt: Demotic Land Surveys and Accounts (P. Agri.)* (Bonn: Dr. Rodolf Habelt, 2012), 28.

actively to help improve the state of the crops. Thus it seems evident that a key intention behind the sowing schedule was to aim for a high level of *predictability* for the harvest.

The sowing schedule was not dictated from Alexandria and is thus not a real example of central planning.[41] Still, individual farmers did not have a choice regarding how much of their land to farm with which crops.[42] Local officials surveyed the land to ensure that the proper crops were being grown. The state had control over which crops were planted and periodically checked that the cultivation was progressing smoothly, but agricultural production is also dependent on external factors, like the level of the Nile inundation, and no amount of planning could completely control the actual yields of the fields. Nonetheless, the sowing schedule could have assisted the state in maintaining a steady supply of core crops. Since the sowing schedules included land devoted to the monopoly crops—sesame, castor, etc.—and the schedules were mentioned in P. Rev. and P. Tebt. 3 703, Monson has suggested that the schedule's "intention may have been partly to ensure a predictable basis on which tax farmers could underwrite the revenue due the king from oil crops."[43] The sowing schedule seems to have dropped out of use after the end of the third century BCE.[44]

The very existence of the sowing schedule suggests that the production levels of the included crops would have been in accordance with the needs of the kingdom, from the local level on up. The inspections of the land likely were intended to keep production high, which could have

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[41] Pierre Vidal-Naquet, *Le Bordereau d'ensemencement dans l'Égypte ptolémaïque.* Papyrologica Bruxellensia 5 (Brussels: Fondation égyptologique Reine Elisabeth, 1967), 21-24 ; against the earlier view of the sowing schedule as evidence for central planning suggested by Préaux, in C. Préaux, *L'économie royale des Lagides*, 117-19, and Rostovtzeff, in M. Rostovtzeff, *Social and Economic History of the Hellenistic World*, 279, 286, 302-03.
[42] Vidal-Naquet, *Bordereau*, 21-24 ; J. A. S. Evans and C. B. Wells, "The archives of Leon," *Journal of Juristic Papyrology* 7 (1953): 29-70.
[43] Monson, *P. Agri*, 29.
[44] Ibid.

assisted in minimizing supply shocks. Moreover, since rents on these royal lands were usually paid in kind, the state was able to build up storehouses with reserves of these core crops, keeping supply not only high but elastic. In the case of a bad harvest, theoretically at least the state could release some of these reserves to prevent famine or price gouging. For all these reasons, it seems likely that the sowing schedule aimed to increase production levels for core crops and, most importantly, to maintain a predictable, elastic supply of them. If the Ptolemies were successful, i.e., if human planning were indeed able to outweigh the effects of natural variability due to weather environmental causes, then we might expect too see lower volatility in the prices of crops on the sowing schedule than crops that were not on the schedule.

Still, some deviations were possible, and variability in the harvest and in pricing could not be prevented entirely. In addition to the vicissitudes of nature, it must be kept in mind, that the sowing schedule was not always followed perfectly. For example, the verso of SB 1 4369 contains an official letter complaining that too much wheat was sown where safflower should have been in its place.[45] At least on occasion, then, the crops were not sown according to plan—the fact that this merited a letter of complaint, though, indicates that such occurrences were not entirely commonplace; this mistake was clearly noticed and handled through official channels. Moreover, the state did not fix the market price of the crops on the sowing schedule (other than the seeds discussed previously in this chapter). Therefore it is reasonable to expect that the price of these crops would have shown some variation, but still, state supervision was at least intended to ensure some predictability in supply and therefore pricing.

Which crops were included? Surviving sowing schedules list those crops were considered important enough for the state to oversee in this way. One crucial source is P. Petrie 3 75 (235

[45] Discussed in Monson, *P. Agri*, 29.

BCE), which records how about 180,000 arouras of land in the Fayyum was to be farmed. This land represented about a third of the total land in the Arsinoite nome; Monson suggests that this was probably the entirety of royal land in the nome.[46] It is worth analyzing the full text:

β[α]σιλεύοντος Πτολεμαίου [τοῦ] Πτολεμαίου καὶ Ἀρσινόης θεῶν Ἀδελφῶν ἔτους ιβ παρ᾽ Ἀμμων[ίου] νομάρχου τοῦ Ἀρσινοίτου τῆς κατεσπαρμένης γῆς εἰς τὸ ιγ ἔτο[ς] ἕως Ἀθὺρ λ καθότι ἐπέδωκαν οἱ τ[ο]πάρ[χαι ἐν τῶι Ἀρσινοίτηι	In the reign of Ptolemy (III) [son of] Ptolemy (II) and Arsinoe, the divine siblings, year 12. From Ammonios the nomarch. The area of the land of the Arsinoite sown for year 13 up to Hathyr (day) 30, according to the reports of the toparchs in the Arsinoite:
πυρῶι μ(υριάδες) ιγ Δτιε ∠	wheat: 134,315.5
φακῶι ωπ ∠ ις´ λβ´	phakos-lentils: 880.59375
κυάμωι [-ca.?-]	kuamos- beans: […]
κριθῆι μ(υριάδες) β χκ̣ς̣ .	barley: 20,626
[ὀλύρ]αι Γριη ∠ δ´ ῃ´ ι̣ς̣´	[emme]r: 3,119.9375
χόρτωι Δχι̣β ∠ δ´ ῃ´	grass: 4,612.875
ἀράκωι μ(υριὰς) α ρθ ∠ .	vetch: 10,109.5
σησάμωι Σξα	sesame: 6,061
κρότωνι νε	castor: 55
μήκωνι ρ	poppy: 100
[. .] . ωι ρνς ∠	[…] 156.5
[. . . .]ι ε	[…] 5(?)
[. . . .] μ	[…] 40(?)

A great majority (74%) of the land was to be sown with wheat, and the remaining other crops consist mainly of grains (in addition to wheat: barley, emmer, and vetch), legumes (lentils and beans), and fodder for animals, in addition to seeds (sesame, castor, and poppy). Since P. Petrie 3 75 was from the Fayyum, it only directly attests to the crops farmed in that region. However, Monson has noted that BGU 6 1217 (c. 2nd century) might also present comparable information for the Hermopolite nome in the south.[47] The crops mentioned are essentially the same. Table 7.23 lists these crops, along with their Demotic equivalents. I will analyze variability in the price of each of them in turn in the following pages.

[46] Monson, *P. Agri*, 28.
[47] Monson, *Agriculture and Taxation*, 28-29.

Table 7.24: Crops on the Sowing Schedule

Commodity	Greek	Demotic
wheat	πύρος	*sw*
barley	κριθή	*ỉt*
emmer, olyra	ὄλυρα	*bt*
vetch, arakos	ἄρακος	*wrỉ*
grass, hay	χόρτος	*sm*
poppy	μήκων	*mqn*
lentil	φακός	*ʿršn*
bean	κύαμος	

Wheat was the most prominent crop in these sowing schedules; 74% of land was designated to be sown with wheat. Clearly wheat was a priority for the Ptolemaic state, especially as wheat overcame barley and emmer to become to the most popular grain in Egypt, as was discussed in Chapter 4.[48] Luckily, many Ptolemaic wheat prices survive; I have been able to find 86 of these prices, and perhaps more if other terms for wheat are included. The prices for πυρὸς and *sw* are listed in Tables 24 and 25, below.

The split between Tables 7.24 and 7.25 is based on the type of price recorded. Twenty-five of the wheat prices were included in the penalty clauses of contracts and represent valuations of the money to be paid as a penalty for each artaba of grain in case the payment specified in the contract were not made on time. According to the terms of these contracts regarding land rents which were to be paid in kind, non-payment of rent led to a penalty in kind on top of the payment owed. One clear example of such a penalty clause can be seen in P. Hibeh 1 84a, lines 7-9:

ἐὰν δὲ μὴ ἀποδῶι ἀποτεισάτω Ἐπι[μέ]νης Τιμοκλεῖ τιμὴν τῆς ἀρτάβης ἑκάστης δραχμὰς [τέσ]σαρας	But if Epi[me]nes should not pay, then he must pay to Timokles the value of each artaba, [fo]ur drachmas.

[48] See especially 4.3.3 "Agriculture."

In these lines, wheat is not mentioned directly, but this grain is specified earlier in the contract. If Epimenes were to fall through on the payment that, by this contract, he would owe Timokles in wheat, then he would be required to pay Timokles a penalty on the value of the wheat he owes. That penalty is quantified as the value of each artaba of wheat in terms of money. The valuations in penalty clauses like these are clearly valuable as prices even if they do not represent a planned exchange, and penalty valuations constitute a majority of the prices listed by Cadell and Le Rider in *Prix du blé.*[49] However, the penalty clause valuations might not have matched the market price of wheat. In texts that include both a market price (i.e., the standard rent) and a penalty price (in case of non-payment of that rent), the penalty price tends to be 10 times the market price; after all, it was a penalty. As von Reden has written, "penalty prices were not market prices" and "penalty prices may not have been very sensitive to actual price fluctuation."[50] Noting that potential difference, Maresch referred to these as *Strafpreise* and listed them separately in his tables as well.[51] I have listed the penalty valuations in Table 7.25, after the more typical prices of Table 7.24.

While plentiful, the data for wheat prices in both tables are still not without problems. Many texts cannot be dated precisely, with a number of texts dated only to the Ptolemaic period in general. These undated texts display the variety of prices attested for the Ptolemaic period but obviously cannot yield much information on contemporaneous variation or change from time period to time period.

Despite these caveats in the dating of the texts, an analysis of the pricing dynamics is still possible. As discussed in the initial introduction to this chapter, weather and other environmental

[49] Cadell and Le Rider, *Prix du blé*, 28-31.
[50] von Reden, *Money in Ptolemaic Egypt*, 70.
[51] Maresch, *Bronze und Silber*, 184.

factors would have played the largest role in determining the scale of the harvest. The sowing schedules may have been able to make supply more elastic, but only if this potential elasticity were realized in actuality: that is, if the state and individuals did not hoard their reserves or engage in price speculation in the face of a poor harvest. It is theoretically possible that there may have been some geographic variation in the price of wheat at the beginning of the period, given the differences in grain preferences outlined in Chapter 4, with wheat being strongly preferred among the Greek-speaking population, particularly in the Fayyum. However, if the prices were actually more geographically stable, then we cannot discount the possibility that the state may have adjusted the sowing schedules to account for local preferences and keep prices consistent. Ultimately, if the state's planning were able to outweigh the effects of nature (supply) and human preferences (demand), then we would expect to see wheat prices that were less volatile than the prices of unmanaged commodities (discussed later in this chapter) but more volatile than the prices of the more closely regulated commodities (those under commodity monopolies or price regulations).

I will begin my analysis with the 'market' prices of wheat (Table 7.24), followed by a separate analysis of the prices found in penalty clauses (Table 7.25). The prices from Table 7.24 were mostly written in the Fayyum, with some examples from Upper Egypt. However, the Upper Egyptian texts are undated and thus not as helpful for the present analysis. Thus most of this analysis represents the dynamics of wheat prices outside Upper Egypt and should not be generalized to the whole of Egypt.

In the period before the shift in accounting standards, the market price of wheat showed dramatic variability. Just within the set of securely dated texts in the 250s BCE, we see a low value of 1.0417 dr./artaba and a high of 5.3333 dr./artaba (an increase of 411.98% from low to high).

Within one text, we see variation of up to 50%, from 2 to 3 dr./artaba in P. Lond. 7 1996. These levels of variation seem similar to the variation seen in the price of wine outside the Thebaid, which might indicate that a high number of data points is closely correlated with high levels of variation.

Variation of over 4x in the price of wheat, the most basic commodity of Ptolemaic life, within one decade, is rather surprising. While the state did not fix wheat prices, there was a great deal of oversight of the amount of land sown with wheat, and it seems that the state went to great efforts to ensure a predictable wheat supply. While the high variability in wheat prices may be due in part to the high number of surviving prices, seasonal factors should also be considered. If the variability were seasonal, I would expect prices to be lowest during and right after the harvest (when supply would be highest) and highest soon before the harvest (when supply would be low). Of those texts from before 210 BCE that are dated to a specific month (leaving aside extreme outliers), the highest price could be found from Mecheir in 256 BCE: a value of 2.8571 dr./art. (P. Mich. Zen. 28). Mecheir was indeed in the middle of the growing season. The lowest price, 1.0417 dr./art., was from the month of Pharmouthi in 252 BCE (P. Cairo Zen. 5 59825). Pharmouthi is the last month of the growing season, right before the harvest: just the time I would expect the price to be at its highest. This finding seems to hint that seasonality alone cannot explain the price volatility. Likewise, the same price (1.3333 dr./art.) is attested from the growing season (Tybi, Xandikos, Mecheir-Hathyr) and the harvest (Epeiph). Nonetheless, seasonal factors cannot be ruled out. During the floods, three prices are attested: one example of 2 dr./art. and two examples of 1.5 dr./art: unlike during growth and harvest, no values under 1.5 dr./art. are known from the time of the flood. Thus it seems quite possible, in the end, that wheat prices in general were higher during the flood season than in the growing or harvest seasons.

There is no way to determine with certainty the causes of the wide variability in wheat prices. I think it is likely that there was some seasonal variation, with prices a bit higher during the flood. Nonetheless, this seasonal variation was very minor when compared to the levels of variation even within one season. For example, the price data from texts dated to a particular month before 210, leaving aside extreme outliers, actually yields an average price of 1.6667 dr./art. during the flood, 1.5109 dr./art. during the growing season, and 1.75 dr./art. during the harvest: an increase of only 15.825% from the least to the most expensive average season. However, within the growing season, we find the lowest and highest prices, 1.0417 and 2.8571 dr./art.: an increase of 174.2728% from the lower to the higher value. There was much greater price variation within seasons than when we compare seasons to each other. Thus seasonality cannot explain all the variability in wheat prices.

In theory, extreme variability in prices can sometimes be caused by a lack of information: if buyers and sellers do not know what other people are paying for a thing, they might agree to prices that are not in line with what others have been paying. However, the Ptolemaic evidence indicates that these ancient actors actually had a good idea of what typical price levels should be. For example, P. Köln 5 217 is a letter from Asklepiades to Theodoros, in which Asklepiades records the price of white wheat (πυροῦ λευκοῦ) in Memphis over the course of five days in the month of Pachons, either in 212 or 195 BCE. On each day, wheat was selling at 170 dr./art. even though the typical price was 180 dr./art.: essentially, wheat was selling at a discount of 10 dr./per artaba (a 5.5555% discount). The discount was not particularly extreme, but the very fact that Asklepiades was able to notice and comment on the lower-than-expected price proves that he had expectations, he knew what the price should normally be, what the same wheat normally sold for in the agora of Memphis. The fact that Asklepiades had expectations regarding the price of wheat

hints to me that the extreme variability in wheat prices cannot be explained entirely by a lack of information.

Thus far I have been leaving out those prices that seem to be outliers, but even stranger prices are evident. One text, P. Cairo Zen. 3 59325, includes prices of between .5555 and .5833 dr./art., roughly half to a fourth of the expected price of wheat. The exact reasons for these very low values are inscrutable. However, it is possible that in this text, a rental agreement, there was a significant power imbalance between landlord and lessee that led to a sort of predatory pricing. The text lists a number of kleruchs, from whom Zenon was leasing land, farming that land by means of his own hired cultivators.[52] Zenon generally was paying rents in kind, but it seems that he could also convert the payment he owed into an amount in money and pay in cash instead, based on equivalences set up in the text (for example, 7 artabas of wheat are equivalent to 4 drachmas on line 1/18). These money payments were very low compared to the market price of wheat, so if Zenon were paying in cash according to these rates, he would have been benefiting extraordinarily from the deal. It is possible that Zenon's high social position allowed him to exploit his kleruchic landlords. This example seems to highlight the potential that differences in the social capital of the parties involved in these transactions may have impacted prices.

The data for the market price of wheat show wild variability in wheat prices: variability beyond that which could be explained based on seasonal rhythms. The variability in wheat prices was similar to the high variability in wine prices discussed previously. Even within securely dated texts from the 250s BCE, prices varied over 4x at the extremes, and 50% within a single text. The

[52] C. C. Edgar, *Catalogue Géneral des Antiquités égyptiennes du Musée du Caire, nos. 59298-59531: Zenon Paypri, Volume III* (Cairo : Imprimerie de l'Institut Français d'Archéologie Orientale, 1928), 27-30.

reasons for this variability cannot be determined with certainty, but seasonality and a lack of information cannot alone explain all the price differences.

Table 7.25: Price of Wheat

Date	*Location*	*Commodity*	*Unit Price (per artaba of wheat)*	*Original Price*	*Source Text*
(4th cent.)	Herakleopolites (Upper Egypt)	*sw*	1.1667 dr.	400 (art.?) = 23.3333 deben	Enchoria 14 (1986), p. 21-22, 1/11
(Ptolemaic)	Thebes (Upper Egypt)	*sw*	30 dr.	1 art. = 1.5 deben	O. Leiden Dem. 139, x+3
(Ptolemaic)	Thebes (Upper Egypt)	*sw*	2640 dr.	1/6 art. = 22 deben; 1/24 art. = 5.5 deben	O. Leiden Dem. 139, x+6, x+8
(Ptolemaic)	Thebes (Upper Egypt)	*sw*	2400 dr.	1/12 art. = 10 deben; 1/24 art. = 5 deben	O. Leiden Dem. 139, x+7, x+9
(Ptolemaic)	Thebes (Upper Egypt)	*sw*	10 dr.	50(?) art. = 25 deben	O. Leiden Dem. 148, x+9
305, Tybi	Hermopolis (Upper Egypt)	*sw*		price of 6 artabas of wheat = 4 silver qite (ḥḏ qt(.t) 4(.t))	P. Loeb 18, 8
302, Thoth	Djeme, Thebes west (Upper Egypt)	*sw*	.00416667 deben/art.	Its provision for 12 days: 4 artabas of wheat per day, making a total of 48 artabas = 2 silver qite; Their food for 8 days: at the rate of 4 artabas of wheat per day, making a total of 32 (artabas of wheat) = 1 1/3 silver qite	P. Phila. Dem. 30, 1/5, 2/13
(299-200)	El-Lahun? (Fayyum)	πυρὸς	2 dr.	1405 art. = 2811 dr. .75 ob.; 185.5 art. = 371 dr.	P. Petrie 3 80 a, 2/16, 2/22
(271-246)	Herakleopolites (Upper Egypt)	(πυρὸς)	2 dr.	20 art. = 40 dr.	P. Hibeh 1 110 ro.
(271-246)	Herakleopolites (Upper Egypt)	πυρὸς	4.8333 dr.	294 art. = 1421 dr.	P. Hibeh 1 110 ro., 11
271, Daisios 20	Upper Egypt	πυρὸς	2.1667 dr.	70 art. = 151 dr. 4 ob.	P. Hibeh 1 99, 13-15
267, Phaophi 11	Egypt	(πυρὸς)	2 dr.	6 art. = 12 dr.	P. Hibeh 1 100, 6
(263-229)	Fayyum?	(πυρὸς)	4.3333 dr.	900 art. at 4 dr. 2 ob. per art.	P. Cairo Zen. 4 59753
(260-258)	Fayyum?	πυρὸς	1.5 dr.	6 art. = 9 dr.	P. Cairo Zen. 4 59698, 5

Table 7.24: Price of Wheat (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of wheat)*	*Original Price*	*Source Text*
(260-236)	Fayyum	πυρὸς	1.5 dr.	15 art. = 22 dr. 2 ob.	P. Petrie 3 47 a, 3
(about 256, Epeiph 10?)	Philadelphia? (Fayyum)	[πυρὸς]	1.3333 dr. bronze	1 dr. 2 ob. bronze per artaba	P. Iand. Zen. 1, 4
256, Mecheir 5	Aphroditopolis (Upper Egypt)	πυρὸς	2.8571 dr.	241 art. at .1428 chrysous/art.	P. Mich. Zen. 28, 11
255/4, Mecheir 18 - Hathyr 4	Philadelphia? (Fayyum)	Θηβ(αίου) πυ(ροῦ)	1.5 dr.	10 art. = 15 dr.	P. Cairo Zen. 4 59745, 33
255/4, Mecheir 18 - Hathyr 4	Philadelphia? (Fayyum)	Συρ(ίου) πυ(ροῦ)	1.5 dr.	10 art. = 15 dr.	P. Cairo Zen. 4 59745, 39-40, 52
255/4, Mecheir 18 - Hathyr 4	Philadelphia? (Fayyum)	Συρ(ίου) πυ(ροῦ)	1.3333 dr.	9 art. = 12 dr.	P. Cairo Zen. 4 59745, 56-57
255/4, Mecheir 18 - Hathyr 4	Philadelphia? (Fayyum)	Θηβ(αίου) πυ(ροῦ)	1.5 dr.	20 art. = 30 dr.	P. Cairo Zen. 4 59745, 68
254, Hathyr 30	Fayyum?	πυρὸς	1.5 dr.	20 art. = 30 dr.	P. Cairo Zen. 3 59499, 3-4
254, Choiak 28	Fayyum?	πυρὸς	1.5 dr.	20 art. = 30 dr.	P. Cairo Zen. 3 59499, 5
254, Tybi 25	Fayyum?	πυρὸς	1.3333 dr.	22.5 art. = 30 dr.; 51 art. = 68 dr.	P. Cairo Zen. 3 59499, 7, 9
254	Philadelphia? (Fayyum)	πυρὸς	1.1667 dr.	5 art. = 5 dr. 5 ob.	P. Lond. 7 1974 + PSI inv. 3038 Ro ined., 37-38
252	Philadelphia (Fayyum)	(πυρὸς?)	5.3333 dr.	1 art. = 5 dr. 2 ob.	P. Cairo Zen. 3 59320
252	Philadelphia (Fayyum)	(πυρὸς?)	5.2780 dr.	90.5 art. 5 chous = 477 dr. 4 ob.	P. Cairo Zen. 3 59320
252, Pharmouthi 2	Fayyum?	πυρὸς	1.0417 dr.	60 art. at 1.0417 dr./art.	P. Cairo Zen. 5 59825, 6
252/1	Fayyum?	πυρός	2 dr. bronze	wheat: 1.5 artabas = 3 dr. bronze	PSI 6 571, 16

Table 7.24: Price of Wheat (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of wheat)*	*Original Price*	*Source Text*
250, Xandikos	Philadelphia? (Fayyum)	πυρὸς	1.3333 dr. bronze	1 art. = 1 dr. 2 ob. bronze	P. Col. Zen. 1 54, 1/16, 2/33
250	Fayyum?	πυρὸς	3 dr.	135.25 art. = 405 dr. 4.5 ob.	P. Lond. 7 1996, 41
250	Fayyum?	πυρὸς	2 dr.	4.0833 art. = 8 ob.	P. Lond. 7 1996, 71
(249)	Fayyum?	πυρὸς	.5714 dr.	7 art. = 4 dr.	P. Cairo Zen. 3 59325, 1/18, 1/24
(249)	Fayyum?	πυρὸς	.5833 dr.	2 art. = 1 dr. 1 ob.	P. Cairo Zen. 3 59325, 2/34
(249)	Fayyum?	πυρὸς	.5729 dr.	8 art. = 4 dr. 3.5 ob.	P. Cairo Zen. 3 59325, 2/38
(249)	Fayyum?	πυρὸς	.5555 dr.	1.5 art. = 5 ob.	P. Cairo Zen. 3 59325, 2/44
(249-247)	Fayyum?	πυρὸς	2.8571 dr. silver	7 art. = 20 dr. silver	P. Cairo Zen. 3 59326 + P. Lond. 7 2002 + P. Cairo Zen. 3 59326 bis, 28
(237/6?)	Dios Polis (Upper Egypt)?	*sw*	5.5 qite/art.	1 artaba of wheat, 5 1/2 qite, 1 1/4 (obols), the tr 1 1/4 qite	Dodson e.a. (ed.), A good scribe and an exceedingly wise man. Studies W. J. Tait p. 25-56, 1/10
234, Thoth 9	Oxyryncha (Fayyum)	πυρὸς	6 dr.	500 art. = 3000 dr.	P. Heid. Gr. 6 383, 8, 20
222/3, Gorpaios 21	Themistou Meris (Fayyum)	πυρὸς	4 dr. silver	each artaba = 4 silver dr.	P. Tebt. 3 815, fr. 3, 14-15
212 or 195, Pachons 6	Memphis (Lower Egypt)	πυροῦ λευκοῦ	170 dr.	[x artabas] sold at a rate of 170 dr.	P. Köln 5 217, 5-6
212 or 195, Pachons 6	Memphis (Lower Egypt)	πυροῦ λευκοῦ	180 dr.	frequently the same wheat sells in the agora at a rate of 180 dr.	P. Köln 5 217, 6
212 or 195, Pachons 7	Memphis (Lower Egypt)	πυροῦ λευκοῦ	170 dr.	[x artabas] of the same wheat sold at a rate of 170 dr.	P. Köln 5 217, 7
212 or 195, Pachons 7	Memphis (Lower Egypt)	πυροῦ λευκοῦ	180 dr.	frequently the same wheat sells at a rate of 180 dr.	P. Köln 5 217, 8
212 or 195, Pachons 8	Memphis (Lower Egypt)	πυροῦ λευκοῦ	170 dr.	52 artabas of the same wheat at a rate of 170 dr.	P. Köln 5 217, 8
212 or 195, Pachons 8	Memphis (Lower Egypt)	πυροῦ λευκοῦ	180 dr.	frequently the same sells at a rate of 180 dr.	P. Köln 5 217, 9
212 or 195, Pachons 9	Memphis (Lower Egypt)	πυροῦ λευκοῦ	180 dr.	frequently the same sells for [1]80 dr.	P. Köln 5 217, 10

Table 7.24: Price of Wheat (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of wheat)*	*Original Price*	*Source Text*
212 or 195, Pachons 10	Memphis (Lower Egypt)	πυροῦ λευκοῦ	170 dr.	6 artabas of the same wheat at a rate of 170 dr.	P. Köln 5 217, 11
212 or 195, Pachons 10	Memphis (Lower Egypt)	πυροῦ λευκοῦ	180 dr.	frequently [the same wheat sells for 180 dr.]	P. Köln 5 217, 11
(210-204?) or (193-187?)	Philadelphia (Fayyum)	πυρὸς	166.6 dr.	100 art.? = 1666 dr.	BGU 7 1532, 11
(210-204?) or (193-187?)	Philadelphia (Fayyum)	πυρὸς	155 dr.	308 art. = 7 talents, 3740 dr.	BGU 7 1532, 12
(210-204?) or (193-187?)	Philadelphia (Fayyum)	πυρὸς	180 dr.	259 art. = 15 talents, 2740 dr.	BGU 7 1532, 13
(210-204?) or (193-187?)	Philadelphia (Fayyum)	(πυρὸς?)	160 dr.	35 art. at 160 dr. per art.	BGU 7 1536
(210-183)	Thebes (Upper Egypt)	(πυρὸς?)	180 dr.	47.5 art. = 427.5 deben	O. Leiden Dem. 100
206 or 189, Tybi	Philadelphia (Fayyum)	πυρὸς	87.7063 dr. bronze	117.5 art. = 1 talent, 4305 dr., 3 ob.	BGU 7 1505, 3
(about 205)	Elephantine (Upper Egypt)	*sw*	4.5 qite/art.	But do not let an end come to some little grain while its price is 4.5 qite per artaba of wheat here.	Depauw, The Demotic letter p. 348-350 vo., 6-7
(200?) or (176?)	Herakleopolites (Upper Egypt)	πυρὸς	100 dr.	517 art. at 100 dr./art.	BGU 20 2840, 16
(early 2nd c.)	Hermopolites (Upper Egypt)	σῖτος	2 dr. bronze per art.	10,000 art. wheat at a rate per artaba of 2 dr. of bronze = 10 talents, 1615 dr. (but this math doesn't seem to work out!)	SB 18 13619, 14-15
190/89	Herakleopolis (Upper Egypt)	πυρός	300 dr./art.	10,800 bronze drachmas as penalty price for 36 artabas of wheat	P. Heid 8 417, 21-22
186, Xandikos 2	Herakleopolis (Upper Egypt)	πυρός	300 dr./art.	loan agreement with a value of 100 artabas of wheat, i.e., 30,000 drachmas	P. Heid. 8 412, 13-14

The penalty prices of wheat, however, were considerably more regular than the market prices of the same commodity. As penalties, these prices were much higher (roughly 4 times as high) as the market prices from the same time. Moreover, the penalty prices increased in a clear, stepped manner. At the beginning of the Ptolemaic period, the penalty for non-payment of rent was 4 dr./art., increasing to 10 dr./art. around 216 BCE – an increase of 2.5x.[53] In general, the penalty prices were quite regular, with only one text deviating from these standards within each time period.

Why might the penalty prices have behaved more predictably than the market prices? One difference in the data between the market and penalty prices is that the penalty prices recorded here mostly came from Upper Egypt. It is theoretically possible that wheat prices were less volatile in the south, but P. Enteux. 55 does record a penalty price from the Fayyum of 4 dr./art.: the same penalty paid throughout the rest of Egypt at that time. A more likely explanation, I believe, is von Reden's: the penalty prices were not market prices.[54] They were more standardized and simply did not fluctuate very much based on supply and demand or other factors.

Table 7.26: Price of Wheat from Penalty Clauses

Date	*Location*	*Commodity*	*Unit Price (per artaba of wheat)*	*Source Text*
305, Tybi	Hermopolis (Upper Egypt)	*sw*	4 dr.*	P. Loeb 3, 16-19
286/5 or 266/5 or 228/7	Takona? (Upper Egypt)	πυρὸς	4 dr.	BGU 6 1267, 12-13
285/4, Dios	Peroe (Upper Egypt)	πυρὸς	4 dr.	P. Hibeh 1 84a, 8-9

[53] This increase of 2.5x in penalty prices is mirrored in emmer penalty prices, below, from around the same time. It is also paralleled in Brian Muhs' unpublished Nag' el-Mesheikh ostraca, which show a 2.5x increase in the price of transport, attested for 212 and 211 BCE. Brian Muhs, personal communication, February 21, 2018.

[54] von Reden, *Money in Ptolemaic Egypt*, 70.

Table 7.25: Price of Wheat from Penalty Clauses (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of wheat)*	*Source Text*
(about 265), Hathyr 4	Egypt	(πυρὸς)	4 dr.	P. Hibeh 1 65
259, Choiak	Oxyrynchites (Upper Egypt)	(πυρὸς)	4 dr.	BGU 6 1226
258, Thoth	Oxyrynchites (Upper Egypt)	(πυρὸς)	4 dr.	BGU 6 1228
222, Choiak 13	Hiera Nesos (Fayyum)	πυρὸς	4 dr.	P. Enteux. 55, 16-17
222, Gorpaios	Tholthis (Upper Egypt)	πυρὸς	5 dr.	P. Hibeh 1 90, 15
216/5	Oxyrynchites (Upper Egypt)	πυρὸς	10 dr.	BGU 6 1262, 12
215/4, Audnaios	Tholthis (Upper Egypt)	πυρὸς	[10] dr.	BGU 10 1943, 12, 14
215/4	Tholthis (Upper Egypt)	[πυ]ρὸς	10 dr.	BGU 10 1959
215/4, Xandikos	Tholthis (Upper Egypt)	πυρὸς	10 dr.	BGU 10 1969, 8
215/4	Tholthis (Upper Egypt)	πυρὸς	[10 dr.]	BGU 14 2383, 12
215/4	Tholthis (Upper Egypt)	πυρὸς	10 dr.	BGU 14 2384, 10-11
215/4, Peritos	Tholthis (Upper Egypt)	πυρὸς	10 dr.	BGU 6 1263
215/4, Peritos	Tholthis (Upper Egypt)	πυρὸς	10 dr.	BGU 6 1264, 22-23
215/4, Peritos	Tholthis (Upper Egypt)	πυρὸς	10 dr.	P. Frankf. 2, 26
214/3	Tholthis? (Upper Egypt)	πυρὸς	10 dr.	BGU 10 1944, 12
214/3, Hyperberetaios	Tholthis (Upper Egypt)	πυρὸς	12 dr. bronze	BGU 14 2397, 10-11, 29
214/3	Tholthis (Upper Egypt)	πυρὸς	10 dr.	BGU 6 1265, 20
213, Panemos	Tholthis (Upper Egypt)	πυρὸς	10 dr.	P. Frankf. 1, 23-24, 75-76
213/2, Gorpaios	Tholthis (Upper Egypt)	πυρὸς	10 dr. bronze	BGU 10 1946, 12

* P. Loeb 3 records 1 deben for 5 artabas.

One surviving price records the value of Greek κάκις, which Maresch argues could be a reference to wheat, and I have included it separately in Table 7.26, below. The value, 7.5 drachmas per artaba, in a text that dates to around 208-206 BCE, seems rather low as a market price for that date if it is indeed a reference to wheat.

Table 7.27: Price of Kakis

Date	*Location*	*Commodity*	*Unit Price (per artaba of kakis)*	*Original Price*	*Source Text*
(208-206?)	Memphis? (Lower Egypt)	κάκις*	7.5 dr.	2 art. = 15 dr.	UPZ 1 149, 24

* Maresch interprets this price as a reference to wheat, referencing Egyptian kᶜkᶜ. Maresch, Bronze und Silber, 181 & n. 4. See also LSJ 860b.

The prices of some other products related to wheat, wheat flour, wheat meal, and wheat cake, have also survived and are included in Tables 27-29. It seems logical that the prices of these wheat products would move in tandem with the price of raw wheat. Unfortunately, only one price remains for each of these commodities, so no further testing of this hypothesis was possible.

Table 7.28: Price of Wheat Flour

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(3rd c.)	Egypt	σεμίδαλις		10 dr.	BGU 6 1495, 40

Table 7.29: Price of Wheat Meal

Date	*Location*	*Commodity*	*Unit Price (per artaba of wheat flour)*	*Original Price*	*Source Text*
(259?)	Palestine?	ἄλευρον	4 dr.	5.5 art. = (22 dr.)	P. Cairo Zen. 1 59004 vo., 2/76

Table 7.30: Price of Wheat Cake (Fodder)

Date	*Location*	*Commodity*	*Unit Price (per artaba of wheat-cake)*	*Original Price*	*Source Text*
251	Philadelphia (Fayyum)	βωλόπυρος	.5965 art. wheat	57 art. wheat-cake = 34 art. wheat	P. Lond. 7 1994, 340-341

After wheat, barley ranked second on the sowing schedule in terms of the amount of land dedicated to the crop. As was discussed in Chapter 4, barley had a long history in Egypt, but over the course of the Ptolemaic period, barley waned in popularity due to the rise of wheat as the preferred staple grain.[55] This decrease in the popularity of barley leads me to expect that the price of barley would have decreased over time as demand decreased. I also expect that the price of barley would show similar contemporaneous variability as that observed for other staple crops on the sowing schedule. I have recovered many prices for barley (Table 7.30), but they are not all comparable to each other. Of these, some were quantified in money, with the remaining examples as prices in terms of wheat. I will analyze each set separately, beginning with the prices in money.

The prices of barley in money do reveal that the price may have decreased over time, although the source texts cannot all be precisely dated and the mechanics of this decrease cannot be determined with certainty. In P. Hibeh 1 40 (261 BCE), Polemon writes to Harimouthes:

Πολέμων Ἁριμούθηι χαίρειν. περὶ τῶν συμβόλων γεγράφαμεν Κρίτωνι καὶ Καλλικλεῖ ἵνα γένηται ὡς ἐπέ-σταλκας. ἐπίστασο	Polemon to Harimouthes, greetings. I have written to Kriton and Kallikles about the receipts in order to have things done as you have have instructed. But you must understand that for barley no one will pay you a price of so

[55] For further discussion, see 4.3.3 "Agriculture."

μεντον ἀκριβῶς ὅτι τῆς κριθῆς ἧς συγγέγραψαι τιμῆς δώσειν δραχμὴν μίαν οὐθείς σοι μὴ πλῃρι· καὶ γὰρ οἱ παρὰ Κερκίωνος ἔχουσιν ἤδη ἐμ παρα- γραφῆι ἐκ τοῦ λογι- στηρίου. ἔρρωσο. (ἔτους) κδ Ἐπὴφ κα. Ἁριμούθηι.	much as one drachma, (the price which) you described. For Kerkion's men have already obtained (a lower price?) in a memo from the logisterion.[56] Goodbye. Year 24, Epeiph 21. To Harimouthes.

Harimouthes had expected to be able to sell barley at 1 drachma (presumably per artaba), a price which is not entirely unreasonable: a price of 2.8333 dr. is recorded from 259 BCE (although it might be from Palestine or Alexandria) and one of 1.2 dr. from 257 BCE (in Memphis). However, between his letters, it seems that a lower price appeared, and 1 drachma was no longer acceptable. By 252 BCE, barley was regularly selling at around .2 dr./art., although one higher price of 1.1111 dr. appears in a text from circa 249-246 BCE. What this reveals is that prices generally decreased, but there was still variability of over 5x in the 240s BCE.

In theory, the value ratio between barley and wheat was relatively standard at 5 artabas barley for 3 artabas of wheat.[57] The prices of barley in terms of wheat come from four main sources, all from the Fayyum: two accounts from the Zenon archive (P. Lond. 7 1994 and P. Lond. 7 1995) from 251 BCE and two Demotic land surveys (P. Agri. Dem. 1 and P. Agri. Dem. 2) from 216 BCE. Within each text, there was considerable variation in the value of barley, even to the extent that barley could seem more valuable than wheat in some cases. For example, 1 artaba of barley was equivalent to between .4718 and 2.1667 artabas of wheat in P. Lond. 7

[56] For further discussion, see 4.4.7 "Granaries and Banks."
[57] Skeat, *Greek Papyri in the British Museum VII*, 99.

1994, and between .3 and 1.8 artabas of wheat in P. Agri. Dem. 1. However, it would be faulty to understand this variation in prices as volatility in the real market price of barley. Rather, the differences in price seem to relate more to the context of the payments made. P. Agri. Dem. 1, after all, lists these prices in the context of seed loans; the higher price of 1.8 artabas wheat per artaba barley seems to be a reference to repaying the loan with interest.[58] It is possible that P. Lond. 7 1994 similarly records different prices based on different contexts of payment. I think it is fair to assume that there was relative stability in the value ratio between wheat and barley.

Still, the prices of barley in money do show considerable variability, with a range of .2 to 2.8333 dr./art. in the 250s and of .2083 to 1.1111 dr./art. in the 240s BCE: differences of over 10x and 5x, respectively.

Table 7.31: Price of Barley

Date	*Location*	*Commodity*	*Unit Price (per artaba of barley)*	*Original Price*	*Source Text*
(4th cent.)	Herakleopolites (Upper Egypt)	*ỉt*	.5833 dr.	800 (art.?) = 23.3333 deben	Enchoria 14 (1986), p. 21-22, 1/12
(Ptolemaic)	Thebes (Upper Egypt)	*ỉt*	10 dr.	8 art. = 2 deben	O. Leiden Dem. 156, 4
(3rd. cent.)	Fayyum	κριθή		barley (for the donkey???) = 4 ob.	P. Petrie 3 135, 7
(3rd. cent.)	Fayyum	κριθή		barley = .75 ob.	P. Petrie 3 139a, 2/3
(271-246?)	Herakleopolites (Upper Egypt)	κριθή	1.5833 dr.	88 art. = 139 dr. 2 ob.	P. Hibeh 1 110 ro., 15-16
(263-229)	Philadelphia? (Fayyum)	κριθή	4 dr. silver	15 art. barley at a rate of 4 drachmas silver = partial payment of 150 dr.	P. Cairo Zen. 4 59787, 29
(263-229)	Pelousion	κριθή		barley in Pelousion for the horses: 1 dr. 3.5 ob.	PSI 5 543, 1/5
(263-229)	Herakleopolis	κριθή	4 ob./art.	(in Herakleopolis), barley: 1.5 art. at 4 ob./art. = 1 dr.	PSI 5 543, 1/7

[58] Monson, *P. Agri.*, 68-69, esp. n. to l. 13.

Table 7.30: Price of Barley (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of barley)*	*Original Price*	*Source Text*
(263-229)	Kalamine	κριθή	5 ob./art.	in Kalamine for breakfast, an artaba of barley = 5 ob.	PSI 5 543, 1/9
(263-229)	Phakoussai	κριθή	3 ob./(art.)	in Phakoussai for dinner, (1 art.) of barley = 3 ob.	PSI 5 543, 1/10-11
(263-229)	The Isieioi	κριθή	1 dr./art.	in the Isieioi for breakfast, barley: 1 art. = 1 dr.	PSI 5 543, 1/13-14
(263-229)	Herakleopolis	κριθή	2 ob./art.	in Herakleopolis, barley: 1.5 art. = 3 ob.	PSI 5 543, 1/23
(263-229)	Isios	κριθή	5 ob./art.	in Isios, 1 aft. of barley = 5 ob.	PSI 5 543, 1/34
(263-229)	Naukratis	κριθή	2 ob./art.	in Naukratis, barley: 1.5 art. = 3 ob. for dinner	PSI 5 543, 2/35-36
(263-229)	Hermopolis	κριθή	2 ob./art.	in Hermopolis, barley: 1.5 art. = 3 ob. for breakfast	PSI 5 543, 2/41
(263-229)	Thegkours	κριθή	2 ob./art.	in Thegkours for dinner, barley: 1.5 art. = 3 ob.	PSI 5 543, 2/42
(263-229)	Thebachuth	κριθή	2 dr./art.	in Thebachuth, barley: 1.5 art. at 2 dr./art. = 3 dr.	PSI 5 543, 2/45
261, Epeiph 21	Oxyrynchites (Upper Egypt)	κριθή	<1 dr.	(1 art.) <1 dr. (hypothetical)	P. Hibeh 1 40, 6-8
(259)	Palestine? or Alexandria?	κριθή	2.8333 dr.	10 art. = 28 dr. 2 ob.	P. Cairo Zen. 1 59010, 2/21
257, Mecheir 8	Memphis? (Lower Egypt)	κριθή	1.2 dr.	3.3333 art. = 4 dr.	P. Lond. 7 1937, 4
252, Pharmouthi 2	Fayyum?	κριθή	.2 dr. silver	500 art. = 100 dr. silver = 108 dr. 2 ob. bronze	P. Cairo Zen. 5 59825, 10
251	Philadelphia (Fayyum)	κριθή	.6 art. wheat	576.6667 art. barley = 345 art. wheat	P. Lond. 7 1994, 80
251	Philadelphia (Fayyum)	κριθή	2.1667 art. wheat	159 art. barley = 344.5 art. wheat	P. Lond. 7 1994, 156
251	Philadelphia (Fayyum)	κριθή	2.1183 art. wheat	574.5 art. barley = 1217 art. wheat	P. Lond. 7 1994, 156
251	Philadelphia (Fayyum)	κριθή	.4718 art. wheat	2028.25 art. barley = 957 art. wheat	P. Lond. 7 1994, 156

Table 7.30: Price of Barley (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of barley)*	*Original Price*	*Source Text*
251	Philadelphia (Fayyum)	κριθή	.6 art. wheat	421.6667 art. barley = 253 art. wheat	P. Lond. 7 1994, 191
251	Philadelphia (Fayyum)	κριθή	.5999 art. wheat	9628.5 art. barley = 5777 art. wheat	P. Lond. 7 1994, 199-200
251	Philadelphia (Fayyum)	κριθή	.6001 art. wheat	1899 art. barley = 1139.5 art. wheat	P. Lond. 7 1994, 213
251	Philadelphia (Fayyum)	κριθή	2.2256 art. wheat	3690.6667 art. barley = 8214 art. wheat	P. Lond. 7 1995, 60
251	Philadelphia (Fayyum)	κριθή	.8223 art. wheat	8650.6667 art. barley = 7119 art. wheat	P. Lond. 7 1995, 326
(250)	Fayyum?	[κριθή?]	.6667 dr.?	1329 art. = 886? dr.	P. Lond. 7 1996, 37
(250-211), Pharmouthi through Epeiph	Fayyum	κριθή		for the barley in Eleusis, which he owed(?) you, in the house of Korion: 11 dr.	P. Köln Gr. 8 346, 2/32-34
(late 3rd - early 2nd c.)	Fayyum	κριθή		barley = 170 dr.	SB 22 15238, 2/15-16
(249-246)	Fayyum?	κριθή	1.1111 dr.	9 art. = 10 dr. silver	P. Cairo Zen. 3 59326 + P. Lond. 7 2002 + P. Cairo Zen. 3 59326 bis, 103-107
(249)	Fayyum?	κριθή	.2083 dr.	2 art. = 2.5 ob.	P. Cairo Zen. 3 59325, 1/25
(249)	Fayyum?	κριθή	.2049 dr.	5.0833 art. = 1 dr. .25 ob.	P. Cairo Zen. 3 59325, 3/74
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	20 art. barley = 12 art. wheat	P. Agri. Dem. 1, 4/8
216, Thoth	Tebtunis (Fayyum)	*ỉt*	1.8 art. wheat	3.3333 art. barley = 6 art. wheat	P. Agri. Dem. 1, 4/13
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	8.3333 art. barley = 5 art. wheat	P. Agri. Dem. 1, 4/13
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.3 art. wheat	3.3333 art. barley = 1 art. wheat	P. Agri. Dem. 1, 4/14
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	13.3333 art. barley = 8 art. wheat	P. Agri. Dem. 1, 4/24
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	3.3333 art. barley = 2 art. wheat	P. Agri. Dem. 1, 5/17
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	10 art. barley = 6 art. wheat	P. Agri. Dem. 1, 6/4

Table 7.30: Price of Barley (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of barley)*	*Original Price*	*Source Text*
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	15 art. barley = 9 art. wheat	P. Agri. Dem. 1, 6/11
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	18.6667 art. barley = 11.208333 art. wheat	P. Agri. Dem. 1, 6/17
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	8 art. barley = 4.833333 art. wheat	P. Agri. Dem. 1, 6/21
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	15 art. barley = 9 art. wheat	P. Agri. Dem. 1, 7/m9
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	6.6667 art. barley = 4 art. wheat	P. Agri. Dem. 1, 7/20
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	5 art. barley = 3 art. wheat	P. Agri. Dem. 1, Fr. 1/3
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	5 art. barley = 3 art. wheat	P. Agri. Dem. 1, Fr. 1/4
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	34 art. barley = 20.4167 art. wheat	P. Agri. Dem. 2, 7/4
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	9.1667 art. barley = 5.5 art. wheat	P. Agri. Dem. 2, 7/5

In addition to proper barley, prices also survive for barley-groats (Greek ἄλφιτον) and are listed in Table 7.31. Barley-groats are hulled barley, i.e., barley with its outer husk removed. While barley-groats did not constitute a specific category on the sowing schedules, it seems reasonable to expect that their price would move in a similar manner to that of un-hulled, regular barley. Four prices for barley-groats are preserved, with values listed between 5-30 drachmas (Table 7.31). However, a quantity is only listed for one price, so it is not possible to analyze these prices on a per-artaba basis. The prices are not necessarily comparable to each other, so unfortunately the analysis must end there.

Table 7.32: Price of Barley-Groats

Date	*Location*	*Commodity*	*Unit Price (per artaba of barley-groats)*	*Original Price*	*Source Text*
(260-258)	Fayyum?	ἄλφιτον	3 dr.	4 art. = 12 dr.	P. Cairo Zen. 4 59698, 12-13
(about 259)	Palestine? or Alexandria?	ἄλφιτον		30 dr.	P. Cairo Zen. 1 59010, 2/30
257, Artemisios	Fayyum?	ἄλφιτον		8 dr. silver	P. Cairo Zen. 1 59091, 4
(about 200)	Fayyum?	ἄλφιτον		5 (dr.)	P. Tebt. 3 885, 61

One further price exists for "peeled barley" (Table 7.32). No quantity is mentioned, but the three examples from the same text all give the same value (1/2 obol) – hinting at some regularity in pricing.

Table 7.33: Price of Peeled Barley

Date	*Location*	*Commodity*	*Unit Price (per artaba)*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	πτισάνη		peeled barley = .5 ob.	P. Petrie 3 140d, 3, 5, 6

Table 7.33 records a price for barley-cake. Since barley-cake was presumably made of barley, I expect that its price would have moved at least somewhat in tandem with the price of raw barley. The dearth of prices in this category prevents any testing of that hypothesis, unfortunately. It is perhaps interesting, though, that the price of barley-cake is roughly similar to the price of barley-wheat, below.

Table 7.34: Price of Barley-Cake

Date	*Location*	*Commodity*	*Unit Price (per artaba of barley-cake)*	*Original Price*	*Source Text*
251	Philadelphia (Fayyum)	βωλοκρίθου	.5974 art. wheat	77 art. barley cake = 46 art. wheat	P. Lond. 7 1995, 62

Barley-wheat (Greek κριθόπυρον), unsurprisingly, was a mixture of barley and wheat. As such, its price likely moved in proportion to the prices of its components, barley and wheat. Seven barley-wheat prices are preserved from P. Lond. 7 1994 and 1995, the same Zenon archive accounts which have been discussed for many prices above; these barley-wheat prices are listed in Table 7.34. While the Zenon accounts did display variation in the prices of sesame and other commodities that were more closely regulated, the price of barley-wheat remains remarkably consistent. These prices only record the value ratio between barley-wheat and wheat, with 1 artaba of barley-wheat equivalent to about .6 artabas of pure wheat. The consistency in the prices here indicates that the price of barley-wheat did remain proportional to the price of wheat. Still, that consistent proportion does not necessarily mean that the price of barley-wheat did not show variability. Its variability should simply be considered as the same as the variability seen in the price of pure wheat.

Table 7.35: Price of Barley-Wheat

Date	*Location*	*Commodity*	*Unit Price (per artaba of barley-wheat)*	*Original Price*	*Source Text*
251	Philadelphia (Fayyum)	κριθόπυρον	.5985 art. wheat	137 art. barley-wheat = 82 art. wheat	P. Lond. 7 1994, 130
251	Philadelphia (Fayyum)	κριθόπυρον	.5985 art. wheat	137 art. barley-wheat = 82 art. wheat	P. Lond. 7 1994, 170
251	Philadelphia (Fayyum)	κριθόπυρον	.6 art. wheat	20 art. barley-wheat = 12 art. wheat	P. Lond. 7 1994, 170

Table 7.36: Price of Barley-Wheat (contd.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of barley-wheat)*	*Original Price*	*Source Text*
251	Philadelphia (Fayyum)	κριθόπυρον	.5999 art. wheat	4183.5 art. barley-wheat = 2510 art. wheat	P. Lond. 7 1994, 338-339
251	Philadelphia (Fayyum)	κριθόπυρον	.5294 art. wheat	8.5 art. barley-wheat = 4.5 art. wheat	P. Lond. 7 1994, 81
251	Philadelphia (Fayyum)	κριθόπυρον	.6 art. wheat	2897.6667 art. barley-wheat = 1738 art. wheat	P. Lond. 7 1995, 327
251	Philadelphia (Fayyum)	κριθόπυρον	.6 art. wheat	306.5 art. barley-wheat = 183.6667 art. wheat	P. Lond. 7 1995, 63

Emmer (Greek ὄλυρα) was also listed on the sowing schedule, where it constituted about 5% of the land sown. Prices for emmer are tabulated in Tables 7.35 and 7.36, below (Table 7.36 includes emmer prices from penalty clauses). In this case, there are data from multiple regions within Egypt (Upper, Lower, and the Fayyum), and the data have a temporal range of 257 to around 186 BCE. Some prices were in terms of money, others in terms of wheat. It is necessary to analyze the prices in money and in wheat separately. Unfortunately the prices from different geographic regions are not evenly distributed over the different types of valuation: all the prices from the Fayyum are in wheat or barley ratios, while those from Upper and Lower Egypt are in money. Thus regional differentiation is difficult to unravel.

The non-penalty prices in money show a decline from the 250s into the 240s BCE, with prices of .8 and .8333 dr. in 257, followed by prices of .4 and .32 dr. in 249 and 248 BCE, respectively. If this was a drop in the real price of emmer, it was significant: essentially the price of emmer was cut in half. Even within these two price levels, there was considerable variation. For example, .4 dr. is 25% higher than .32 dr. Emmer penalty prices were much higher than the non-penalty prices; in the same text, P. Hibeh 1 102, for example, the penalty price of emmer is 2

dr./art. while the market price is only .4 dr./art. (only 20% of the penalty price). The penalty prices, unlike the non-penalties, show a clear stepped increase. Initially, penalties wer 2 dr./art. around 250 BCE, rising to 4 dr./art. by 222, a value which lasted as late as 214 BCE. One outlier with a penalty of 20 dr./art. could be found from 215 BCE. The increase in penalty prices for wheat also occurred around 215-214 BCE, soon before the change in accounting standards in 210 BCE, as did an increase in the price of transportation at Nag el-Mesheikh, so an increase in the penalty price of emmer around the same time would be expected.[59] However, while the wheat penalty prices and transportation rose by 2.5x, this 20-drachma penalty price for emmer would be a 5x increase over the previous price of 4 drachmas, and 4-drachma penalties continue to be attested until 214/3. The higher multiplier for emmer vs. wheat is difficult to explain.

In general, the value ratio between emmer and wheat hovered around 5 artabas of emmer for every 2 artabas of wheat.[60] The emmer prices in terms of wheat come from only two texts, the accounts from the Zenon archive, P. Lond. 7 1994 and P. Lond. 7 1995, both from 251 BCE. In P. Lond. 7 1994, one artaba of emmer is valued at between .1928 and .4422 artabas of wheat. The much lower value of .1928 art. is difficult to explain, but I might speculate that, as in other prices in terms of wheat from this text, it had to do with the context of the payment. In P. Lond. 7 1995, emmer is worth either .3956 and .4422 artabas of wheat: a difference of about 12%.[61] These accounts are incredibly difficult to make sense of, but I think it is likely that the ratio between emmer and wheat was somewhat consistent, only really varying by about 12%. The ratio between emmer and barley was even more consistent, as recorded in several annuity contracts

[59] For wheat penalty prices, see above. The information on Nag' el-Mesheikh is based on unpublished ostraca; I must thank Brian Muhs for this early preview of that material. Brian Muhs, personal communication, February 21, 2018.
[60] Skeat, *Greek Papyri in the British Museum VII*, 99.
[61] Skeat notes here that the value of .4422 art. wheat per artaba emmer is unusual, saying "the ratio is not the usual 2:5." Skeat, *Greek Papyri in the British Museum VII*, 130.

from 239 to around 186 BCE, generally at a rate of 1 artaba of emmer for every 2/3 artaba barley. This consistency is remarkable and may reflect the traditional (perhaps even archaizing) nature of these annuity contracts related to marriage; the ratios do not seem to have been updated as barley fell out of favor.

Table 7.37: Price of Emmer

Date	*Location*	*Commodity*	*Unit Price (per artaba of emmer)*	*Original Price*	*Source Text*
257, Mecheir 4	Memphis? (Lower Egypt)	ὄλυρα	.8 dr.	5 art. = 4 dr.	P. Lond. 7 1937, 4
257, Mecheir 8	Memphis? (Lower Egypt)	ὄλυρα?	.8333 dr.	1 art. olyra = 5 ob.	P. Lond. 7 1937, 5-6
251	Philadelphia (Fayyum)	ὄλυρα	.4 art. wheat	1098 art. olyra = 439 art. wheat	P. Lond. 7 1994, 117
251	Philadelphia (Fayyum)	ὄλυρα	.4351 art. wheat	92.5 art. olyra = 40.25 art. wheat	P. Lond. 7 1994, 157
251	Philadelphia (Fayyum)	ὄλυρα	.1928 art. wheat	191.91666667 art. olyra = 37 art. wheat	P. Lond. 7 1994, 157
251	Philadelphia (Fayyum)	ὄλυρα	.4167 art. wheat	24 art. olyra = 10 wheat	P. Lond. 7 1994, 192
251	Philadelphia (Fayyum)	ὄλυρα	.3986 art. wheat	148 art. olyra = 59 art. wheat	P. Lond. 7 1994, 203
251	Philadelphia (Fayyum)	ὄλυρα	.4 art. wheat	172.25 art. olyra = 69 art. wheat	P. Lond. 7 1994, 85
251	Philadelphia (Fayyum)	ὄλυρα	.4422 art. wheat	480.5 art. olyra = 212.25 art. wheat	P. Lond. 7 1995, 331
251	Philadelphia (Fayyum)	ὄλυρα	3.6956 art. wheat	218.5 art. olyra = 807[.5] wheat	P. Lond. 7 1995, 61
249, Payni 6	Koites? or Oxyrynchites (Upper Egypt)	ὀλυρ(ῶν)	.4 dr.	10 art. = 4 dr.	P. Hibeh 1 102, 4
248, Hathyr 10	Oxyrynchites (Upper Egypt)	ὀλυρ(ῶν)	.32 dr.	25 art. = 8 dr.	P. Hibeh 2 264, 5
239, Tybi 19	Hawara (Fayyum)	*bt*	1 oipe emmer = .6667 oipe barley	I give you emmer: 36 by the (oipe of) 40 hin, making 24 barley (by the oipe of) 40 hin, [making em]mer, 36 by the oipe of) 40 hin again	P. Hawara 1, 3

Table 7.35: Price of Emmer (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of emmer)*	*Original Price*	*Source Text*
235, Epagomenai 1	Hawara (Fayyum)	*bt*	1 oipe emmer = .6667 oipe barley	I give you emmer: 72 by the (oipe of) 40 hin, making 48 barley (by the oipe of) 40 hin, making emmer, 72 by the oipe of) 40 hin again	P. Hawara 2, 4
230, Mecheir	Akhmim (Upper Egypt)	*bt*	1 hin emmer = .6667 hin barley	emmer, 72 by the 40-hin measure = barley, 48 by the 40-hin meausre = emmer, 72 by the 40-hin measuer again	P. Eheverträge 17, 2
225, Mecheir	Thebes (Upper Egypt)	*bt*	1 hin emmer = .6667 hin barley	And I give you emmer, 36 by the 40-hin measure = barley, 24 by the 40-hin measure = emmer, 36 by teh 40-hin measure again	P. Eheverträge 19, 3
(late 3rd – early 2nd c.)	Tebtunis (Fayyum)	(ὄλυρα)	68 dr.	30 art. olyra = 2040 dr.; 25 art. olyra = 1700 dr	P. Tebt. 3 1079 descr., 56, 57
221, Tybi	Akhmim (Upper Egypt)	*bt*	1 hin emmer = .6667 hin barley	to total 10 deben = 50 staters = 10 deben again, emmer: 400 by teh 40-hin measure = barley, 266 2/3 = emmer [400 by teh 40-hin measure again]	P. Eheverträge 21, 3
210, Payni	Thebes (Upper Egypt)	*bt*	1 hin emmer = .6667 hin barley	I am giving you emmer, 36 with the (oipe) of 40 hin [=] barley, 24 with the (oipe) of 40 hin = emmer, 36 with the (oipe) of 40 hin [again]	P. Eheverträge 25 + P. Berl. Spieg. p. 7 no. 3075, 3
205/4	Fayyum?	*bt*	1 oipe emmer = .6667 oipe barley	I will give you emmer: [24] by the (oipe of) 40 hin = 16 barkley by the (oipe of) 40-hin = 24 emmer again	P. Köln Ägypt. 1 7, 3
201, Epeiph	Thebes (Upper Egypt)	*bt*	1 oipe emmer = .6667 oipe barley	and I will give you emmer, 36 by the 40-hin measure = 24 barley = 36 emmer by the 40-hin measure again	P. Eheverträge 27 + P. Berl. Spieg. p. 17-18 no. 3145, 2

Table 7.35: Price of Emmer (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of emmer)*	*Original Price*	*Source Text*
199, Choiak	Philadelphia (Fayyum)	*bt*	1 oipe emmer = .6667 oipe barley	I will give you 72 emmer (by the oipe of) 40 (hin) = 48 barley (by the oipe of) 40 (hin) = 72 emmer (by the oipe of) 40 (hin) again	P. Eheverträge p. 148-150 no. 4 D + P. Eheverträge p. 150-152 no. 4 Z, 2
195/4	Fayyum	*bt*	1 oipe emmer = .6667 oipe barley	I will give you 72 emmer (with the oipe of) 40 hin = 48 barley (with the oipe of) 40 (hin) = 72 emmer (with the oipe of) 40 (hin) again	P. Eheverträge 31 + Acta Orientalia 23 (1958), p. 126 no. A, 3
(186 BCE)	Philadelphia (Fayyum)	*bt*	1 oipe emmer = .6667 oipe barley	and I will give you 48 emmer, (with the oipe of) 40 hin = 32 barley = 48 emmer (with the oipe of) 40 hin again	P. Eheverträge 30 + Acta Orientalia 23 (1958), p. 123-124 no. B, 4

Table 7.38: Price of Emmer in Penalty Clauses

Date	*Location*	*Commodity*	*Unit Price (per artaba of emmer)*	*Source Text*
251	Philadelphia (Fayyum)	ὄλυρα	4 art. wheat	P. Lond. 7 1994, 117
(about 250)	Thothis? (Upper Egypt)	ὀλυρ(ῶν)	2 dr.	P. Hibeh 1 124 descr.
249, Payni 6	Koites? or Oxyrynchites (Upper Egypt)	ὀλυρ(ῶν)	2 dr.	P. Hibeh 1 102, 10
222, Gorpiaios	Tholthis (Upper Egypt)	[ὀ]λ̣υρῶν	4 dr.	P. Hibeh 1 90, 14-15
215/4	Tholthis (Upper Egypt)	ὄλυρ[α]	[4 dr.]	BGU 14 2393, [16]
215/4, Artemisios	Takona (Upper Egypt)	ὄλυρα	20 dr. silver	BGU 6 1266 + BGU 14 2386, 28
215/4, Xandikos	Tholthis (Upper Egypt)	ὄλυρα	4 dr. [silver]	BGU 6 1277, 12-13
215/4, Artemisios	Tholthis (Upper Egypt)	ὄλυρα	4 dr.	BGU 6 1278, 10-11, 28
214/3	Tholthis? (Upper Egypt)	[ὄλυρα]	4 dr.	BGU 10 1944, 13

In addition to the grain prices discussed thus far, for which the grain was specified clearly, five prices remain for σῖτος, which can best be translated as simply "grain" in a generic sense. These prices are listed in Table 7.37. Maresch and Cadell and Le Rider classified these prices as references to either wheat or emmer, based on the similarity the prices bear to the values tabulated for those particular grains. These scholars may well be correct in their classifications, but to analyze the σῖτος prices alongside wheat or emmer prices, when they are only classified as such on the basis of the prices, becomes a circular sort of logic that is unreliable for my present purposes. For that reason, I am not including them in the tables above for wheat and emmer but rather have listed them separately. Since they might not all be references to the same grain type, these prices are not likely to be comparable to each other either. Unfortunately, no further analysis is possible.

Table 7.39: Price of Generic Grain

Date	*Location*	*Commodity*	*Unit Price (per artaba of grain)*	*Original Price*	*Source Text*
(275-225)	Arsinoe epi tou zeugmatos (Upper Egypt)	σῖτος*	3 dr.	(penalty price? of) 3 dr. (per artaba?)	P. Sorb. 1 33, 15
(271-246)	Herakleopolites (Upper Egypt)	σῖτος	.3333 dr./sack	2 sacks (σάκκους) = 4 ob.	P. Hibeh 1 110 ro., 21
257	Memertha (Upper Egypt)	σῖτος?†	4 dr.	penalty price of 4 dr. per artaba	P. Sorb. 1 17, a.15
257	Memertha (Upper Egypt)	σῖτος?‡	4 dr.	penalty price of 4 dr. per artaba	P. Sorb. 1 17, b.16
248	Oxyrynchites (Upper Egypt)	σῖτος[62]	2 dr.	penalty price of 2 dr. per artaba	P. Hibeh 1 86, 11-12
(199-175)	Hermopolites (Upper Egypt)	σῖτος	2 dr. bronze per art.	10,000 art. wheat at a rate per artaba of 2 dr. of bronze = 10 talents, 1615 dr.[63]	SB 18 13619, 14-15

[62] Maresch and Cadell and Le Rider all list this price as a reference to emmer. Maresch p. 186. Cadell & Le Rider price 20.
[63] The math in this case does not work out neatly.

* Maresch and Cadell and Le Rider all list this price as a reference to wheat. Maresch p. 181. Cadell & Le Rider price 21.

† Maresch and Cadell and Le Rider all list this price as a reference to wheat. Maresch p. 184. Cadell & Le Rider price 11.

‡ Maresch and Cadell and Le Rider all list this price as a reference to wheat. Maresch p. 184. Cadell & Le Rider price 11.

The extant prices for vetch (Greek ἄρακος) are presented in Table 7.38, below. The data allow us to compare variability of vetch prices within individual texts. Both vetch prices recorded in P. Lond. 7 1994 were the same (with 1 artaba of vetch as equivalent to .6 artabas of wheat). Thus there was a lack of variability in vetch prices within this text, even though the text does include different prices for sesame seeds, safflower seeds, and flaxseed, discussed previously. The price of those other commodities was regulated within P. Rev., unlike the price of vetch, and yet vetch prices varied less than the more regulated commodities—perhaps because vetch (like barley) was pegged to wheat for tax payments at a rate of 5:3. Texts with vetch prices in money showed greater variation: from 6.6667 – 7.3333 dr./art. in P. Strasb. Gr. 7 661 – a 10% difference—and from 2.5-4 dr./art. (a 60% difference!) in P. Lille 1 37.

Table 7.40: Price of Vetch

Date	*Location*	*Commodity*	*Unit Price (per artaba of vetch)*	*Original Price*	*Source Text*
251	Philadelphia (Fayyum)	ἄρακος	.6 art. wheat	190 art. arakos = 114 art. wheat	P. Lond. 7 1994, 116
251	Philadelphia (Fayyum)	ἄρακος	.6 art. wheat	190 art. arakos = 114 art. wheat	P. Lond. 7 1994, 169
244/3	Fayyum	ἄρακος	4 dr./art.	2 1/2 (artabas) at a rate of 4 dr. = 10 dr.	P. Lille Gr. 1 37, 6
244/3	Fayyum	ἄρακος	2.5 dr./art.	5 (artabas) at a rate of 2 dr. 3 ob. = 12 dr. 3 ob.	P. Lille Gr. 1 37, 6
240, Mecheir 29	Tholthis (Upper Egypt)	ἄρακος	6.6667 dr./art.	9 (artabas) at a rate of 6 dr. 4 ob. = 60 dr.	P. Strasb. Gr. 7 661, 9

Table 7.41: Price of Vetch (contd.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of vetch)*	*Original Price*	*Source Text*
240, Mecheir	Tholthis (Upper Egypt)	ἄρακος	6.5 dr./art.	16 (artabas) at a rate of 6 dr. 3 ob. = 104 dr. 1/2 ob.	P. Strasb. Gr. 7 661, 12
240, Mecheir	Tholthis (Upper Egypt)	ἄρακος	7.3333 dr./art.	3 (artabas) at a rate of 7 dr. 2 ob. = 22 dr. 1/2 ob.	P. Strasb. Gr. 7 661, 15

The sowing schedules include some attempt to regulate the production of hay or perhaps grass (Greek χόρτος, Demotic *sm*). Twenty prices for Greek χόρτος survive, and I was able to find five prices for Demotic *sm* from Demotic ostraca now at Leiden; these prices are listed in Table 7.39, below. In Demotic, *sm* can have multiple meanings; in addition to "hay," the term can be translated as "fodder," "greens" or perhaps even generic "vegetables." For that reason, it is unclear to what extent this *sm* should be associated with the hay in the sowing schedules. The Demotic prices in Table 7.39 record payments of between .5-3.5 deben (or 10-70 drachmas) for *sm*. However, no quantities are listed, so the degree to which these prices record price changes as opposed to mere differences in quantity is impossible to unravel. Moreover, the texts cannot be dated more precisely than the Ptolemaic period and all come from Thebes, so they are not a useful group for investigating regional variability or change over time. The Greek prices are more enlightening, although they do not include quantities either. A travel account, PSI 5 543, includes the amount spent on fodder day by day along the journey: in some locations, fodder was given away for free as a gift, while in others, the price rose to 2, all the way up to 5 obols. Since the quantities are not recorded, it is not possible to tell if this is true variation, but the text does demonstrate that costs could change from day to day and place to place, in part depending on where one could expect gifts.

Table 7.42: Price of Hay, Fodder

Date	*Location*	*Commodity*	*Unit Price (per artaba of hay)*	*Original Price*	*Source Text*
(Ptolemaic)	Thebes (Upper Egypt)	*sm*		1.5 deben	O. Leiden Dem. 96, 2/5
(Ptolemaic)	Thebes (Upper Egypt)	*sm*		5 deben	O. Leiden Dem. 204, 5
(Ptolemaic)	Thebes (Upper Egypt)	*sm*		.5 deben	O. Leiden Dem. 209, x+11
(Ptolemaic)	Thebes (Upper Egypt)	*sm*		1 deben	O. Leiden Dem. 209, x+12
(Ptolemaic)	Thebes (Upper Egypt)	*sm*		3.5 deben	O. Leiden Dem. 211, 6
3rd. cent.	Fayyum	χόρτος		fodder = 1.5 ob.	P. Petrie 3 138, 1/4
3rd. cent.	Fayyum	χόρτος		fodder = 2 ob.	P. Petrie 3 138, 2/2
3rd. cent.	Fayyum	χόρτος		fodder = .5 ob.	P. Petrie 3 139a, 2/1
(263-256?)	Fayyum?	χόρτος		fodder: 61 dr. 1.5 ob.	PSI 6 551 vo., 16
(263-229)	Pelousion	χόρτος		fodder for the first day (of travel from Pelousion to Kanopus) = 5 ob.	PSI 5 543, 1/2
(263-229)	Pelousion	χόρτος		fodder for the second day = 5 ob.	PSI 5 543, 1/3
(263-229)	Herakleopolis	χόρτος		in Herakleopolis, fodder: 4 ob.	PSI 5 543, 1/6
(263-229)	Phakoussai	χόρτος		(in Phakoussai), fodder = 2 ob.	PSI 5 543, 1/12
(263-229)	The Isieioi	χόρτος		(in the Isieioi) fodder = 2 ob.	PSI 5 543, 1/15
(263-229)	Bubastis	χόρτος καὶ κριθῶν		in Boubastis, fodder and barley: 1.5 art., a gift from Dionysodoros	PSI 5 543, 1/17-19
(263-229)	Pseptaos	κριθῶν … καὶ χόρτον		in Pseptaos with Diokles during the day, barley: 1.5 art. and fodder, for 3 days: a gift	PSI 5 543, 1/20-22
(263-229)	Herakleopolis (a different one?)	χόρτος		(in Herakleoplis), fodder: a gift	PSI 5 543, 1/24
(263-229)	Nathos	κρ(ιθῶν) … καὶ χόρτου		In Nathos, we passed for free, and from the komarch, for dinner, we had barley: 1 art. and fodder: 40 desmas = free.	PSI 5 543, 1/25-29
(263-229)	Nathos	χόρτος		(in Nathos), the (free) fodder was not enough, (so we bought more): 2 ob.	PSI 5 543, 1/29-30

Table 7.39: Price of Hay, Fodder (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of hay)*	*Original Price*	*Source Text*
(263-229)	village of Diokleous	χόρτος κριθαῖ		in the village of Diokleous, [5 ob.] for 2 days' fodder, barley = free	PSI 5 543, 1/31-33
(263-229)	Naukratis	χόρτος		from the komarch, fodder: 50 desmai = free	PSI 5 543, 2/37-38
(263-229)	Thegkours	χόρτος		(in Thegkours), fodder = 2 ob.	PSI 5 543, 2/43
(263-229)	Thebachuth	χόρτος		(in Thebachuth), fodder from the Herakleidos = free	PSI 5 543, 2/46-47
(263-229)	Hieranesos	χόρτος		in Hieranesos, fodder: 50 desmai from Stratonos = free	PSI 5 543, 2/48-49
221, Tybi 13	Memphis	χόρτος		5 dr. per aroura of grass	P. Enteux. 36, 2 & 4
(late 3rd - early 2nd c.)	Fayyum	χόρτος		Fodder = 15 dr.	SB 22 15238, 2/19

Seven prices for poppy (Greek μήκων) survive in the familiar accounts from the Zenon archive, P. Lond. 7 1994 and 1995, and I have listed them below in Table 7.40. Again, since these two texts are from the same time and location, they cannot be used to assess price variation over time and space. All seven prices record value ratios between poppy and wheat, and they display remarkably little variation in this ratio, with a standard rate of 1 artaba of poppy for 2 artabas of wheat. The only price that seems distinct (at a rate of 3 artabas of poppy for 1 of wheat) comes from P. Lond. 7 1995, 57, and the price itself is in a lacuna and was restored by Skeat.[64] If that price is discarded, then all the rest show essentially the same value, with no variation across P. Lond. 7 1994 and 1995: texts which do record variation in many other commodities discussed previously, such as sesame, that were ostensibly more tightly regulated. Still, this lack of variation

[64] T. C. Skeat, *Greek Papyri in the British Museum (Now in the British Library), Volume VII: The Zenon Archive* (London: British Museum Publications, 1974), 98 and 128, n. to l. 57.

does not necessarily mean that poppy prices did not vary or show any volatility; rather, what is clear is that they varied in proportion to variation in the price of wheat.

Table 7.43: Price of Poppy

Date	*Location*	*Commodity*	*Unit Price (per artaba of poppy)*	*Original Price*	*Source Text*
251	Philadelphia (Fayyum)	μήκων	2 art. wheat	.5 (art.) poppy = 1 (art.) wheat	P. Lond. 7 1994, 84
251	Philadelphia (Fayyum)	μήκων	2.0004 art. wheat	34 choinikes poppy = 68.1667 (choinikes) wheat	P. Lond. 7 1994, 133
251	Philadelphia (Fayyum)	μήκων	2 art. wheat	26.8333 (art.) poppy = 53.6667 (art.) wheat	P. Lond. 7 1994, 201
251	Philadelphia (Fayyum)	μήκων	2 art. wheat	30 (art.) poppy = 60 (art.) wheat	P. Lond. 7 1994, 212
251	Philadelphia (Fayyum)	μήκων	2 art. wheat	3350. 5417 (art.) poppy = 6701.0833 (art.) wheat	P. Lond. 7 1994, 346-347
251	Philadelphia (Fayyum)	μήκων	2 art. wheat	718.5 (art.) poppy = 1437 (art.) wheat	P. Lond. 7 1995, 325
251	Philadelphia (Fayyum)	μήκων	[3] art. wheat	[12.5] (art.) poppy = 37.5 (art.) wheat	P. Lond. 7 1995, 57

Lentils were also included as staple crops on the sowing schedule. Only one price for lentils survives, and it is listed in Table 7.41 for the sake of completeness. However, since there is only one price with no basis for comparison, no further analysis of lentil pricing dynamics can be done.

Table 7.44: Price of Lentils

Date	*Location*	*Commodity*	*Unit Price (per artaba of lentils)*	*Original Price*	*Source Text*
(263-229)	Fayyum?	φακός	26.6667 dr. bronze	3 art. lentils = 80 dr. bronze	PSI 6 620, 8-9

Also included in the sowing schedule from P. Petrie 3 75 was a second legume, a type of bean known in Greek at κύαμος. I was not able to find any prices associated with this type of bean, so no analysis of bean prices is possible here. However, more prices do survive for other

legumes, like chickpeas, and those are listed in the next section on unmanaged commodities, since they were not explicitly listed on the sowing schedule.

In general, the data on those crops listed in the sowing schedule clearly demonstrate that market prices in money moved in different ways than did penalty prices or value ratios to wheat, both of which showed considerably more regularity in their pricing and which increased in a consistent, stepped manner. The market prices in money were far more variable, with variability of 2x to 5x within one decade; variation of 50% within one text was not uncommon. This variability cannot be explained by a lack of information or seasonality alone. There is some evidence for regional differences in the price of emmer, but a conclusion about regionality is limited based on the lack of representative data from all regions. One other possible reason for variability is the specific contexts of the prices themselves, especially differences in power between buyer and seller (more powerful people may have been able to pay less and charge more). A definitive cause for the variability in agricultural prices still eludes me, but it is clear that prices varied far more than previous studies have suggested.

In addition to agricultural goods, certain products that required more manufacturing were also produced according to quotas from the state. These goods included beer and cloth. The Ptolemies may have managed the production and sale of beer (Greek ζῦθος, Demotic *ḥnq.t*) similarly to their management of the oil monopoly, although without an expectation of exclusivity—e.g., production and sale by non-state actors.[65] The Greek account P. Hibeh 1 113 mentions the ζυτηρά, or "revenues from beer," in parallel with the ἐλαική, or "revenues from oil." However, there is no evidence that this 'beer monopoly' was exclusive in the same way that the monopolies on sesame and castor were. Any potential regulation of the price of beer also

[65] For further discussion, see 4.4.10 "Private Contracting of State Commodity Monopolies."

remains unclear. The exact organization of beer production is uncertain, but it is possible that brewers contracted with the state for the right to brew beer with barley supplied by the state and perhaps even for the right to sell beer within certain localities. For this reason, beer production and, to some extent, sales may have involved some influence from the Ptolemaic state, and beer is thus included in this category of commodities with supervised production.

While there is no evidence that the Ptolemies dictated specific production levels for beer, there are some indications, discussed in Chapter 4, that the state was involved in the production of some beer.[66] For that reason, beer prices might be expected to move similarly to the price of those staple crops on the sowing schedules, in that the state could amp up or decrease production to some extent. If the state's interventions in artificially stabilizing prices were effective, then I would expect that beer prices would have varied more than the price of the true commodity monopolies, like sesame and castor, but not as much as the unmanaged commodities discussed later in this chapter. Unfortunately, however, only one price for beer remains (Table 32). Due to this dearth of data for comparison, no further analysis of beer price variability is possible.

Table 7.45: Price of Beer

Date	*Location*	*Commodity*	*Unit Price (per keramion of beer)*	*Original Price*	*Source Text*
255, Pachons (7-30)	Fayyum?	ζῦθος	.6667 dr.	1 keramion = 4 ob.	P. Cairo Zen. 2 59176 + P. Lond. 7 2167, 40

The state also seems to have been involved in organizing the production of cloth.[67] As was discussed in Chapter 4, the state probably set schedules of quotas of cloth to be produced in each nome and established contracts with weavers to ensure that the quotas were met. The instructions

[66] For further discussion, see 4.4.10 "Private Contracting of State Commodity Monopolies."
[67] Ibid.

from the dioiketes to the oikonomos, P. Tebt. 3 703, lines 87-99, includes instructions that the oikonomos should oversee weaving:

ἐπιπορεύ- ου δὲ καὶ ἐπὶ τὰ ὑφαντεῖα ἐν οἷς τὰ ὀ- θόνια ὑφαίνετα[ι] κ̣α̣ὶ τὴν πλείστην σπουδὴν ποιοῦ ἵν̣[α πλεῖσ]τα τῶν ἰσ- τέων ἐνεργὰ ᾖι, συντελούντων κ[α]ὶ τῶν̣ ὑ̣φαντῶν τὴν διαγεγραμ- μένην τῶι νομῶι ποικιλίαν. ἐὰν δέ τινες πρὸς τὰς συντεταγμένας ἐκτομὰς ὀφείλωσι, πρασσέσθωσαν καθ' ἕκαστον γένος τὰς ἐκ τοῦ δια- γράμ̣μα[τ]ος τιμάς. ὅπως δὲ καὶ τὰ ὀ̣θ̣ νι̣α̣ χρηστὰ ᾖ κ̣[αὶ τ]ὰ̣ς̣ ἀ̣[ρ]πεδόνας ἔχωσι κατὰ τὸ̣ διάγραμμα [μὴ πα]ρέργως φρό[ντι]ζε.	Visit also the weaving-houses in which the linens are woven, and do your best to have as many looms working as possible, with the weavers supplying the embroidered cloths prescribed for the nome. If any of them should owe (pieces that were ordered), let the prices fixed by the ordinance for each kind be collected from them. Take special care, too, that the linens are good and have the prescribed number of weft-threads.

This text seems to indicate that the oikonomos would inspect these state weaving-houses (ὑφαντεῖα) to ensure that the production of linens was kept as high as possible in order to meet the quota. If a weaver did not meet her quota, she would need to pay for the pieces she failed to produce at set rates. Unfortunately, those rates paid by weavers do not survive in any extant texts, to my knowledge. Apparently the state's ordinances regarding linen did not only prescribe quotas but also dictated the thread-count of the linen to be woven, so the oikonomos was also responsible for inspecting the linen's quality. This clause indicates that cloth with different thread-counts may have had different values. I have included cloth in this section because some of its production was supervised by the state, but the extent to which clothing can be considered an undifferentiated commodity is still in question.

Which sorts of cloth should be included in this section? P. Tebt. 3 703 mentions ὀθόνια "linens" and ποικιλία "embroidered cloths," but I have not been able to find any prices for cloths described with either of these terms, and P. Rev.'s description of cloth production does not specify

much more which types of cloth were included. However, more types of cloth are included in P. Hibeh 1 67 and 68, which discuss payments made by a royal banker on behalf of the state to weavers in the Herakleopolite nome. P. Hibeh 1 67, lines 1-17, reads:

Ἀσκλ[η]πιάδης Κλειτάρχωι χ[α]ίρειν. [δὸς] ἀπὸ τῶν πι- πτόντω[ν εἰ]ς τὸ ιθ (ἔτος) τοῖς ἐν Ἀγκυρῶν πόλει [ὑ]πογεγραμμένοις ὑφάνταις δι̣ὰ̣ . . εω̣ς̣ τοῦ παρ᾽ Ἀπολλωνίου [καὶ Πετ]ειμούθου τοῦ Τε- [. . . . . τ]οπογραμματέως [καὶ νῦν] κωμογραμματέως [εἰς τιμὰ]ς ὀθονίων τῶν [συντελ]ουμένων εἰς τὸ [βα-] σ[ιλικ]ὸν μη( ) κα πρ( ) ζ, (γίνονται) ἰσ(τοὶ) κη, (δραχμὰς) τκς (τετρώβολον), βου(κολικῶν) ζ ξε (διώβολον), σορωίων ζ νς, (γίνονται) ἰσ(τοὶ) μβ (δραχμαὶ) υμη, καὶ ἀλλα(γῆς) ιδ, (γίνονται) υξβ, καὶ σύμβολον ποίησαι πρὸς αὐτούς. ἔρρωσο.	Asklepiades to Kleitarchos, greetings. [Give] the sums for year 19 to the weavers in Ankyropolis, written below, through … agent of Apollonios [and Pet]eimouthes son of Te[…, t]opogrammateus, [and now] komogrammateus [for the price]s of linens supplied to the [royal treasury]: 21 me( ), 7 pr( ), making 28 webs: 326 drachmas 4 obols; 7 pastoral cloths: 65 (drachmas) 2 obols; 7 cerecloths: 56 (drachmas); Total: 42 webs: 448 drachmas, and for the agio 14 drachmas, making 462 drachmas, And make a receipt for them. Goodbye.

This text initially mentions ὀθόνια "linens," but then further specifies three key categories, μη(…) and πρ(…), which add up to a total of ἰσ(τοὶ) "webs"; βου(κολικός) "pastoral cloth"; and σορώιον "cerecloth." The exact meaning of these cloth types is unknown.[68] P. Hibeh 1 68 also includes in its list a value for a finished garment, the ἱμα(τίον) "himation." The himation was an outer cloak, usually made of a large piece of wool (perhaps as large as 8 feet by 6 feet).[69] Thus it is clear that these types of cloth were included in the weaving-houses overseen by the state.

[68] For more on these, especially on the meaning of "webs" and their components, me( ) and pr( ), see Grenfell and Hunt, *The Hibeh Papyri, Part I*, 216, esp. n. to ll. 2-14.
[69] James Laver, *Costume and Fashion: A Concise History* (New York: Thames and Hudson, 1995).

Since P. Hibeh 1 68 includes a cloth type, the himation, that was not included in P. Hibeh 1 67's similar text, it seems possible that the types of cloth that fell under state-supervised production could have included different types. I included a sample of commonly-attested types of cloth here, but it would have been unfeasible to collect a full set of all cloth types. I have included among the tables below, in addition to the cloth types already listed, the chiton, which was, along with the himation, one of the most commonly attested types of clothing in extant texts.[70] It is typically understood that the chiton was a sort of tunic, made of wool or linen and worn close to the skin. The other cloths for which prices survive are the *ỉnw*-cloth, the Syrian cloth (συρία), mantle (χλαμύς), cloak (καυνάκης), socks or perhaps leggings (ποδείων ζεῦγος), the theristra (θέριστρα), and, for comparison, various rags and threadbare clothing.

An analysis of cloth prices in this section poses several methodological problems. Much of the terminology is known from Greek texts and does not clearly match up with Demotic translations. The extent to which cloths were even commodities—i.e., were interchangeable, with values that would not have differed based on qualitative factors—is unclear.

I will begin my analysis with those cloth types clearly mentioned in the letters regarding payments to weavers. Prices for webs, pastoral cloths, and cerecloths are only attested in these letters, P. Hibeh 1 67 and 68; these prices are listed in Tables 43-45. It must be kept in mind that the prices from these texts might not match the retail price of the cloths: the amounts record payments for the labor the weavers put into producing the cloths, but the cloths might have sold for higher prices later on. The price of pastoral cloths and cerecloths shows no variation at all: it is clear that at least within these two texts, which are very similar to each other, involving the same parties, that the price paid to weavers for their work was somewhat fixed. Some variation is

[70] Ibid.

apparent in the price of webs, with the price recorded in P. Hibeh 1 67 at a rate 40.54% higher than the price in P. Hibeh 1 68. The reason for this variation cannot be known for sure, but the "webs" in P. Hibeh 1 68 actually do not include pr( ) or ἰσ(τοὶ). It seems reasonable that these missing parts could have led to the lower price.

Table 7.46: Price of Webs

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	τρα( ) με( )		tra( ) and me( ) = 1.5 dr. 12 chalkoi?	P. Petrie 3 138, 1/7
3rd. cent.	Fayyum	τρα( ) με( )		tra( ) and me( ) = 1 dr. 5.5 ob.	P. Petrie 3 138, 1/8
3rd. cent.	Fayyum	με( ) . .		me( ) = 4 ob.	P. Petrie 3 138, 2/4
3rd. cent.	Fayyum	με( )		me( ) = 3 (dr.?)	P. Petrie 3 138, 2/6
(about 228), Hathyr	Choibnotmis (Upper Egypt)	μη( )	8.3013 dr./μη( )	104 μη( ) = 863 dr. 2 ob.	P. Hibeh 1 68, 7
228, Hathyr 22	El-Hibeh (Upper Egypt)	μη( ) + πρ( ) = ἰσ(τοὶ)	11.6667 dr./web	21 μη( ) + 7 πρ( ) = 28 webs, worth 326 dr. 4 ob.	P. Hibeh 1 67, 12-13
228, Hathyr 22	El-Hibeh (Upper Egypt)	μη( ) + πρ( ) = ἰσ(τοὶ)	11.6667 dr./web	3 μη( ) + 1 πρ( ) = 4 webs, worth 46 dr. 4 ob.	P. Hibeh 1 67, 20-21

Table 7.47: Price of Pastoral Cloths

Date	*Location*	*Commodity*	*Unit Price (per cloth)*	*Original Price*	*Source Text*
228, Hathyr 22	El-Hibeh (Upper Egypt)	βου(κολικός)	9.3333 dr.	7 pastoral cloths = 65 dr. 2 ob.	P. Hibeh 1 67, 13
228, Hathyr 22	El-Hibeh (Upper Egypt)	βου(κολικός)	9.3333 dr.	1 pastoral cloth = 9 dr. 2 ob.	P. Hibeh 1 67, 21
(about 228), Hathyr	Choibnotmis (Upper Egypt)	βου(κολικός)	9.3333 dr.	21 pastoral cloths = 196 dr.	P. Hibeh 1 68, 7
(about 228), Hathyr	Choibnotmis (Upper Egypt)	βου(κολικός)	9.3333 dr.	1 pastoral cloth = 9 dr. 2 ob.	P. Hibeh 1 68, 19

Table 7.48: Price of Cerecloths

Date	*Location*	*Commodity*	*Unit Price (per cloth)*	*Original Price*	*Source Text*
228, Hathyr 22	El-Hibeh (Upper Egypt)	σορώιον	8 dr.	7 cloths = 56 dr.	P. Hibeh 1 67, 14
228, Hathyr 22	El-Hibeh (Upper Egypt)	σορώιον	8 dr.	1 cloth = 8 dr.	P. Hibeh 1 67, 21
(about 228), Hathyr	Choibnotmis (Upper Egypt)	σορώιον	8 dr.	42 cloths = 336 dr.	P. Hibeh 1 68, 8
(about 228), Hathyr	Choibnotmis (Upper Egypt)	σορώιον	8 dr.	2 cloths = 16 dr.	P. Hibeh 1 68, 19

A wider variety of texts record prices for himatia (Table 46). Unlike the situation described previously for many agricultural commodities, himatia prices were consistent within the same text. However, between texts the variability in price was extreme: for example, before the accounting change, a himation could be priced between .6667 and 25 drachmas. No text explicitly explains the variability in a way that would provide conclusive evidence, but my explanation for the extreme variability in this case is that himatia were not seen as undifferentiated comomdities. Some examples include descriptors; e.g., the cheapest himatia are described as being for children, in P. Cairo Zen. 3 59398. Ideally, it would make sense to compare himatia of similar types to each other only (i.e., those for children, women, and men). Unfortuantely most texts do not include such specificity.

Table 7.49: Price of Himation-Cloths

Date	*Location*	*Commodity*	*Unit Price (per himation)*	*Original Price*	*Source Text*
(3rd. cent.)	Tebetny?	ἱμάτιόν	6 dr.	worn himation worth 6 dr.	P. Lille Gr. 1 6, 9
(mid-3rd c.)	Krokodilopolis (Fayyum)	ἱμάτιον		himation: 24 (dr.)	P. Tebt. 3 1077 descr., 5
(263-229)	Fayyum?	ἱματίον	1.5 dr.	1 himation = 1 dr. 3 ob.	P. Cairo Zen. 3 59507, 11
(263-229)	Fayyum?	ἱματίον	14 dr.	1 himation = 14 dr.	P. Cairo Zen. 4 59701, 5

Table 7.46: Price of Himation-Cloths (cont.)

Date	*Location*	*Commodity*	*Unit Price (per himation)*	*Original Price*	*Source Text*
(263-229)	Fayyum?	ἱματίον	54 dr.	1 himation = 54 dr.	P. Cairo Zen. 4 59776, 1
(263-229)	Fayyum?	ἱματον	<2 dr./mina	himation-cloth from the Thebaid, 3.5 minas: spend up to 28 dr.	P. Col. Zen. 2 107, 5
257, Choiak 3	Herakleopolis (Upper Egypt)	ἱμάτιον	1.1667 dr.	himation: 1 dr. 1 ob.	P. Sorb. 1 16, 16
(after 257)	Alexandria? (Lower Egypt)	ἱματίον	.6667 dr.	9 himatia for children at a rate of 4 ob. = 6 dr.	P. Cairo Zen. 3 59398, 7
before 256, Daisios 11	Philadelphia? (Fayyum)	ἱμάτιον	6 dr.	2 lost himatia worth 12 dr.	P. Cairo Zen. 2 59145, 9
254, Thoth 21	Tanis (Lower Egypt)	ἱμάτιον	40 dr.	we bought a himation = 40 dr.	PSI 4 348, 6
250, Choiak 1	Fayyum?	ἱμάτιον	60 dr.?	of the himation and others = …, they say the value is 60 dr.	PSI 6 572, 3
(250-211), Pharmouthi through Epeiph	Fayyum	ἱμάτιον	6 dr.	in Arsinoe, for the deposit of a pawned himation (himation as security): 6 dr.	P. Köln Gr. 8 346 vo., 2/22-23
249, Dios 4	Fayyum?	ἱματίον	25 dr.	1 himation = 25 dr.	P. Cairo Zen. 3 59319, 4
249, Dios 4	Fayyum?	ἱματίον	25 dr.	1 himation = 25 dr.	P. Cairo Zen. 3 59319, 9
after 249	Fayyum?	ἱμάτιον	24 dr.	1 himation = 24 dr. silver	P. Cairo Zen. 3 59326 + P. Lond. 7 2002 + P. Cairo Zen. 3 59326 bis, 23
(244, Mecheir 26) or (219, Mecheir 26)	Moeris (Fayyum)	ἱμάτιον	30 dr.	new men's himation worth 30 dr.	SB 18 13160, 11-12
(about 228), Hathyr	Choibnotmis (Upper Egypt)	ἱμα(τίον)	7 dr.	21 himatia = 147 dr.	P. Hibeh 1 68, 8

Table 7.46: Price of Himation-Cloths (cont.)

Date	*Location*	*Commodity*	*Unit Price (per himation)*	*Original Price*	*Source Text*
226, epagomenal day 5	Fayyum	ἱμάτιον	30 dr.	and a himation, which is worth 30 dr.	P. Sorb. 3 133, 9
(late 3rd c.)	Meidum (Lower Egypt)	ἱμάτιον		one woman's himation, worth 600 dr.	SB 6 9068, 15
(late 3rd c.)	Meidum (Lower Egypt)	ἱμάτιον		one woman's himation, worth 400 dr.	SB 6 9068, 18
221, Tybi 12	Oxyryncha	ἱμάτιόν	30 dr.	1 himation worth 30 dr.	P. Enteux. 83, 7 & 10
(late 3rd - early 2nd c.)	Fayyum	ἱμάτιον	25,010 dr.	Himation = 4 talents, 1010 dr.	SB 22 15238, vo., 1/36
(late 3rd - early 2nd c.)	Fayyum	ἱμάτιον	25,000 dr.	hima(tion?) = 4 talents 1000 dr.	SB 22 15238, vo., 2/48
(193-187?) or (210-204?)	Philadelphia (Fayyum)	ἱματίον	20 dr.	1 himation = 20 dr.	BGU 7 1558, 7
(2nd cent.)	Fayyum	ἱμάτιον	>125 dr.	partial payment towards a himation = 125 dr.	P. Tebt. 3 891, 21
(2nd cent.)	Fayyum	ἱμάτιον	>1000 dr.	partial payment towards a himation = 1000 dr.	P. Tebt. 3 891, 31
197, Mesore 17	Fayyum	ἱμάτιόν	800 dr.	1 Egyptian himation worth 800 dr.	P. Petrie 3 36 d, 19

Similarly high variation can be seen in the price of chitons (Table 47), and it seems likely that chitons should not be considered commodities. Many chiton prices also include qualitative descriptions of the garments, and these qualitative differences probably contributed to their different prices. For example, one of the most expensive chitons was described as being "adorned with figures" (χιτῶν ἐπὶ ζωωτῶι): this embroidery probably made it more expensive than a plain chiton. Even within one text, P. Cairo 3 59319, the price of chitons that are described as for

women, the price still varies considerably: with prices of 40 and 60 dr., an increase of 50% from low to high.

Table 7.50: Price of Chitons

Date	*Location*	*Commodity*	*Unit Price (per chiton)*	*Original Price*	*Source Text*
(3rd. cent.)	Tebetny?	χιτών	6 dr.	chiton worth 6 dr.	P. Lille Gr. 1 6, 9
(3rd. cent.)	Egypt	χιτών	2.5 dr.	chiton towards 2.5 dr.	P. L. Bat. 33 13, 2/7
(3rd. cent.)	Egypt	χιτών	8 dr.	women's linen chiton, towards 8 dr.	P. L. Bat. 33 13, 2/39-40
(263-229)	Fayyum?	χιτών	13.5 dr.	1 chiton = 13.5 dr.	P. Cairo Zen. 4 59778, 3
(263-229)	Fayyum?	χιτών	10 dr.	3 chitons = 30 dr.	P. Cairo Zen. 4 59778, 4
249, Dios 4	Fayyum?	χι(τῶν) γυ(ναικεῖος)	40 dr.?	women's chitons = 40 dr.	P. Cairo Zen. 3 59319, 3
249, Dios 4	Fayyum?	χι(τῶν) γυ(ναικεῖος)	60 dr.?	women's chitons = 60 dr. (crossed out: 40 dr.)	P. Cairo Zen. 3 59319, 8
after 244, Phamenoth 3	Fayyum?	χιτών ἐπὶ ζωωτῶι	1270 dr./chiton	1 chiton adorned with figures = 1270 dr.	P. L. Bat. 20 62, 2
(after 241)	Fayyum?	χιτών	5 dr.	1 chiton = 5 dr.	P. Cairo Zen. 4 59659, 19
238/7	Krokodilopolis? (Fayyum)	χιτών	40 dr.	woman's woolen chiton: 40 dr.	P. Petrie(2) 1 13, 18
238/7	Krokodilopolis? (Fayyum)	χιτών	12 dr.	men's chiton: 12 dr.	P. Petrie(2) 1 13, 18-19
238/7	Krokodilopolis? (Fayyum)	χιτών	10.3333 dr.	new chiton: 10 dr 2 ob.	P. Petrie(2) 1 13, 19
(211 - mid-2nd c.)	Egypt	χιτών	50 dr.	the chiton = 50 dr.	SB 22 15236 Fragment 2, vo./77
(early 2nd c.)	Egypt	χιτών	210 dr.	For a chiton = 210 dr.	SB 24 16004, 4
197, Mesore 17	Fayyum	χιτών	15 dr.	2 chitons worth 30 dr.	P. Petrie 3 36 d, 21

Table 7.51: Price of Chitons (cont.)

Date	*Location*	*Commodity*	*Unit Price (per chiton)*	*Original Price*	*Source Text*
(2nd cent.)	Fayyum	χιτῶν τῆς μικρᾶς	600 dr.	1 chiton for a little girl = 600 dr.	P. Tebt. 3 891, 19
(2nd or 1st cent.)	Thebes (Upper Egypt)	*gtn*	1160 dr.	1 chiton = 58 deben	O. Leiden Dem. 276, 1/1
(187-88)	Pathyris	*gtn*	4000 dr.	1 chiton = 200 deben	Enchoria 21 (1994), p. 48 no. 48, 4

The *ỉnw*-cloth, known from Demotic texts, particularly annuity contracts, was discussed already in Chapter 6, but its prices are nonetheless presented more formally here in Table 48.[71] This type of cloth, made of wool, was also likely a differentiable good--in other words, not a commodity. There was clearly a massive rise in the value of *ỉnw*-cloths in inventories after the accounting changes of the late third century. Still, even within texts of similar dates, a wide variety in prices is visible. For example, in 198 BCE, we find a price of 600 drachmas (30 deben), but only ten years later, a *ỉnw*-cloth is valued at 8000 drachmas (400 deben), an increase of 1233.3333%! If these cloths were commodities (i.e., if no qualitative factor could be the cause of the price difference), this would imply a doubling in the value of *ỉnw*-cloths each year between 198-188/7 BCE. It seems more likely to me that these cloths were not all perceived in the same way. The more expensive cloth may simply have been nicer. Such a wide variety in pricing levels implies either major volatility or qualitative difference, and in the absence of similar increases for other commodities, I am inclined to think these cloths were perceived differently from each other.

[71] For further discussion, see 6.2.6 "Standard Social Payments."

Table 7.52: Price of *inw*–Cloths

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
287, Mesore	Thebes	*inw*	4 qite	1 inw = 4 silver qite	Revue d'Égyptologie (RdE) 35 (1984), p. 4-6, 3
(247-221)	Edfu (Upper Egypt)	*inw*	12 dr.	1 *inw*-cloth = 6 qite	P. Hauswaldt Manning 4, 2
226, Epeiph	Djeme, Thebes west (Upper Egypt)	*inw*	1.6 deben	1 inw-cloth: 1 deben 6 qite	P. Recueil 7, 5
(225/4)	Armant (Upper Egypt)	*inw*	40 dr.	1 *inw*-cloth = 2 deben	P. BM Andrews 46, 3
219, Mesore	Edfu (Upper Egypt)	*inw*	12 dr.	1 *inw*-cloth = 6 qite bronze	P. Hauswaldt Manning 6, 3
(2nd-1st cent.)	Thebes (Upper Egypt)	*inw*	2000 dr.	1 *inw*-cloth = 100 deben	O. Leiden Dem. 276, 1/6
(2nd-1st cent.)	Thebes (Upper Egypt)	*inw*	6000 dr.	1 *inw*-cloth = 300 deben	O. Leiden Dem. 277, x+6
(2nd-1st cent.)	Pathyris (Upper Egypt)	*inw*	370 deben	1 inw-cloth: 370 deben	Enchoria 21 (1994), p. 45-46 no. 46, 11
(2nd-1st cent.)	Pathyris (Upper Egypt)	*inw*	300 deben	1 inw-cloth: 300 deben	Enchoria 21 (1994), p. 47-48 no. 47, 3
(2nd-1st cent.)	Pathyris (Upper Egypt)	*inw*	10 deben	another inw-cloth: 10 deben (great example of variety in price)	Enchoria 21 (1994), p. 47-48 no. 47, 4
(2nd-1st cent.)	Pathyris (Upper Egypt)	*inw*	400 deben	1 inw-cloth: 400 deben	Enchoria 21 (1994), p. 54 no. 52, 1
(2nd c. BCE)	Gebelein? (Upper Egypt)	*inw*	1100 deben	1 inw-cloth = 1100 deben	Bulletin of the Center of Papyrological Studies (BACPS) 26 (2009), p. 158-159 no. 4, 1
198, Thoth		*inw*	600 dr.	1 *inw*-cloth = 30 deben	P. Eheverträge 28, 5
(198-118)	Aswan? (Upper Egypt)	*inw*	1000 dr.	1 *inw*-cloth = 50 deben	P. Äg. Handschr. 63 descr., x+2

Table 7.48: Price of *inw*–Cloths (cont.)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(189-100)	Deir el-Medina (Upper Egypt)	*inw*	250 deben	1 *inw*-cloth = 250 deben	P. Tor. Botti 39, 11
(188/7)	Pathyris (Upper Egypt)	*inw*	8000 dr.	1 *inw* -cloth = 400 deben	Enchoria 21 (1994), p. 48 no. 48, 3
186, Choiak 27	Deir el-Ballas (Upper Egypt)	*inw*	6 silver qite	1 inw-cloth = 6 qite silver (hd sp-sn)	Journal of the American Research Center in Egypt (JARCE) 2 (1963), p. 114, 6

The prices of so-called Syrian cloths (συρία) are listed below in Table 49. Unfortunately most examples do not record a quantity of cloths, so it was not possible to calculate unit prices. It is perhaps interesting that in two texts from the mid-3rd century, similar total prices are listed (6 and 6.5 dr.), but in the absence of quantities no reliable conclusions can be drawn. One later example records a much higher price, 34 drachmas, for one cloth—this text likely dates to decades later, probably 219 BCE.

Table 7.53: Price of Syrian Cloths

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(about 259)	Palestine? or Alexandria?	συρία		Syrian cloths = 6 dr. 3 ob.	P. Cairo Zen. 1 59010, 2/25
245, Mecheir 12	Oxyrynchites (Upper Egypt)	συρία		Syrian cloths = 6 dr.	P. Hibeh 1 51, 5-6
(244, Mecheir 26) or (219, Mecheir 26)	Moeris (Fayyum)	συρία	34 dr.	woman's Syrian cloth worth 34 dr.	SB 18 13160, 11

Two prices for mantles (Greek χλαμύς) survive from one text, P. Cairo Zen. 4 59778, along with one later example from SB 22 15238; they are listed in Table 50, below. Although no descriptions of the mantles are included, it seems likely that these were not commodities, given the

large difference in their value within even one text. One was priced at 37 dr., the other at 21 dr., a difference of 76.19% from the lower to the higher price. There is no way to determine definitely what the cause of this difference was, but it is very possible that the cause was related to perceived differences in these particular cloths.

Table 7.54: Price of Mantles

Date	*Location*	*Commodity*	*Unit Price (per mantle*	*Original Price*	*Source Text*
(263-229)	Fayyum?	χλαμύς	37 dr.	1 mantle = 37 dr.	P. Cairo Zen. 4 59778, 1
(263-229)	Fayyum?	χλαμύς	21 dr.	1 mantle = 21 dr.	P. Cairo Zen. 4 59778, 2
(late 3rd - early 2nd c.)	Fayyum	χλαμύς	4500 dr.	Mantle = 4500 dr.	SB 22 15238, vo., 1/27

While there seem to be two prices for cloaks (καυνάκης) listed in Table 51, these prices come from the same text and really represent the same transaction. Thus their equivalent value does not mean much, and no further analysis is possible.

Table 7.55: Price of Cloaks

Date	*Location*	*Commodity*	*Unit Price (per cloak)*	*Original Price*	*Source Text*
249, Dios 4	Fayyum?	καυνάκης	18.75 dr.	2 cloaks, with wool of 30 minas(?) = 37 dr. 3 ob.	P. Cairo Zen. 3 59319, 2
249, Dios 4	Fayyum?	καυνάκης	18.75 dr.	2 cloaks, with wool of 30 minas(?) = 37 dr. 3 ob.	P. Cairo Zen. 3 59319, 7

Four prices survive for ποδεί(ων) ζεῦ(γος), pairs of things worn on the feet that might be socks or perhaps leggings (Table 52). Two of these come from P. Cairo Zen. 3 59319 and display the same price, 4 drachmas per pair, in 249. The existence of the same price in the same text is different from some other cloths, which showed greater intra-text variability; it is theoretically

possible that socks were less differentiable than other types of clothing. A much lower price of 1.1667 dr., is known from P. Cairo Zen. 4 59778, but that text cannot be securely dated: the lower price could have come before, after, or contemporaneously with the 4-drachma price (this could be a rise or drop in prices, or contemporaneous variation). The increase from low to high is 170%: quite a lot of variation. One futher price survives from P. Cairo Zen. 4 59782a, but the price is listed as 4 minas and is therefore difficult to interpret. It is difficult to draw any firm conclusions about variability in the price of socks based on this meager evidence.

Table 7.56: Price of Socks/Leggings

Date	*Location*	*Commodity*	*Unit Price (per pair of socks)*	*Original Price*	*Source Text*
(263-229)	Fayyum?	ποδεί(ων) ζεῦ(γος)	1.1667 dr.	2 pairs of socks = 2 dr. 2 ob.	P. Cairo Zen. 4 59778, 5
(263-229)	Arsinoites? or Lower Egypt? or Herakleopolites?	ποδεί(ων) ζεῦ(γος)	4 minas of ?	1 pair of socks = 4 minas (of wool? or of iron?)	P. Cairo Zen. 4 59782a, 69
249, Dios 4	Fayyum?	ποδεί(ων) ζεῦ(γος)	4 dr.	1 pair of socks = 4 dr.	P. Cairo Zen. 3 59319, 3
249, Dios 4	Fayyum?	ποδεί(ων) ζεῦ(γος)	4 dr.	1 pair of socks = 4 dr.	P. Cairo Zen. 3 59319, 8-9

Only one example survives for theristra, two for threadbare cloaks (τριβώνιον), and one for ragged garments (ῥάκος), so no real substantive analysis of these is possible. The prices are listed in Tables 53-55 nonetheless.

Table 7.57: Price of Theristra

Date	*Location*	*Commodity*	*Unit Price (per garment)*	*Original Price*	*Source Text*
216, Artemisios	Oxyrynchites (Upper Egypt)	θέριστρα καινὰ		new theristra = 2 dr.*	BGU 6 1283, 14

* No quantity is specified.

Table 7.58: Price of Threadbare Cloaks

Date	*Location*	*Commodity*	*Unit Price (per cloak)*	*Original Price*	*Source Text*
(after 241)	Fayyum?	τριβώνιον	3 dr.	1 threadbare cloak stolen, worth 3 dr.	P. Cairo Zen. 4 59659, 20
(211 - mid-2nd c.)	Egypt	τρίβων		(pawn payment) on a threadbare cloak = 140 dr.	SB 22 15236 Fragment 2, 2/43

Table 7.59: Price of Ragged Garments

Date	*Location*	*Commodity*	*Unit Price (per garment)*	*Original Price*	*Source Text*
(263-229)	Fayyum?	ῥάκος	4 dr.	1 ragged garment = 4 dr.	P. Mich. Zen. 90, 6

The extreme variation in the price of many types of clothing, coupled with the addition of descriptors in many of the texts that include clothing prices, leads me to assume that for the most part, clothing was probably not a commodity (and therefore falls outside the scope of the present research). Perhaps, then, a better approach to understanding the commoditized aspects of clothing production would be to analyze the price of the raw materials that went into producing cloth. Most cloths were made of either linen or wool. Linen was discussed in the previous section, as flaxseed fell under the price controls of the Revenue Laws, although there was not much data to work with. Wool still remains. There is no evidence that the state maintained flocks of sheep or otherwise directly supervised wool production, so the inclusion of wool in this section of the analysis is a bit problematic. Still, I have chosen to include it here to better understand the commoditized components of the cloth sector. Further, it is possible that the state's demand for wool in order to reach these production quotas for wool cloths could have influenced cloth prices. If this demand were relatively regular, I would expect wool prices to be regular in turn.

The surviving prices for wool are listed in Table 56, below. I began with the assumption that raw wool was an undifferentiable commodity, an assumption which seems logical given the fact that wool was valued by the mina-weight rather than by the particular sheep it came from. However, one text does include a descriptor that might hint to the contrary: P. Cairo Zen. 1 59012 lists a price for ἔρια καθαρὰ, "pure wool." It is possible that wool that had already gone through some processing (or "purification") was more expensive than truly raw wool. Since none of the other prices include this descriptor, though, it is impossible to tell whether they reference raw or pure wool: this hidden difference may have impacted the price nonetheless.

The wool prices in Table 56 show consistency within texts (that is, in texts that list the price multiple times, the same price was paid in the different examples) but a great deal of variability between texts. For example, in P. Cairo Zen. 5 59825 (252 BCE), the price of wool was 1.3333 dr./mina consistently, but only five years later, in P. Mich. Zen. 61 (248/7 BCE), the price was 2 dr./mina. The extreme values, 1.3333 and 2.5 dr./mina, represent an increase of 87.5% from low to high. The reasons for this variability cannot be determined with certainty. It is possible that the price of wool varied seasonally in accordance with supply and demand. Sheep are typically shorn in the springtime so sheep will not overheat in the summer: thus supply would be highest in the spring and early summer—the exact time when I would expect demand for wool clothing to be lowest. Demand might have been highest in the colder months, when sheep were still growing out their wool. Thus it seems reasonable to suspect that wool prices would be lowest in the spring and summer, and highest in the wintertime. Unfortunately, the lack of information on the seasonality of most of the prices prevents a true test of this hypothesis. Still, some speculation is possible. The lowest price of ἔρια, 1.3333 dr., dates to Pharmouthi (roughly April-May)—the time of year when I expected wool prices would be low, soon after the shearing. The

high price, though, dates to the Macedonian month of Artemesios (also April): evidence that seems to disprove my initial hypothesis. Of course it is possible that the high price of 2.5 dr. in Artemisios of 259 was a result of the "purity" of that wool, discussed above, but it seems that seasonality alone cannot explain the variability in wool prices. The reasons for the variability of up to 87.5% in wool prices remain obscure. The variability in the price of raw wool may have contributed to variability in the price of cloths made from wool.

Table 7.60: Price of Wool

Date	*Location*	*Commodity*	*Unit Price (per mina)*	*Original Price*	*Source Text*
(263-229)	Fayyum?	γνάφαλλον	.8 dr.	flocks of wool of 35 minas = 28 dr.	P. Cairo Zen. 4 59776, 2-3
259, Artemisios	Fayyum?	ἔρια καθαρὰ	2.5 dr.	[22.5? minas] of pure wool, 1 bronze half-obol?, at 2 dr. [3 ob. (per mina) = 56 dr. 1] 1/2 ob.	P. Cairo Zen. 1 59012, 3/62-64
(after 257)	Alexandria? (Lower Egypt)	ἔρια	2.2667 dr. silver	30 minas wool = 68 dr. silver	P. Cairo Zen. 3 59398, 2
256, Daisios 11	Philadelphia? (Fayyum)	ἔρια		wool = 2 dr.	P. Cairo Zen. 2 59145, 10
252, Pharmouthi 2	Fayyum?	ἔρια	1.3333 dr.	15 minas wool = 20 dr.	P. Cairo Zen. 5 59825, 6
252, Pharmouthi 2	Fayyum?	ἔρια	1.3333 dr.	10 minas wool at a rate of 1 dr. 2 ob. = 13 dr. 2 ob.	P. Cairo Zen. 5 59825, 33
248/7	Fayyum?	ἔριον	2 dr.	15 minas wool = 30 dr.	P. Mich. Zen. 61, 27
248/7	Fayyum?	(ἔριον)	2 dr.	15 minas wool = 30 dr.	P. Mich. Zen. 61, 29
197, Mesore 17	Fayyum	ἔρεα καινὰ ("new wool")	100 [+ x] dr.	new wool = 100 [+ x] dr.	P. Petrie 3 36 d, 20
197, Mesore 17	Fayyum	[ἔρεα] ἰργασμένων ("worked wool")	60 dr./mina	5 minas of worked [wool?] worth 300 dr.	P. Petrie 3 36 d, 21

My initial hypothesis regarding the prices of commodities with supervised production—wine, crops on the sowing schedule, beer, and cloth—was that these prices would vary more than those of the seed oils for which the state fixed prices, but that in general, the state's oversight of production would lead to a steady supply and would prevent wild price volatility. The above analysis demonstrated, however, that the price of these commodities was extremely variable and irregular. Texts from the same time period include prices that were commonly double (or more) the price of other texts. Even within one text, price variation of 50% was not a rarity. These levels of variability are indeed higher than those seen in the case of the seed oils, but the variation was so high as to be quite surprising.

This price variability is so surprising in part because it represents a different pattern to pricing than the more regular, stepped increases represented in other studies of Ptolemaic grain prices and the inflation question.[72] In general, prices did increase over the course of the period, but there was a great deal of variability even in contemporaneous prices. This variability was not visible to the same extent in the value ratios between other grains and wheat, which were relatively stable, and in the penalty clauses for grain rents, which increased in a consistent, stepped manner. Cadell and Le Rider heaviliy emphasized penalty prices in their analysis, an approach which, I would argue, is the cause of their view that prices increased stepwise. Therefore my analysis emphasizes the need to study prices from multiple source types, since market prices seem to have been much more erratic than prices reflected in other sorts of contract clauses.

In her recent article on Ptolemaic prices, von Reden noted this discrepancy, but she assumed the penalty prices reflected "normal price levels," and that, despite fluctuations ("massive

[72] See 3.3.2 "Review of Literature on Ptolemaic Prices." E.g., Cadell and Le Rider, *Prix du blé,* 28-31 ; Reekmans, "Ptolemaic Copper Inflation"; W. Clarysse and E. Lanciers, "Currency and the Dating of Demotic and Greek Papyri from the Ptolemaic Period," *Ancient Society* 20 (1989): 117-132.

deviations from normal price levels"), market prices derived from these "normal" prices.[73] My research adds greater depth and color to these differences, but I would disagree with von Reden's interpretation. Given the total lack of correlation between penalty and non-penalty prices, I would argue that they each had distinct, separate dynamics. Penalty prices were more subject to tradition and "normality," whereas market prices were more volatile, based on the specific situation of each transaction, as well as the relative actual elasticity of supply and demand, as outlined above.

Some of the variability in the prices in this section, especially cloth prices, might be explained by qualitative differences in the things being priced. For example, I do not think most cloths were true commodities in the sense of being undifferentiable. However, other goods, like wheat, showed extreme variation even though they clearly were commodities. This variability, in particular, is very difficult to explain. My analysis above demonstrated that seasonality or a lack of information on prices alone cannot justify the wild differences in price. Regional variation may have been an important factor, but the nature of the extant evidence precludes much reliable analysis of the role of geography. If I may speculate, I might suggest that some differences in price could have been caused by the context of the valuation or payment being paid, with powerful individuals or insitutions being better able to get favorable deals. It is also possible that there were qualitative differences in some of these seeming commodities, like wine or wool, that simply were not recorded in the source texts.

In any case, the Ptolemaic state's supervision of the production of certain goods—wine, staple grain crops, beer, and cloth—did not stabilize the prices of those goods, even if it did keep them in ready supply.

[73] von Reden, "Grain prices in the eastern Mediterranean (c. 420-30 BC)," 166 and 170.

7.3.4 Unmanaged Commodities: (Almost) Everything Else

Finally, there were many commodities for which the Ptolemaic state did not issue any official regulations; I am calling these 'unmanaged commodities.' For the purpose of the present study, this category will still be limited to commodities—differentiable goods will not be included, although I can say that I expect that their prices varied even more than those of any commodities. The category of unmanaged commodities includes all sorts of agricultural produce that was not subject to sowing schedules, as well as the products necessary for regular life, such as bricks and papyrus. An unmanaged commodity is one which could legally be bought and sold by anyone, for whom the price was not fixed by the state, and whose production levels were not dictated based on any state-issued quotas or supervised by state agents. Of course the state could still tax these commodities and therefore did ultimately have the ability to control them, but no evidence exists to suggest that such control was a serious priority for the state with regard to the commodities in this category.

If the state's interventions twoards price stability were effective as outlined in the introduction, then, of all commodities, those regulated the least would also show the greatest variability in their price. Anyone could produce them, in whatever quantities he wanted, and sell them to whomever he wanted for whatever price he and the buyer could agree on. Without external management of production levels, it is more likely that unexpected events, such as bad harvests, could cause shocks to supply and prices in turn. Certain commodities may have been limited in their range of movement, and it is possible, then that greater regional variation in prices could arise. Change to these prices did not require any official processing, so it could happen quickly. I expect that these changes would mainly have been gradual, with some sharp increases and drops as a result of disruptions to supply. Since so many factors that contributed to price

levels could have varied, these commodities would likely have been the least predictable and most variable in their pricing overall.

This section includes a wide variety of goods. I will begin with an analysis of the prices of those commodities most similar to the ones discussed so far, starting with food products, including other seed oils and agricultural produce. Next, I will discuss the price of spices, followed by processed foods (such as cakes), and animal-based foods (honey, cheese, meats, and fish). Following my analysis of animal foods, I will analyze the price of live animals and the extent to which animals were seen as interchangeable commodities. Then I will move on to discuss non-food animal products (such as beeswax, sheepskins, and sponges) and non-food plants and plant products (like papyrus rolls). Finally, I will analyze the prices of earth (including mudbricks), stone, and pottery.

In addition to the seeds and oils discussed earlier in this chapter—i.e., those subject to commodity monopolies or at least some manner of price regulation—prices also survive for generic seeds and for another oil, white oil. These prices are listed in Tables 57 and 58, below. Since there is only one extent price for each of these commodities, no comparative analysis of the variability within each commodity is possible, but the prices are included here for the sake of completeness.

Table 7.61: Price of Generic Seeds

Date	*Location*	*Commodity*	*Unit Price (per artaba of seeds)*	*Original Price*	*Source Text*
(about 265)	Egypt	σπέρμα[το]ς	2.1818 dr.	33 art. = 72 dr.	P. Hibeh 1 63, 16

Table 7.62: Price of White Oil

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
259, Artemisios	Fayyum?	ἐλαίον λευκόν	30 dr./hemikadion	1 hemikadion = 30 dr.	P. Cairo Zen. 1 59012, 1/12

Most grains were included on the sowing schedules; the production of these commodities was somewhat managed by the Ptolemaic state, so these grains were discussed in the previous section. However, a few prices survive for other grains that were not a part of the sowing schedules. These grains included Demotic *tḥ* "straw" as well as Greek ἄχυρον "chaff," and their prices are listed in Tables 59 and 60, below. With regard to straw, only one securely dated text exists, so not much analysis can be done. In the case of chaff, three prices remain; two penalty prices and one more specific price (10 drachmas and 12.5 drachmas per artaba, respectively). The locations where the texts were written are unclear, so nothing can be said about geographic price variability. Neither of the three texts that record chaff prices can be dated securely, but the higher price does date to later than the lower prices (between 17-104 years later). The increase is only 25%, so it seems more likely that the temporal distance between the two was not extreme.

Table 7.63: Price of Straw

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(Ptolemaic)	Thebes (Upper Egypt)	*tḥ*		5 qite	O. Leiden Dem. 211, 7
302, Thoth	Djeme, Thebes west (Upper Egypt)	*tḥ*	.005 deben/(bundle)	price for 20 (bundles of) straw for the mud: 1 qite	P. Phila. Dem. 30, 1/7

Table 7.64: Price of Chaff

Date	*Location*	*Commodity*	*Unit Price (per artaba of chaff)*	*Original Price*	*Source Text*
(mid-3rd c.)	Tholthis? (Upper Egypt)	ἄχυρον	10 dr./art.	10 dr./artaba (in penalty clause)	P. Hamb. 4 239, 10-11
(286/5) or (266/5) or (228/7)	Takona? (Upper Egypt)	ἄχυρον	10 dr.	10 dr./artaba (in penalty clause)	BGU 6 1267, 12-13
(211-182)	Egypt	ἄχυρον	12.5 dr.	2 artabas = 25 drachmas	BGU 6 1290, 11

Some prices remain for other greens, which, as potential fodder for animals, may have been somewhat similar to Demotic *sm*, discussed previously. Table 61 lists three prices for greens for which the purpose is unclear; these may be references to greens as fodder or as food for humans. In any case, no quantities are given for these three payments, so not much analysis is possible. In Table 62, I have listed two prices found in the Zenon archive for greens used as fodder for sheep; the prices were listed per aroura of fodder land. Both come from the same text, P. Cairo Zen. 4 59628, so no geographic or temporal variability can be pulled from this data. Nonetheless, the data do reveal variability in the unit price, from 4-6 drachmas (a difference of 50% from the lower to the higher figure). Since these unit prices were described not per artaba of harvested greens but rather per aroura of fodder land, it is possible that different plots of land produced different quantities or qualities of greens. Thus I cannot be sure that fodder land should be treated as a commodity at all, but I have included the price variability here for the sake of completeness.

Table 7.65: Price of Greens

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
252/1	Philadelphia? (Fayyum)	χλωρός		949 dr.	P. Cairo Zen. 2 59268, 1/3
(about 200)	Fayyum	χλοίη		1 (dr.)	P. Tebt. 3 885, 16
(about 200)	Fayyum	χλοῖον		2 (dr.)	P. Tebt. 3 885, 52

Table 7.66: Price of Green Fodder (for Sheep)

Date	*Location*	*Commodity*	*Unit Price (per aroura of fodder land)*	*Original Price*	*Source Text*
(263-229)	Fayyum?	χλωρός	4 dr.		P. Cairo Zen. 4 59628, 4
(263-229)	Fayyum?	χλωρός	6 dr.		P. Cairo Zen. 4 59628, 5

Some legumes were included in the sowing schedule discussed in the previous section, but the production and pricing of other legumes were less directly managed by the state. These unmanaged legumes included phaselos-beans, chickpeas, and nuts; the prices for these legumes are listed in Tables 63-65, below. The price of phaselos-beans was consistent in the one text from which prices for this bean survive: P. Lond. 7 1994. Given the fact that even sesame prices varied within this text, the lack of variability in bean prices does stick out. Unfortunately the surviving prices for chickpeas are not possible to analyze, given the different units with which chickpeas were valued (in money and in kind). Nut prices, likewise, are impossible to analyze reliably, since they were of different types; those of the same type do not include enough information regarding quantities to make it possible to calculate unit prices for comparative purposes.

Table 7.67: Price of Phaselos-Beans

Date	*Location*	*Commodity*	*Unit Price (per artaba of phaselos)*	*Original Price*	*Source Text*
251	Philadelphia (Fayyum)	φάσηλος	.6667 art. wheat	.25 art. phaselos = .1667 art. wheat	P. Lond. 7 1994, 148
251	Philadelphia (Fayyum)	φάσηλος	.6667 art. wheat	.25 art. phaselos = .1667 art. wheat	P. Lond. 7 1994, 171

Table 7.68: Price of Chickpeas

Date	*Location*	*Commodity*	*Unit Price (per artaba of chickpeas)*	*Original Price*	*Source Text*
(4th c.)	Memphis (Lower Egypt)	ἐρ̣ο̣βίνθων		chickpeas(?): 9 dr.	SB 14 11963, 2/4-5
(Ptolemaic)	Thebes (Upper Egypt)	*gfgf**	18 deben/*mḏ.t* = 216 deben/artaba	.5 *mḏ.t* = 9 deben	O. Leiden Dem. 204,1
255, Dios 12	Alexandria? (Lower Egypt)	ἐρέβινθος κριός	5 dr./art.	2 artabas = 10 dr.	P. Cairo Zen. 2 59192, 8
251	Philadelphia (Fayyum)	ἐρέβινθος	1.0425 art. wheat	155.75 art. chickpeas = 162.375 art. wheat	P. Lond. 7 1994, 118
231, Thoth 19 or 206, Thoth 19	Fayyum	ἐρέβινθος		chickpeas = 1.25 ob.	P. Petrie 3 136, 3/24
210, Phamenoth	Tebtunis (Fayyum)	ἐρέβινθος		chickpeas = 5 ob.	P. Tebt. 3 884 Fr. 1, 1/11
210, Phamenoth	Tebtunis (Fayyum)	[ἐρέβινθος] καθαρός		clean ones = 4.5 ob.	P. Tebt. 3 884 Fr. 1, 1/12

* The exact translation of *gfgf* is unknown but might be chickpeas. Cf. *gfg(?)*, CDD "G" 04:1 (May 25, 2004), p. 26.

Table 7.69: Price of Nuts

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(263-229)	Fayyum?	κάρυον	32 (dr./art?)	2 art. at a rate of 32 (dr./art.?), making 134 (dr.?)	P. Cairo Zen. 4 59776, 4-5
(263-229)	Fayyum?	κάρυον		nuts = 2 ob.	P. Col. Zen. 2 94, 15
259, Artemisios	Fayyum?	σκληρός (hard nuts)	12 dr./art.	2 artabas = 24 dr.	P. Cairo Zen. 1 59012, 2/49-51
(mid-3rd c.)	Fayyum	καρύα		nuts: 2 ob.	SB 12 10863, 3
(mid-3rd c.)	Fayyum	καρύα		nuts: 1 chalkous	SB 12 10863, 18
231, Thoth 19 or 206, Thoth 19	Fayyum	κάρυον		nuts = 1 dr. 1 ob.	P. Petrie 3 136, 3/21
(about 200)	Arsinoites	κάρυον		10 (dr.)	P. Tebt. 3 885, 60

Many prices for λάχανον, generic vegetables or herbs, survive and are listed in Table 66. While not many quantities are preserved, the account UPZ 2 158 A records many prices over several days, and it is possible to compare these roughly contemporaneous prices to each other. They actually were remarkably uniform, at ¼ obol, indicating much less price variability than would be expected of an unmanaged commodity.

Table 7.70: Price of Generic Vegetables or Herbs

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Upper Egypt	λάχανον	.0347 dr./vegetable	6 vegetables = 1.25 ob.	O. Strasb. 1 584, 5
3rd. cent.	Upper Egypt	λάχανον	.0298 dr./vegetables	7 vegetables = 1.25 ob.	O. Strasb. 1 603, 5
3rd. cent.	Fayyum	λάχανα		herbs = .5 ob.	P. Petrie 3 138, 1/9
3rd. cent.	Fayyum	λάχανα		herbs = .5 ob.	P. Petrie 3 139a, 2/2
3rd. cent.	Fayyum	λάχανα		herbs = .25 ob.	P. Petrie 3 140d, 2
3rd. cent.	Fayyum	λάχανα		herbs = 1 chalkous	P. Petrie 3 140d, 4
3rd. cent.	Fayyum	λάχανα		herbs = .25 ob.	P. Petrie 3 142, 25
(3rd c.)	Tebtunis (Fayyum)	λάχανα		herbs: .5 ob.	P. Tebt. 3 1078 descr. vo., 32
(263-229)	Fayyum?	λάχανον		vegetables = 1 chalkous	P. Col. Zen. 2 94, 11
243, Mesore 3	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, 4/28
243, Mesore 4	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, 5/34
243, Mesore 6	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, 8/57
243, Mesore 7	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, 11/70
243, Mesore 8	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, 11/75
243, Mesore 9	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, 13/84

Table 7.66: Price of Generic Vegetables or Herbs (cont.)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
243, Mesore 11	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, 15/103
243, Mesore 12	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, 17/115
243, Mesore 13	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, 18/121
243, Mesore 14	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, 19/133
243, Mesore 15	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, 20/140
243, Mesore 16	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, 21/147
243, Mesore 18	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, Vo 2/167
230 or 205, Thoth	Thebes (Upper Egypt)	λάχανα		3 ob.	O. Bodl. 1 307, 13
(before 210)	Ptolemais Hormou? (Fayyum)	λάχανα		herbs = 2 chalkoi	SB 4 7451, 7
(before 210)	Ptolemais Hormou? (Fayyum)	λάχανα		herbs = 2 chalkoi	SB 4 7451, 11
(early 2nd c.)	Tebtunis (Fayyum)	λάχανα		herbs: 1 dr.?)	P. Tebt. 3 1086 descr., 6

Prices have also survived for a number of other different vegetables, the production and pricing of which were not managed by state institutions. These vegetables include leafy greens (lettuce and cabbage), root vegetables (radishes, onions, leeks, garlic, fennel, and beets), and peas; their prices are listed in Tables 67-75, below. Unfortunately these prices do not include enough information to enable an analysis of price variability, either because only one price survives or because of a lack of quantities mentioned in reference to the price. They are included here merely for the sake of completeness.

Table 7.71: Price of Lettuce

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	θρίδαξ		lettuce = 1 chalkous	P. Petrie 3 140d, 2
251	Philadelphia (Fayyum)	θρίδαξ	1 choinikes lettuce = 1 choinikes wheat	2 chokinkes lettuce = 2 choinikes wheat	P. Lond. 7 1994, 173

Table 7.72: Price of Cabbage

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	κράμβη		cabbage = 4 ob.	P. Petrie 3 137, 1/8
3rd. cent.	Fayyum	ῥάφανος		cabbage = 1 chalkous	P. Petrie 3 137, 1/11
(3rd c.)	Tebtunis (Fayyum)	κράμβη		cabbage: .5 ob.	P. Tebt. 3 1078 descr. vo., 34
257, Choiak 1	Herakleopolis (Upper Egypt)	ῥάφανος		cabbages: .25 ob.	P. Sorb. 1 16, 7
243, Mesore 5	Thebes (Upper Egypt)	κράμβη		cabbage = .5 ob.	UPZ 2 158 A, 7/48
243, Mesore 11	Thebes (Upper Egypt)	κράμβη		cabbage = .5 ob.	UPZ 2 158 A, 14/98
(about 200)	Fayyum	κράμβη		5 (dr.)	P. Tebt. 3 885, 50

Table 7.73: Price of Radishes

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	συρμός		radishes = 1 ob.	P. Petrie 3 138, 1/10
243, Mesore 11	Thebes (Upper Egypt)	συρμαία		Syrmaia radishes = 1/2 ob.	UPZ 2 158 A, 15/99

Table 7.74: Price of Onions

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(Ptolemaic)	Thebes (Upper Egypt)	*ḥtt šn*		2.5 (value and volume units in lacunae)	O. Leiden Dem. 213 vo., x+14
3rd. cent.	Fayyum	κρόμμυον		onions = .25 ob.	P. Petrie 3 140a, 6
252	Philadelphia (Fayyum)	κρόμμυον αὐτοφυῶν (wild onions)		90 dr.	P. Cairo Zen. 2 59269, 5
(210-204?) or (193-187?)	Philadelphia (Fayyum)	κρόμμυον	1100 dr./art.	1 art. at a rate of 1100 dr./art.	BGU 7 1523, 3

Table 7.75: Price of Leeks

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(252-243)	Philadelphia (Fayyum)	πράσον		28 dr. 4 ob.	P. Cairo Zen. 2 59269, 27

Table 7.76: Price of Garlic

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Egypt	σκόροδον		12 dr.	BGU 6 1495, 12
3rd. cent.	Egypt	σκόροδον		5 dr.	BGU 6 1495, 14
3rd. cent.	Fayyum	σκόροδον		garlic = 1 chalkous	P. Petrie 3 137, 1/12

Table 7.77: Price of Fennel

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(Ptolemaic)	Thebes (Upper Egypt)	*šmr*		5 qite	O. Leiden Dem. 209, x+13

Table 7.78: Price of Beets

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	σεῦτλον		beet = 1 chalkous	P. Petrie 3 137, 1/22
(about 200)	Fayyum	σεῦτλον	4 (dr./kotyla?)	4 (dr.?)	P. Tebt. 3 885, 39

Table 7.79: Price of Peas

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(about 200)	Fayyum	πίσος		15 (dr.)	P. Tebt. 3 885, 54
(299-200)	Egypt	πίσος		8 dr.	BGU 6 1495, 4

A number of fruit prices also survive. Fruits, as the produce of orchards, were taxed along with wine in the apomoira, and owners of orchards were registered with the state.[74] However, presumably since fruits (with the exception of dates) spoil quickly, these taxes were collected in money rather than in kind. The discussion of taxes on orchards in P. Rev. and elsewhere never specifies which fruits were taxed; it seems likely, then, that the state did not oversee the growing of fruits and probably did not particularly care which fruits were grown. If the tax were collected based on the area of the orchard land, theoretically any fruits could be grown there.

The surviving fruit prices include the prices of olives, grapes, mulberries, pomegranates, and figs; these are listed in Tables 76-84, below. Unfortunately, only one price remains for most of these fruits, preventing the possibility of comparative analysis. Two prices survive for olives, recording payments made in exchange for olives, but no quantities are included by which to calculate a unit price for comparison. The one fruit whose price can be discussed is grapes, for which two prices remain from the same text, P. Tebt. 3 885 (Table 77, below). In this text, both grape prices are equivalent, at 3 drachmas. The units intended are not clear, but the context seems to indicate the same unit in both examples. Thus there does not seem to be any variation within the set of grape prices, although they are from only one source text.

[74] P. Rev., 29-33.

Table 7.80: Price of Olives

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(Ptolemaic)	Thebes (Upper Egypt)	*ḏyt*		1 deben 7.5 qite	O. Leiden Dem. 211, 5
302, Thoth	Djeme, Thebes west (Upper Egypt)	*ḏyt*	.1 deben	1 olive tree = 1 silver qite	P. Phila. Dem. 30, 3/34
(249-246)	Fayyum?	ἐλαία		100 dr. of silver	P. Cairo Zen. 3 59326 + P. Lond. 7 2002 + P. Cairo Zen. 3 59326 bis, 128
243, Mesore 3	Thebes (Upper Egypt)	ἐλαία		olives = 1/4 ob.	UPZ 2 158 A, 4/24

Table 7.81: Price of Grapes for Eating

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(about 200)	Fayyum	τρώξιμος	3 (dr./kotyla?)	3 (dr.)	P. Tebt. 3 885, 15
(about 200)	Fayyum	τρώξιμος	3 (dr./kotyla?)	3 (dr.)	P. Tebt. 3 885, 38

Table 7.82: Price of Mulberries

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
257, Daisios 21	Alexandria? (Lower Egypt)	συκάμινος		.5 ob.	P. Cairo Zen. 1 59083, 3

Table 7.83: Price of Pomegranates

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
257, Daisios 21	Alexandria? (Lower Egypt)	ῥόα		.5 ob.	P. Cairo Zen. 1 59083, 4

Table 7.84: Price of Pomegranate Seeds

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
259, Artemisios	Fayyum?	κόκκωνος	2 dr./art.	2 artabas = 4 drachmas	P. Cairo Zen. 1 59012, 2/50-51

Table 7.85: Price of Figs

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(3rd-1st c.)	Thebes (Upper Egypt)	*qn(t)*		4 deben	O. Leiden Dem. 122 [1], 4
3rd. cent.	Fayyum	σῦκον		figs = 1 ob.	P. Petrie 3 140a, 7
3rd. cent.	Fayyum	σῦκον		figs = 1 dr.	P. Petrie 3 142, 18
(mid-3rd c.)	Fayyum	σῦκα		figs: 1.5 ob.	SB 12 10863, 8
(263-229)	Fayyum?	σῦκον		figs = 1 dr.	P. Col. Zen. 2 94, 14
(mid-3rd c.)	Egypt	σῦκα		figs = .5 ob.	SB 24 16067 Fragments g+i, 6
(early 2nd c.)	Tebtunis (Fayyum)	σῦκον		figs: 2 (dr.?)	P. Tebt. 3 1086 descr., 14

Table 7.86: Price of Figs and Pomegranates (Undifferentiated)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(252-246)	Philadelphia (Fayyum)	[σ]ύκων καὶ ῥοῶν		20 dr. for one year	P. Cairo Zen. 2 59269, 9

Table 7.87: Price of Dried Figs

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
259, Artemisios	Fayyum?	ἰσχάς	8 dr./ker.	9 keramia = 72 dr.	P. Cairo Zen. 1 59012, 1/21
231, Thoth 19 or 206, Thoth 19	Fayyum	ἰσχάς		figs = 1 ob.	P. Petrie 3 136, 3/22

Table 7.88: Price of Dates

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Upper Egypt	βαλανεῖ		1 ob.	O. Strasb. 1 584, 6

Several prices for spices and aromatics survive, including cinnamon, coriander, cumin, fenugreek, mustard, oregano, saffron, generic seasoning, salt, natron, and frankincense (remember that myrrh is listed above with commodities under price regulation). It is possible that salt was not actually "unmanaged"; although the salt tax is generally understood as a capitation tax, it may have had some relationship to the distribution of or access to salt. However, in the absence of concrete evidence to this effect, I cannot assume it was actually managed. These prices are listed in Tables 85-95, below. Unfortunately the data are not complete enough to make substantive analysis possible.

Table 7.89: Price of Cinnamon

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(270-258?)	Fayyum	κιννάμωμον		cinnamon = 3 ob.	SB 8 9860a, 21

Table 7.90: Price of Coriander

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(Ptolemaic)	Thebes (Upper Egypt)	*pr.t šw*		2.5 qite	O. Leiden Dem. 209, x+14

Table 7.91: Price of Cumin

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(Ptolemaic)	Thebes (Upper Egypt)	*tpn*		5 qite	O. Leiden Dem. 209, x+13

Table 7.92: Price of Fenugreek

Date	*Location*	*Commodity*	*Unit Price (per artaba of fenugreek)*	*Original Price*	*Source Text*
251	Philadelphia (Fayyum)	τῆλις	.5976 art. wheat	20.5 art. fenugreek = 12.25 art. wheat	P. Lond. 7 1995, 64

Table 7.93: Price of Mustard

Date	*Location*	*Commodity*	*Unit Price (per hin of mustard)*	*Original Price*	*Source Text*
(Ptolemaic)	Thebes (Upper Egypt)	*ḫltn*	2 deben	1 hin = 2 deben	O. Leiden Dem. 204, 3

Table 7.94: Price of Oregano

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(270-258?)	Fayyum	ὀρίγανον		oregano = 2 dr.	SB 8 9860a, 18-19

Table 7.95: Price of Saffron

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(270-258?)	Fayyum	κρόκος		saffron = 3 ob.	SB 8 9860a, 20

Table 7.96: Price of Generic Seasoning

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
257, Daisios 21	Alexandria? (Lower Egypt)	ἀρ]τύματα χλωρὰ		.5 ob.	P. Cairo Zen. 1 59083, 3
243, Mesore 2	Thebes (Upper Egypt)	ἄρτυμα		seasonings = 1/4 ob.	UPZ 2 158 A, 3/21
243, Mesore 3	Thebes (Upper Egypt)	ἄρτυμα		seasonings = 1/4 ob.	UPZ 2 158 A, 4/27

Table 7.97: Price of Salt

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	ἅλς		salt = .25 ob.	P. Petrie 3 140a, 2
(mid-3rd c.)	Egypt	ἅλς		salt = .75 ob.	SB 24 16067 Fragments g+i, 6
257, Daisios 21	Alexandria? (Lower Egypt)	ἅλς		.25 ob.	P. Cairo Zen. 1 59083, 4

Table 7.98: Price of Salt (contd.)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
243, Mesore 1	Thebes (Upper Egypt)	ἅλς		salt = 1/4 ob.	UPZ 2 158 A, 3/16
243, Mesore 10	Thebes (Upper Egypt)	ἅλς		salt = 1/4 ob.	UPZ 2 158 A, 14/92

Table 7.99: Price of Natron

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
213, Pachons 14	Fayyum	νιτρική		natron: 1 talent, 1458 dr 22 2 ob.; the fourth: 1194 4	P. Köln Gr. 6 269, 6-8

Table 7.100: Price of Frankincense

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
243, Mesore 5	Thebes (Upper Egypt)	λιβανωτός		frankincense = 1/2 ob.	UPZ 2 158 A, 7/49
(late 3rd c. BCE)	Elephantine (Upper Egypt)	μάνν[ας]		frankincense powder, 2 dr.	Greek medical papyri (GMP) 2 11, 5

Several prices for prepared cakes survive and are recorded in Table 96, although none record a quantity of cakes that would make it possible to calculate a unit price for comparison. However, it is possible to compare prices within individual texts. For example, P. Petrie 3 137 records payments of between 0.5-1.75 obols—enough variation to suggest that these were different quantities of cakes. UPZ 2 158 A, on the other hand, shows remarkable similarity of prices, with payments of 1.5 obols on the majority of days.

Table 7.96: Price of Cakes

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	ἄρτος		1 chalkous	P. Petrie 3 135, 3
3rd. cent.	Fayyum	ἄρτος		cakes for you = .5 ob.	P. Petrie 3 137, 1/2
3rd. cent.	Fayyum	ἄρτος		cakes for me = 1.25 ob.	P. Petrie 3 137, 1/3
3rd. cent.	Fayyum	ἄρτος		cakes = .5 ob.	P. Petrie 3 137, 1/6
3rd. cent.	Fayyum	ἄρτος		cakes for me = .5 ob.	P. Petrie 3 137, 1/17
3rd. cent.	Fayyum	ἄρτος		cakes for me = 1 ob.	P. Petrie 3 137, 1/19
3rd. cent.	Fayyum	ἄρτος		cakes for you: .5 ob.	P. Petrie 3 137, 1/20
3rd. cent.	Fayyum	ἄρτος		cakes = .75 ob.	P. Petrie 3 137, 2/3
3rd. cent.	Fayyum	ἄρτος		cakes for you: .5 ob.	P. Petrie 3 137, 2/5
3rd. cent.	Fayyum	ἄρτος		cakes = 1.75 ob.	P. Petrie 3 137, 2/8
3rd. cent.	Fayyum	ἄρτος		cakes = 1 ob.	P. Petrie 3 137, 2/9
3rd. cent.	Fayyum	ἄρτος		cakes for me = .5 ob.	P. Petrie 3 137, 2/13
3rd. cent.	Fayyum	ἄρτος		cakes = 1.75 ob.	P. Petrie 3 138, 1/3
3rd. cent.	Fayyum	ἄρτος		cakes = 2 ob.	P. Petrie 3 138, 2/1
3rd. cent.	Fayyum	ἄρτος		cakes = 4.5 ob.	P. Petrie 3 138, 2/7
3rd. cent.	Fayyum	ἄρτος		cake = .5 ob.	P. Petrie 3 139a, 2/2
3rd. cent.	Fayyum	ἄρτος		cake = .5 ob.	P. Petrie 3 139b, 2/11
3rd. cent.	Fayyum	ἄρτος		cakes = 1 ob.	P. Petrie 3 140d, 2
3rd. cent.	Fayyum	ἄρτος		cakes = 2 ob.	P. Petrie 3 140d, 4
3rd. cent.	Fayyum	ἄρτος		cakes = 1 ob.	P. Petrie 3 140d, 6
(3rd c.)	Tebtunis (Fayyum)	ἄρτος		cakes: 5 ob.	P. Tebt. 3 1078 descr. vo., 29
(mid-3rd c.)	Fayyum	ἄρτοι		cakes: 2 ob.	SB 12 10863, 4

Table 7.96: Price of Cakes (cont.)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(mid-3rd c.)	Fayyum	ἄρτοι		cakes: 2 ob.	SB 12 10863, 15
(mid-3rd c.)	Fayyum	ἄρτοι		cakes: 2.5 ob.	SB 12 10863, 18
(263-229)	Fayyum?	ἄρτος		cake = 1 chalkous	P. Col. Zen. 2 94, 12
243, Epeiph 30	Thebes (Upper Egypt)	ἄρτος		cakes = 1/2 1/4 ob.	UPZ 2 158 A, 1/7
243, Mesore 1	Thebes (Upper Egypt)	ἄρτος		cakes = 1 1/4 ob.	UPZ 2 158 A, 2/12
243, Mesore 2	Thebes (Upper Egypt)	ἄρτος		cakes = 2 1/2 1/4 ob.	UPZ 2 158 A, 3/18
243, Mesore 3	Thebes (Upper Egypt)	ἄρτος		cakes = 1 ob.	UPZ 2 158 A, 4/23
243, Mesore 4	Thebes (Upper Egypt)	ἄρτος		cakes = 1 1/2 ob.	UPZ 2 158 A, 5/35
243, Mesore 5	Thebes (Upper Egypt)	ἄρτος		cakes = 1/2 1/4 ob.	UPZ 2 158 A, 7/45
243, Mesore 6	Thebes (Upper Egypt)	ἄρτος		cakes = 1 1/2 ob.	UPZ 2 158 A, 9/58
243, Mesore 7	Thebes (Upper Egypt)	ἄρτος		cakes = 1 1/2 ob.	UPZ 2 158 A, 10/68
243, Mesore 8	Thebes (Upper Egypt)	ἄρτος		cakes = 1 1/2 ob.	UPZ 2 158 A, 11/73
243, Mesore 9	Thebes (Upper Egypt)	ἄρτος		cakes = 1 1/2 ob.	UPZ 2 158 A, 12/82
243, Mesore 10	Thebes (Upper Egypt)	ἄρτος		cakes = 2 ob.	UPZ 2 158 A, 13/87
243, Mesore 11	Thebes (Upper Egypt)	ἄρτος		cakes = 1 1/2 ob.	UPZ 2 158 A, 14/97
243, Mesore 12	Thebes (Upper Egypt)	ἄρτος		cakes = 1 1/2 ob.	UPZ 2 158 A, 17/112
243, Mesore 13	Thebes (Upper Egypt)	ἄρτος		cakes = 1 1/2 ob.	UPZ 2 158 A, 18/120
243, Mesore 14	Thebes (Upper Egypt)	ἄρτος		cakes = 1 ob.	UPZ 2 158 A, 19/130
243, Mesore 15	Thebes (Upper Egypt)	ἄρτος		cakes = 1 1/2 ob.	UPZ 2 158 A, 20/137
243, Mesore 16	Thebes (Upper Egypt)	ἄρτος		cakes = 1 1/2 ob.	UPZ 2 158 A, 21/144
243, Mesore 18	Thebes (Upper Egypt)	ἄρτος		cakes = 1 1/2 ob.	UPZ 2 158 A, Vo 1/163

Table 7.96: Price of Cakes (cont.)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(before 210)	Ptolemais Hormou? (Fayyum)	ἄρτος		cakes = 2 chalkoi	SB 4 7451, 9
(early 2nd c.)	Tebtunis (Fayyum)	ἄρτος		cakes: 10 (dr.?)	P. Tebt. 3 1086 descr., 5
3rd. cent.	Fayyum	ἄρτος		cake: 1 chalkous	P. Petrie 3 135, 3

More extant texts record prices for three different types of cakes. These prices are listed in Tables 97-99 below, but the dearth of comparative material in each case prevents any substantive analysis.

Table 7.97: Price of Laganon-Cake

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(299-200), Epeiph 21	Egypt	λάγανον		20 dr.*	BGU 6 1495, 10
(299-200), Epeiph 21	Egypt	λάγανον		20 dr.†	BGU 6 1495, 39

* No specific quantity is mentioned. The singular is used, so it is possible that this is the price of one cake, but that price seems quite high.

† No specific quantity is mentioned. The singular is used, so it is possible that this is the price of one cake, but that price seems quite high.

Table 7.8: Price of Pure Cakes

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(208-206?)	Memphis? (Lower Egypt)	καθαροὺς ἄρτους	.0370 dr./cake	18 cakes = 4 ob.	UPZ 1 149, 17

Table 7.99: Price of Pressed Cake

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(3rd cent.	Egypt	ναστὸς	20 dr./ choinix	3 choinikes = 60 dr.	BGU 6 1495, 38

Table 100 contains prices for prepared meals, which may certainly have varied in their contents and quality. Quantities are not recorded in most cases. Unlike cakes, prepared meals seem to have varied more in their price throughout UPZ 2 158 A, perhaps because what constituted a "meal" was less codified.

Table 7.100: Price of Prepared Meals

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Egypt	ὄψον		50 dr.	BGU 6 1495, 6
3rd. cent.	Upper Egypt	ὄψον	.0556 dr./meal	6 meals = 2 ob.	O. Strasb. 1 603, 2
3rd. cent.	Fayyum	ὄψον		meal = .5 ob.	P. Petrie 3 142, 2
(mid-3rd c.)	Fayyum	ὄψον	2.25 ob.	meal: 2.25 ob.	SB 12 10863, 3
257, Choiak 3	Herakleopolis (Upper Egypt)	ὄψον		for a meal: 1 ob.	P. Sorb. 1 16, 14
243, Epeiph 30	Thebes (Upper Egypt)	ὄψον		meal = 1 1/2 ob.	UPZ 2 158 A, 1/8
243, Mesore 2	Thebes (Upper Egypt)	ὄψον		meal = 2 ob.	UPZ 2 158 A, 3/19
243, Mesore 4	Thebes (Upper Egypt)	ὄψον		meal = 4 ob.	UPZ 2 158 A, 5/32
243, Mesore 5	Thebes (Upper Egypt)	ὄψον		meal = 2 ob.	UPZ 2 158 A, 7/46
243, Mesore 6	Thebes (Upper Egypt)	ὄψον		meal = 2 ob.	UPZ 2 158 A, 8/56
243, Mesore 8	Thebes (Upper Egypt)	ὄψον		meal = 1 1/4 ob.	UPZ 2 158 A, 11/74
243, Mesore 10	Thebes (Upper Egypt)	ὄψον		meal = 1/2 ob.	UPZ 2 158 A, 13/88
243, Mesore 11	Thebes (Upper Egypt)	ὄψον		meal = 1 ob.	UPZ 2 158 A, 15/104
243, Mesore 12	Thebes (Upper Egypt)	ὄψον		meal = 1 1/2 1/4 ob.	UPZ 2 158 A, 17/113
243, Mesore 13	Thebes (Upper Egypt)	ὄψον		meal = 1 1/2 1/4 ob.	UPZ 2 158 A, 18/119

Table 7.100: Price of Prepared Meals (cont.)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
243, Mesore 14	Thebes (Upper Egypt)	ὄψον		meal = 3 ob.	UPZ 2 158 A, 19/131
243, Mesore 15	Thebes (Upper Egypt)	ὄψον		meal = 2 1/2 ob.	UPZ 2 158 A, 20/138
243, Mesore 16	Thebes (Upper Egypt)	ὄψον		meal = 1 1/2 ob.	UPZ 2 158 A, 21/146
243, Mesore 18	Thebes (Upper Egypt)	ὄψον		meal = 1 1/2 ob.	UPZ 2 158 A, Vo 1/165

Many prices survive for foods made from animals or animal products. The 12 extant prices for honey are listed in Table 101, below. These prices show a great deal of variability, some of which might be explained based on perceived qualitative differences between different varieties of honey. For example, P. Cairo Zen. 1 59012 lists prices for imported honey from six different regions. Like wine, the fact that honey was worth importing (and paying heavy customs duties on that import) and that the regional variety of the honey was important enough to record, indicates that this honey was not commoditized: honey from some regions clearly was more valuable (by about 3x) than that from other regions.

Many of the texts with honey prices cannot be securely dated, and even where the date is clear, conversion of the volume units is not certain, so a comparison of honey prices is difficult and probably not the most reliable. Nonetheless, there does seem to have been a great deal of variability in the price of even generic honey (μέλι), with no descriptors attached. In 259 BCE, honey was priced at 36 dr./metretes (P. Cairo Zen. 1 59012) and at 21 or perhaps 28 dr./metretes, depending on the rate of conversion between choes and metretes (P. Mich. Zen. 2). Then in 253 BCE, only six years later, honey was priced at 24 dr./metretes (P. Lond. 7 1977). Within these few years in the 250s, then, there was a possible range of at least 12 dr./metretes (a

50% increase from low to high values) and perhaps as much as 15 dr./metretes, if we accept the low price of 21 dr./metretes: this would be an increase of 71.4286% from low to high). This variability of roughly 50-70% is not inconsistent with the other variability levels discussed so far. Since honey is typically harvested in late summer, it is possible that seasonality played a role, with the lowest honey prices occurring when supply was high, during or soon after the harvest. Unfortunately, not enough data survives regarding the seasonality of these prices for me to carry out a reliable analysis. The price of 24 dr., which may have been the lowest price of our small group from the 250s, occurred in the month of Payni (June or July), which seems a bit early for the honey harvest. The higher prices were from the Macedonian month of Artemesios (roughly April), when the supply of honey was likely lower. It is thus possible that seasonality played a role in honey prices, but the small amount of surviving data still makes this idea quite speculative. What is clear, though, is that even generic honey prices varied by about 50-70% within the same general period of time.

Table 7.101: Price of Honey

Date	*Location*	*Commodity*	*Unit Price (per metretes of honey)*	*Original Price*	*Source Text*
(3rd c.)	Fayyum	μέλι		honey = 1 ob.	P. Petrie 3 139a, 2/1
(3rd c.)	Tebtunis (Fayyum)	μέλι		honey: an obol	P. Tebt. 3 1078 descr. vo., 25
(3rd c.)	Tebtunis (Fayyum)	μέλι		honey: .5 ob.	P. Tebt. 3 1078 descr. vo., 33
(263-229)	Fayyum?	μέλι	10 dr.	1 metretes = 10 dr.	P. Cairo Zen. 3 59512, 2/7

Table 7.101: Price of Honey (cont.)

Date	*Location*	*Commodity*	*Unit Price (per metretes of honey)*	*Original Price*	*Source Text*
(263-229)	Fayyum?	μέλι	96 or 128 dr.	100 choes = 160 dr.	P. Cairo Zen. 3 59516, 19-21
(263-229)	Philadelphia? (Fayyum)	μέλι	16.2326 dr.	21.5 metretes, 3 chous = 349 dr.	P. Cairo Zen. 4 59790, 22
259, Artemisios	Fayyum?	μέλι Θεαγγελικοῦ	36 dr.	7 hemikadia = 84 dr.	P. Cairo Zen. 1 59012, 2/28
259, Artemisios	Fayyum?	μέλι Ῥοδιακοῦ*	12 dr.(?)	1 (keramion?)	P. Cairo Zen. 1 59012, 2/29
259, Artemisios	Fayyum?	μέλι Ἀττικοῦ†	20 dr./stamnos	1 stamnos = 20 dr.	P. Cairo Zen. 1 59012, 2/30
259, Artemisios	Fayyum?	μέλι Λυκιακοῦ‡	36 dr.	1 hemikadion = 12 dr.	P. Cairo Zen. 1 59012, 2/31
259, Artemisios	Fayyum?	μέλι Κορακησιωτικοῦ	33 dr.	4 hemikadia = 44 dr.	P. Cairo Zen. 1 59012, 2/33
259, Artemisios	Fayyum?	μέλι Χαλυβωνίου		2 […] = 5 ob.	P. Cairo Zen. 1 59012, 2/34
259, Artemisios	Fayyum?	μέλι	36 dr.	1 hemikadion = 12 dr.	P. Cairo Zen. 1 59012, 2/47
(about 259)	Fayyum?	μέλι	perhaps 21 or 28 dr.?	1 hemikadion at 3 dr. 3 ob. (per chous?)	P. Mich. Zen. 2, 9
253, Pachons 12	Fayyum?	μέλι	37 dr./metretes	37 dr. per metretes of honey	PSI 5 512, 10
253, Pauni 2	Fayyum?	μέλι	24 dr.	4 metretes = 96 dr. silver	P. Lond. 7 1977, 4-5

* Likely imported honey from Rhodes.

† Likely imported honey from Attica.

‡ Likely imported honey from Lycia.

Three prices of eggs survive and are tabulated in Table 102. No quantities are included, and none of the texts have secure dates, so not much analysis is possible.

Table 7.102: Price of Eggs

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	ὠιά		eggs = .5 ob.	P. Petrie 3 135, 5
(mid-3rd c.)	Egypt	ᾠόν		eggs = .75 ob.	SB 24 16067 Fragments g+i, 7
231, Thoth 19 or 206, Thoth 19	Fayyum	ὠιά		eggs = .5 ob.	P. Petrie 3 136, 3/20

Another animal-based food for which prices survive was cheese (τυρός); four cheese prices are listed in Table 103, below. The volume units for two of these prices are either not recorded or are not readily convertible into comparable units. The other two prices come from the same text and discuss the same transaction. For that reason, not much analysis of cheese prices is possible. Still, the context of the one transaction with two prices, in a letter from a certain Jason to Zenon (P. Lond. 7 2006, lines 15-17), reveals the potential unpredictability of cheese prices:

καὶ τὸν τυρὸν ὃν γράφεις ἡμῖν πα[ρ]αλαμβάνειν ἐκ ι (δραχμῶν) τὸ τάλαντον οὐχ εὑρίσκει \τὸ τά(λαντον)/ ἀλλ᾽ ἢ (δραχμὰς) ς.	And as for the cheese which you write (that) we should take over at 10 dr. per talent, it is fetching no more than 6 dr. per talent.

It seems from this letter that Zenon had expected to be able to sell cheese at 10 dr./talent, but Jason informs Zenon that cheese is only selling for around 6 dr./talent: 40% less than Zenon's expected price. This text illustrates the considerable unpredictability in the price of cheese at this time (248 BCE).

Table 7.103: Price of Cheese

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
259, Artemisios	Fayyum?	τυρός Χῖος	5 dr./stamnion	1 stamnion = 5 dr.	P. Cairo Zen. 1 59012, 3/58
257, Daisios 21	Alexandria? (Lower Egypt)	τυρός		.25 ob.	P. Cairo Zen. 1 59083, 4
248, Pachons 4	Onniton Koite? (Fayyum)	τυρός	10 dr./talent	10 dr./talent (proposed selling price)	P. Lond. 7 2006, 16
248, Pachons 4	Onniton Koite? (Fayyum)	τυρός	6 dr./talent	6 dr./talent (actual feasible market price)	P. Lond. 7 2006, 17

The prices for six further types of animal products used as food are listed in Tables 104-112, below. These include tallow (στέαρ), generic meat (κρέας), pork (κρεῶν συαγρέων), goat meat (αἴγεος), venison (ἐλαφέων), animal guts (χορδή), generic salted meat (τάριχος), fish, and dry salted fish (κύβιον). Many of these are only attested once, or without secure dates, but I will analyze variability in prices where possible, below.

Table 7.104: Price of Tallow

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
253, Tybi	Fayyum?	στέαρ		tallow = 2 ob.	P. Col. Zen. 1 43, 5

While most meat prices are undated and none have quantitites, it is interesting to examine the four prices listed in UPZ 2 158 A, running over a period of about a week. All of these prices are identical at 1.5 obols – this is a suggestion of a lack of variability in a good which we might expect to have seen greater volatility.

Table 7.105: Price of Generic Meat*

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(3rd cent.)	Egypt	κρέας	20 dr./mina	meat at a rate of 20 dr./mina	P. Alex. 1, 6 p. 47
(mid-3rd c.)	Egypt	κρέας		meat = .75 ob.	SB 24 16067 Fragments g+i, 4
243, Mesore 10	Thebes (Upper Egypt)	κρέας		meat = 1 1/2 ob.	UPZ 2 158 A, 14/95
243, Mesore 12	Thebes (Upper Egypt)	κρέας		meat = 1 1/2 ob.	UPZ 2 158 A, 17/114
243, Mesore 16	Thebes (Upper Egypt)	κρέας		meat = 1 1/2 ob.	UPZ 2 158 A, 21/145
243, Mesore 18	Thebes (Upper Egypt)	κρέας		meat = 1 1/2 ob.	UPZ 2 158 A, Vo 1/162

Three prices for pork exist, all form P. Cairo Zen. 1 59012 (Table 106). However, they are all quantified using different volume units, so the prices cannot be compared.

Table 7.106: Price of Pork

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
259, Artemisios	Fayyum?	κρεῶν σ[υα]γρέων	2 dr./salousia	2 salousia at the rate of 2 (dr./salousia)	P. Cairo Zen. 1 59012, 2/44
259, Artemisios	Fayyum?	κρεῶν συαγρέων	5 dr./keramion	1 keramion = 5 dr.	P. Cairo Zen. 1 59012, 3/52
259, Artemisios	Fayyum?	κρεῶν συαγρέων	2.5 dr./banatos	1 banatos-pot = 2 dr. 3 ob.	P. Cairo Zen. 1 59012, 3/53

Table 7.101: Price of Goat Meat

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
259, Artemisios	Fayyum?	αἴγεος	2 dr./banotion	2 banotia-pots = 4 dr.	P. Cairo Zen. 1 59012, 3/55

Table 7.102: Price of Venison

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
259, Artemisios	Fayyum?	ἐλαφέων	3 dr./ker.	2 keramia at a rate of 3 (dr./keramion) = 6 dr.	P. Cairo Zen. 1 59012, 3/54

Table 7.109: Price of Animal Guts

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	χορδή		guts = 1 dr. .5 ob.	P. Petrie 3 142, 22

Many prices also exist for salted meat, although they also lack quantities. Within one text, UPZ 2 158 A, prices varied from 0.25-0.5 obols per purchase (up to 100%).

Table 7.110: Price of Generic Salted Meat

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(3rd. cent.)	Egypt	τάριχος		80 dr.	BGU 6 1495, 11
(3rd. cent.)	Egypt	τάριχος		30 dr.	BGU 6 1495, 13
(3rd. cent.)	Egypt	τάριχος		15? dr.	BGU 6 1495, 35
(3rd. cent.)	Egypt	τάριχος		60 dr.	BGU 6 1495, 41
(mid-3rd c.)	Egypt	τάριχος		Salted meat = 2 ob.	SB 24 16067 Fragments g+i, 2
(mid-3rd c.)	Egypt	τάριχος		salted meat = .25 ob.	SB 24 16067 Fragment e, 2
(mid-3rd c.)	Egypt	τάριχος		salted meat = .25 ob.	SB 24 16067 Fragment f, 3
259, Artemisios	Fayyum?	τάριχος		1 (dr.?)	P. Cairo Zen. 1 59012, 2/38
243, Mesore 1	Thebes (Upper Egypt)	τάριχος		salted meat = 1 ob.	UPZ 2 158 A, 2/13
243, Mesore 4	Thebes (Upper Egypt)	τάριχος		salted meat = 1 ob.	UPZ 2 158 A, 5/33

Table 7.110: Price of Generic Salted Meat (cont.)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
243, Mesore 5	Thebes (Upper Egypt)	τάριχος		salted meat = 1/4 ob.	UPZ 2 158 A, 7/44
243, Mesore 6	Thebes (Upper Egypt)	τάριχος		salted meat = 1 ob.	UPZ 2 158 A, 8/54
243, Mesore 7	Thebes (Upper Egypt)	τάριχος		salted meat = [1/2] 1/4 ob.	UPZ 2 158 A, 10/69
243, Mesore 8	Thebes (Upper Egypt)	τάριχος		salted meat = 1/2 ob.	UPZ 2 158 A, 11/76
243, Mesore 9	Thebes (Upper Egypt)	τάριχος		salted meat = 1/2 ob.	UPZ 2 158 A, 13/85
243, Mesore 10	Thebes (Upper Egypt)	τάριχος		salted meat = 1/2 ob.	UPZ 2 158 A, 14/94
243, Mesore 12	Thebes (Upper Egypt)	τάριχος		salted meat = 1/2 1/4 ob.	UPZ 2 158 A, 17/116
243, Mesore 15	Thebes (Upper Egypt)	τάριχος		salted meat = 1/2 1/4 ob.	UPZ 2 158 A, 20/139
243, Mesore 16	Thebes (Upper Egypt)	τάριχος		salted meat = 1/2 ob.	UPZ 2 158 A, 22/150
243, Mesore 18	Thebes (Upper Egypt)	τάριχος		salted meat = 1/2 ob.	UPZ 2 158 A, Vo 2/166

Fish prices are listed together in Table 111: these represent a few different varieties of fish and are not entirely comparable to each other. Despite the differences in fish types, there seems to be some consistentcy in the value of fish, with a small range of .1 to .8333 dr. per fish in those examples that included clear volumes and definitely represented fish. This is a difference of up to ~8x: a high level of variability.

Table 7.111: Price of Fish

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(Ptolemaic)	Thebes (Upper Egypt)	*mrꜣṱ.t(?)**	1 dr.	1 *mrꜣṱ.t(?)* = ½ qite	O. Leiden Dem. 417, 2-3

Table 7.111: Price of Fish (cont.)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	ὀψάριον		(1) fish = 1.5 ob.	P. Petrie 3 138, 1/11
(mid-3rd c.)	Egypt	ἰχθυηρός		fish = .5 ob.	SB 24 16067 Fragments g+i, 5
259, Artemisios	Fayyum?	ὡραῖος (fish of the season)		4 dr.	P. Cairo Zen. 1 59012, 2/39
259, Artemisios	Fayyum?	βικίον (tunny—fish?)	20 dr./ker.(?)	at a rate of 20 (dr./keramion?)	P. Cairo Zen. 1 59012, 2/41
259, Artemisios	Fayyum?	σφηνέων (mullet)	12 dr./(volume in lacuna)	at a rate of 12 (dr./volume?)	P. Cairo Zen. 1 59012, 2/43
257, Daisios 21	Alexandria? (Lower Egypt)	γλαυκίσκος, κάππαρος, ἀμία	average .3611 dr./fish	6 fish = 2 dr. 1 ob.	P. Cairo Zen. 1 59083, 2
257, Daisios 21	Alexandria? (Lower Egypt)	ἔψητός	.4167 dr./fish	1 fish = 2.5 ob.	P. Cairo Zen. 1 59083, 3
251, Choiak 7	Fayyum?	θρίσσα (thrissa-fish)	.4 dr./fish	100 fish = 40 dr.	P. Cairo Zen. 2 59261, 6
251, Thoth 3	Fayyum?	θρίσσα (thrissa-fish)	.4 dr./fish	200 fish = 80 dr.	P. Cairo Zen. 2 59261, 9
251, Choiak 7	Fayyum?	θρίσσα (thrissa-fish)	.4 dr./fish	50 fish = 20 dr.	P. Cairo Zen. 2 59261, 12
251, Choiak 7	Fayyum?	θρίσσα (thrissa-fish)	.4 dr./fish	100 fish = 40 dr.	P. Cairo Zen. 2 59261, 15
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	θρίσσα	.2857 dr./fish (regardless of quality/size)	Embark for Alexander 10,000 thrissa-fish at 70 (fish) for 20 dr., of which 2/3 are first-class and 1/3 second(-class)	P. Tebt. 3 701, 39-40
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	ἀλάβητας	.2857 dr./fish	and 7,000 alabete-fish, at 70 for 20 dr.	P. Tebt. 3 701, 41
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	κεστρεύς	.8333 dr./fish	We have sold the mullet-fish in the magazine, equal numbers of male and non-male, at a rate of 5 ob.	P. Tebt. 3 701, 43-45
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	κεστρεύς	.6667 dr./fish	for the males, at a rate of 4 ob.	P. Tebt. 3 701, 45

Table 7.111: Price of Fish (cont.)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	θρίσσα	.2857 dr./fish	also 3,000 pairs of thrissa-fish at 70 for 20 dr.	P. Tebt. 3 701, 47
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	θρίσσα	.2857 dr./fish	send out to Panas son of Taos thrissa-fish, first- and second-class, worth 600 dr., [at a rate of 70] for 20 dr., with 2/3 first-class and 1/3 second-class	P. Tebt. 3 701, 48-49
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	κεστρεύς	.8333 dr./fish	mullet-fish, in equal numbers of non-[male and male], at a rate of 5 ob.	P. Tebt. 3 701, 65-66
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	κεστρεύς	.6667 dr./fish	with the male fish at a rate of 4 ob.	P. Tebt. 3 701, 67
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	θρίσσα	.1 dr./fish	fishermen should pay back for nets out of their thrissa-fish, at a rate of 200 for 20 dr.	P. Tebt. 3 701, 90
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	θρίσσα	.2857 dr./fish	price of thrissa-fish: 200 at 70 [for 20 dr.]	P. Tebt. 3 701, 230

* The meaning of *mr*ʾ*t.t(?)* is uncertain, although it might be a fish. This is the only example of the word attested in the CDD. The CDD suggests that it might be related to *mlt*ʿ, a type of fish. CDD "M" 10.1 (July 2010), 155.

Table 7.112: Price of Salted Fish

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
259, Artemisios	Fayyum?	κύβιον	16 dr./(quantity in lacuna)	salted fish ... at a rate of 16 dr. …	P. Cairo Zen. 1 59012, 2/42

Many prices survive for other animals that were traded while the animals wers still living; these are listed in Tables 113-125. Clearly animals were not all the same, so their inclusion in a dissertation on commodity prices might seem questionable. After all, older animals were probably cheaper than younger animals, and females, because of their reproductive capacity, might be expected to gain a higher price than males. However, my intention in including animals here is that, if animals could be grouped into categories based on these key descriptors, then perhaps they may have been commoditized. That is, while a young horse was likely more expensive than an old horse because of its age, perhaps all horses of a similar age were priced as similar commodities: the scale of the analysis just needs to be finer than the species level. My initial expectation was that if I were able to group animals into these finer categories, then they may have been commoditized. In the end, though, there was not consistently enough evidence to group animal prices so finely. I have grouped them in the tables below based on the term used for each animal, mostly in Greek.

Because of my desire to better understand the degree of commodification of animals, I included an extra column in the tables of animal prices for any descriptors of those animals that might have been included in the source texts. The very existence of the descriptors might be taken as evidence that not all animals were treated as interchangeable. However, many of the descriptions of animals come from petitions, letters, and other texts describing the loss or theft of animals; the descriptions therefore might not have had anything to do with the values attached to each animal but could rather have been included to aid in the recovery of these animals. If, however, differences in the descriptions of animals also align with differences in those animals' prices, then it might be the case that the animals were treated differently based on these qualitative factors.[75]

[75] Janssen included animals in his study of "commodity prices." Janssen, *Commodity Prices,* 165-179.

I have organized this analysis of the prices of animals roughly based on the type of animal, beginning with mammals and ending with birds. Fish prices were discussed earlier in this chapter in the section on meats and animal-based foods, since presumably fish were not sold live. Mammals are further divided by type, beginning with bovids (calves, goats, and sheep), then equids (donkeys and horses), then camels, and suids (pigs).

The six surviving prices of calves are listed in Table 113. Great variation in the price of calves is visible in the data, with one calf sold in 241 BCE for more than ten times the value of another calf sold in 240 or 239 BCE. The descriptors attached to these various calves seem to indicate that calves perceived to be better fetched higher prices; calves may not have been commodities. The most expensive calf, which sold for 270 drachmas, was described as white (in P. Hamb. 2 173). It is possible that this pure coloration made this particular calf especially valuable. Likewise, P. Cairo Zen. 3 59370 includes prices for two calves, one smaller than the other, with the smaller calf selling for 26.6667 dr. and the larger for 38.6667 dr.: a difference of 12 drachmas, or a 41.86% increase from smaller to larger. This considerable difference in price seems to have been a result of the different sizes of the animals. For this reason, it seems likely to me that calves were not perceived as commodities.

Moreover, evidence from this text highlights the unpredictability of calf prices. Three calves were assessed as having a combined value of 116 drachmas, but they actually sold for only 80 drachmas.[76] The assessed price was a full 45% higher than the actual selling price, so clearly this assessment was not very reliable. If we compare this difference between expected and actual prices to that seen above in the case of cheese (around 40%), it seems that prices of these goods

[76] P. Cairo Zen. 3 59370, 5-6.

were similarly unpredictable. This text is too short to include any explanation for the difference between assessed and actual selling prices, unfortunately.

Table 7.113: Price of Calves

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
(255-248), Phaophi 21	Fayyum?	μόσχος		200 dr.	1 calf = 200 dr.	P. Cairo Zen. 4 59595, 7
241, Choiak 20	Oxyrynchites (Upper Egypt)	μόσχος	white	270 dr. bronze	2 calves = 540 dr. bronze	P. Hamb. 2 173, 2
240-239?	Fayyum?	μόσχος		65.4545 dr. silver	11 calves (large and small added together) = 720 dr. silver	P. Cairo Zen. 3 59370, 7-8
240-239?	Fayyum?	(μόσχος)	ἐλάττους (larger)	38.6667 dr.	3 calves, assessed at 116 dr. but sold for 80 dr.	P. Cairo Zen. 3 59370, 5-6
240-239?	Fayyum?	(μόσχος)	ἐλάττους (smaller)	26.6667 dr.	3 calves, assessed at 116 dr. but sold for 80 dr.	P. Cairo Zen. 3 59370, 5-6
233, Gorpaios 21	Fayyum	μόσχος		1.5 ob./calf/day	For 5 calves, by day for each: 1.5 ob., per day = 1 dr. 1.5 ob., per month = 37.5 dr.	SB 14 11965, 6-7

Two prices for adult goats are listed in Table 114; I also found one price for kids, which is included in Table 115, below. The tiny number of data points for goat prices make any conclusions drawn based on these prices rather speculative, but some preliminary observations are possible. There was exceptional variation in the price of goats between these two texts, only ten years apart, with the earlier price 50 times higher than the later price. The cheaper goats are described as δασεῖς, which might be translated "thick-haired" or perhaps "unshorn"—it is possible that such thick hair was not preferred. However, another explanation for the difference is

that the more expensive price was a penalty price. In the case of the grains discussed earlier in this chapter, penalty prices tended to be far higher (often by a factor of about 10x) as compared with the usual market price of grains. Even if this penalty price represented ten times the market value of the goats, and we could imagine the market price of the adult goats to be about 10 dr., that price would still be five times as high as that of the goats in P. Hibeh 1 37. Thus it seems that some qualitative factors, like thick hair, may have impacted goat prices: goats were not entirely commoditized.

The one example of a price of kids (Table 115) also shows that kid goats were considerably cheaper than adult goats, based on a comparison of the two penalty prices from the same text (P. Cairo Zen. 3 59340). Given the single kid price, though, no further analysis is possible.

Table 7.114: Price of Goats

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
247, Artemesios	Philadelphia (Fayyum)	αἴξ		100 dr. silver	penalty of 100 dr. silver per goat	P. Cairo Zen. 3 59340, 10
235, Pharmouthi 8	Talae (Upper Egypt)	αἴξ	δασεῖς (thick-haired, i.e., unshorn?), 1 male & 1 female	2 dr.	2 goats = 4 dr.	P. Hibeh 1 37, 15-17

Table 7.115: Price of Kids

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
247, Artemesios	Philadelphia (Fayyum)	ἔριφος	6 months old	10 dr.	penalty price of 10 dr./kid	P. Cairo Zen. 3 59340, 7

Eight prices for sheep (πρόβατον) survive and are listed in Table 116. It seems likely that much of the value of sheep came from their wool, so I expect that recently shorn sheep would be much less expensive than unshorn sheep: the buyer would be buying the animal as well as the

wool. The extant data support this hypothesis but not conclusively so; other factors may have contributed to higher prices for some sheep. For example, 71 sheep described as ὑποδιφθέρων "skin-clad" and perhaps therefore without their wool, were sold for 2.8744 dr. per animal in 242 BCE (P. Lond. 7 2016). In 229 BCE, one lost sheep was valued at 8 dr. (P. Hibeh 1 36). This increase in price of 5.1256 dr./sheep (an increase of 178.3190% from the smaller to the larger price) might have been a result of the additional descriptors attached to the more expensive sheep: she was θῆλυ δασὺ Ἀράβιον "female, unshorn, and Arabian"—i.e., productive, covered in valuable wool, and rather exotic. Qualitative differences in various sheep may have led to their different values; sheep were not entirely commoditized.

Overall, the sheep prices show extremely high variability, with the lowest price at only .6667 dr./sheep and a high price of 8 dr./sheep. Even excluding this high price, for a particularly special sheep, there is another price of 7 dr./sheep from P. Cairo Zen. 59597: over ten times the lowest price. This difference of about 10x is similar to the variability seen in calf prices. It seems likely that variability in the sheep themselves may have led to this high variability in their prices.

Table 7.116: Price of Sheep

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
(263-229)	Fayyum?	πρόβατον		7 dr.	7 dr. per sheep	P. Cairo Zen. 4 59597, 3
(263-229)	Syron Kome? (Fayyum)	πρόβτον		.6667 dr.	100 sheep at a rate of 4 ob. = 66 dr.	P. Cairo Zen. 4 59773, 2-3
(about 250)	Oxyrynchites (Upper Egypt)	πρόβατον		1 dr.(?)	concerning the sheep: 1 dr.*	P. Hibeh 1 111, 40

Table 7.116: Price of Sheep (cont.)

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
(about 250)	Fayyum?	πρόβατα		2.5 dr./sheep/year	He has 71 sheep, of which in year 35, Phamenoth. (Rent?) for each one annually: 2 dr. 3 ob.= 300 dr.	PSI 6 583, 2
250, Pharmouthi 21	Fayyum?	πρόβατον	δοῦναι ἔρια (to provide wool)		the sheep to provide wool = 30 dr.	P. Cairo Zen. 3 59298, 4
245, Dios 25	Oxyrynchites (Upper Egypt)	πρόβατον	ἔρσ[εν]ες η ἄρνες ιγ ὑποδίφθερα ἡμίκουρ[α ιζ] ὧν λευκόφαιον ψιλὸν ἕν [Αἰ]γύπτια ἡμίκουρα γ ψιλὰ νόθα ι, ἡμίκουρον ἕν Αἰγύπτια ψιλὰ β (8 are lambs, 13 rams, [17] wearing leather coats and half-shorn, of which one is whitish grey and shorn, 3 Egyptian and half-shorn, 10 shorn and cross-bred, one half-shorn, 2 Egyptian and shorn)	5.2632 dr.	Penalty for violence is owed of 200 dr. + agio of 20 dr.; in lieu of money, 38 sheep are confiscated. So it is possible that 38 sheep = 200 dr.	P. Hibeh 1 32, 7-17
242, Payni 12	Fayyum?	πρόβατον	ὑποδιφθέρων (skin-clad - i.e., shorn?)	2.8744 dr.	71 sheep sold at auction for 204 dr. 1/2 ob.	P. Lond. 7 2016, 10, mentioned again on ll. 16-18
229, Thoth 2	Talae (Upper Egypt)	πρόβατον	θῆλυ δασὺ Ἀράβιον (female, unshorn, Arabian)	8 dr.	1 lost sheep is valued at 8 dr.	P. Hibeh 1 36, 11-12

* It is not clear if this value represents a purchase price or some other fee or fine.

The surviving purchase prices for donkeys are listed in Table 117. These include a few different terms: Demotic *ʿ.t*, clearly a female donkey; and Greek ὄνος "donkey," and ὑποζύγιον,

literally a "beast of burden," but as the LSJ notes, generally a donkey.[77] It is possible that donkeys referenced with this last term might have been more specifically used under the yoke, but in general, the terms seem to have been used interchangeably. The donkey prices are particularly difficult to analyze because many are undated, and many of those that were dated do not specify the quantity of donkeys included. Others include descriptions of qualities that seem likely to have made these particular donkeys especially valuable. Nonetheless, it is possible to compare the unit prices of those donkeys without descriptors, and high variability in these prices is evident. In P. Hibeh 1 111 (around 250 BCE), one donkey was worth 6 drachmas, but in P. Hibeh 1 73 (244-243 BCE), one donkey was priced at 20 drachmas: an increase of 233.3333%. The highest prices attested are over ten times as high as the lowest prices. This extreme variability is comparable to the variability seen in other animal prices and leads me to suspect that donkeys were not seen as interchangeable commodities.

Table 7.117: Price of Donkeys

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
(263-229)	Fayyum?	ὑποζύγιον		5.6667 dr.	3 donkeys = 17 dr.	P. Cairo Zen. 4 59597, 8
(263-229)	Kanopos	ὄνος	τὸν μέγαν (the big one)	7 staters (=28 dr.)	He sold the donkey, the big one for 7 staters	PSI 5 543, 2/56-57
(263-229)	Kanopos	ὄνος	τὸν μικρὸν (the little one)	4 dr.	the little one for 4 dr.	PSI 5 543, 2/58
before 257, Xandikos 3	Athribis? (Lower Egypt)	ὑποζύγιον			donkeys = 1000 dr.	P. Lond. 7 1944, 2
before 257, Xandikos 3	Athribis? (Lower Egypt)	ὑποζύγιον			donkeys = 1000 dr.	P. Lond. 7 1944 vo., 11

[77] LSJ entry for ὑποζύγιον, http://www.perseus.tufts.edu/hopper/morph?l=%E1%BD%91%CF%80%CE%BF%CE%B6%CF%8D%CE%B3%CE%B9%CE%BF%CE%BD&la=greek#lexicon , <accessed April 13, 2017>.

Table 7.117: Price of Donkeys (cont.)

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
before 257, Xandikos 3	Athribis? (Lower Egypt)	ὑποζύγιον			donkeys = 1000 dr.	P. Lond. 7 1943, a9-b2
257, Thoth 24	Philadelphia	ὄνος		2 ob./donkey	donkeys: 25 at a rate of 2 ob. = 8 dr. 2 ob.	PSI 4 332, 2/21
257, Thoth 25	Philadelphia	ὄνος		2 ob./donkey	donkeys: 29 at a rate of 2 ob. = 9 dr. 4 ob.	PSI 4 332, 2/22
254, Hathyr 12	Philadelphia (Fayyum)	ὄνος	female, white	80 dr.	80 dr. valuation for lost donkey (assessed by owner)	P. Mich. Zen. 34, 15-17
(250-211), Pharmouthi through Epeiph	Fayyum	ὄνος		28 dr.	in Berenikis Thesmophorou, the price of a donkey = 28 dr.	P. Köln Gr. 8 346 vo., 2/20-21
(250-210?)	Philadelphia?	*ϣ.t*	female	200 dr.	1 donkey = 10 deben*	Enchoria 28 (2002-2003), p. 59, x+10 - x+11
(about 250)	Oxyrynchites (Upper Egypt)	ὄνος		6 dr.	1 donkey = 6 dr.	P. Hibeh 1 111, 38
(244-243)	Oxyrynchites (Upper Egypt)	ὄνος		20 dr.	1 donkey = 20 dr.	P. Hibeh 1 73, 6
(243-229)	Oxyrynchites (Upper Egypt)	ὄνος		20 dr.	1 donkey = 20 dr. (penalty price)	P. Hibeh 1 34, 3
(after 241)	Fayyum?	(ὑποζύγιον)	ἔρσεν ἐργατικὸν λευκὸν (male, hard-working, white)	50 dr.	1 donkey = 50 dr.	P. Cairo Zen. 4 59659, 15-16
(after 241)	Fayyum?	ὑποζύγιον	ἄρρεν βαδιστικὸν λευκὸν (male, good at walking - can be ridden, white)	140 dr.	1 donkey = 140 dr.	P. Cairo Zen. 4 59659, 10
226, epagomenal day 5	Fayyum	ὄνος (τὴν ὄνον καὶ τὸν πῶλον αὐ[τῆς])	female, with her foal		a female donkey and her foal, which are worth 60 dr.	P. Sorb. 3 133, 6-7
221, Tybi 12	Magdola (Medinet Nehas)	ὄνος		40 dr.	1 donkey worth 40 dr.	P. Enteux. 41, 2

Table 7.117: Price of Donkeys (cont.)

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
215/4, Dios	Tholthis (Upper Egypt)	ὄνος	3 female: 1 dark, 2 white	133.3333 dr.	3 female donkeys = 400 dr.	SB 3 6283a, 10-11
215/4, Dios	Tholthis (Upper Egypt)	ὄνος	3 female: 1 dark, 2 white	133.3333 dr.	3 female donkeys = 400 dr. (copy of same transaction)	SB 3 6283a, 36-38
215/4, Dios	Tholthis (Upper Egypt)	ὄνος	3 female: 1 dark, 2 white	133.3333 dr.	3 female donkeys = 400 dr. (copy of same transaction)	SB 3 6283b (copy of SB 3 6283a), 14-15

* Manning writes that this might be the purchase price of the donkey, but since the value is so low, it might also be a fine or loan. Joseph G. Manning, "A Ptolemaic agreement concerning a donkey with an unusual warranty clause. The strange case of P. dem. Princ. 1 (inv. 7524)," *Enchoria* 28 (2002/2003): 59.

In addition to the purchase prices recorded in Table 117, there is also evidence that donkeys were rented out at daily rates for short-term labor; these rental rates are listed in Table 118. While the purchase prices varied dramatically, the rental prices were remarkably consistent, at 2 obols per donkey per day, without any descriptions of the specific donkeys. This consistency may be due to the fact that all the rental prices come from the same text, P. Lond. 7 2175, but it is also possible that rented donkeys were more commoditized. After all, their individual qualitites would not have mattered, beyond their basic ability to do labor. All the donkeys rented out together could do that labor, so there was no need to further describe their unique qualities. Given the dearth of comparative data, however, this idea is still purely speculative.

Table 7.118: Price of Rented Donkeys

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
(263-229)	Fayyum?	ὄνος μισθώσιμος		2 ob./donkey/day	14 rented donkeys at 2 ob. = 4 dr. 4 ob.	P. Lond. 7 2175, 2
(263-229)	Fayyum?	ὄνος μισθώσιμος		2 ob./donkey/day	14 rented donkeys at 2 ob. = 4 dr. 4 ob.	P. Lond. 7 2175, 3
(263-229)	Fayyum?	ὄνος μισθώσιμος		2 ob./donkey/day	14 rented donkeys at 2 ob. = 4 dr. 4 ob.	P. Lond. 7 2175, 4
(263-229)	Fayyum?	ὄνος μισθώσιμος		2 ob./donkey/day	13 rented donkeys at 2 ob. = 4 dr. 2 ob.	P. Lond. 7 2175, 5
(263-229)	Fayyum?	ὄνος μισθώσιμος		2 ob./donkey/day	13 rented donkeys at 2 ob. = 4 dr. 2 ob.	P. Lond. 7 2175, 6

I was able to recover one price each for horses (ἵππος) and camels (κάμηλος); these are listed in Tables 119 and 120. Given the singularity of each price, though, no further comparative analysis of these prices is possible.

Table 7.119: Price of Horses

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
(after 212)	Tholthis? (Upper Egypt)	ἵππος	female	100 dr.	1 female horse = 100 dr.	P. Frankf. 3, 7

Table 7.120: Price of Camels

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
(about 259)	Palestine? or Alexandria?	κάμηλος		24 dr.(?)	ἄλλας καμήλων (δραχμὰς) κδ*	P. Cairo Zen. 1 59010, 2/23

* The quantity of camels implied is unclear.

The prices of pigs are listed in Table 122. These were of three varieties: δέλφαξ, an adult pig; χοῖροι, young pigs; and the ἱερεῖον, literally a sacred animal, but more generally in this period, just an adult pig.[78] Adults and juvenile pigs must be analyzed separately.[79] Three prices for young pigs survive, but one does not mention the quantity of pigs and therefore must be excluded. The other two examples come from the same text, P. Mich. Zen. 1, and show variability: one set of pigs was priced at 2.5 dr./pig, the other at 3 dr.: an increase of 20% from the smaller to the larger price. Generic adult pigs were valued more similarly to each other, with values of 4 and 4.0833 dr./pig, an increase of only about 2% from the smaller to the larger value. However, other texts indicate that certain pigs were considered better than others. In P. Cairo Zen. 3 59501, Apollonios is willing to spend up to 20 dr.—five times the usual price—for the best possible pig to sacrifice at the festival of Arsinoe. Another text, P. Cairo Zen. 3 59298, records an actual payment of 12 dr. for such a special pig. Thus particularly great pigs could fetch at least three and perhaps as high as five times the usual price. Even if most adult pigs may, possibly, have been seen as interchangeable, there were clearly some pigs that stood out from the crowd.

Table 7.121: Price of Pigs

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
(3rd cent.)	Egypt	δέλφαξ		500 dr.	1 pig = 500 dr.	BGU 6 1495, 3
(3rd cent.)	Egypt	χοῖροι (young pigs)			20 dr.	BGU 6 1495, 37
(263-229)	Alexandria? (Lower Egypt)	ἱερεῖον	ὡς βέλτιστον (as good a pig as possible for the Arsinoeia)	up to 20 dr.	maximum willing to spend is 20 dr. for the best pig possible	P. Cairo Zen. 3 59501, 6
(about 259)	Fayyum?	χοῖρος		2.5 dr.	2 pigs = 5 dr.	P. Mich. Zen. 1, 2/16

[78] Clarysse and Thompson, *Counting the People*, vol 2, 208.
[79] Ibid., 208-217.

Table 7.121: Price of Pigs (cont.)

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
(about 259)	Fayyum?	χοῖρος		3 dr.	2 pigs = 6 dr.	P. Mich. Zen. 1, 2/18
255, Hathyr 22	Fayyum?	ἱερεῖον		4.0833 dr.	59 pigs at a rate of 4 dr. 1/2 ob.	P. Cairo Zen. 2 59161, 6
254/53	Fayyum?	ἱερεῖον		4 dr.(?)	20 pigs (at a rate of?) 4 dr.	P. Cairo Zen. 4 59769, 5
250, Pharmouthi 21	Fayyum?	ἱερεῖον	for the festival of Arsinoe	12 dr.	1 pig = 12 dr.	P. Cairo Zen. 3 59298, 6

I also uncovered one price for renting dogs by the day, recorded in Table 122, below.

Table 7.122: Price of Dogs

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
250, Thoth through Tybi	Fayyum	κύνες		.5 ob./dog/day	6 dogs at a rate of .5 ob. per day = 2 dr. 3 ob.	PSI 4 368, 1/12-13

Overall, the data for the price of mammals show extreme variability. Within one text, animals that otherwise appear similar could vary greatly. Between texts, variation of up to 10x is attested. This extreme variability may indicate that mammals were not normally seen as commodities; their prices therefore could differ based on factors other than supply and demand. Moreover, there also may have been a high level of unpredictability in mammal prices, as there was a 45% difference between the expected and actual selling prices of calves.

Prices also survive for various birds (Tables 123-125), although it is not entirely clear if these birds were sold alive or as meat. The prices for generic birds (ὄρνις) are listed in Table 123. The increase in prices from the example dating to around 259 BCE to the price from around 200 BCE was dramatic, 60 times higher. This increase of 60x is consistent with the apparent price

increase based on changes in accounting practices. It is possible, then, that bird prices were actually relatively consistent. The fact that these two texts record the price of birds so generically, not even specifying the bird species, leads me to speculate that some birds may have been seen as undifferentiated commodities.

Table 7.123: Price of Birds

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	ὄρνις			birds = 3 dr. 3 ob.	P. Petrie 3 142, 17
(about 259)	Fayyum?	ὄρνις		1 dr.	3 birds = 3 dr.	P. Mich. Zen. 1, 2/14
(about 200)	Fayyum	ὄρνις		60 dr.	2 birds = 120 dr.	P. Tebt. 3 885, 48

The one surviving price for geese (χήν) is listed in Table 124. Since there is only one such price, and the quantity of geese included is not mentioned, no further analysis is possible.

Table 7.124: Price of Geese

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
(199-100)	Fayyum	χήν			1300 dr.*	P. Tebt. 3 891, 17

* The quantity of geese is not mentioned.

Two prices for young pigeons (περιστεριδεύς) are listed in Table 125. While no quantities are specified, both prices are the same: 40 drachmas. This consistency should not be overgeneralized, however, since both prices were from the same text, BGU 6 1495.

Table 7.125: Price of Pigeons

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
(299-200)	Egypt	περιστεριδεύς (young pigeon)			40 dr.*	BGU 6 1495, 36
(299-200)	Egypt	περιστεριδεύς (young pigeon)			40 dr.†	BGU 6 1495, 42

* The quantity of pigeons intended here is unclear.

† The quantity of pigeons intended here is unclear.

I was able to find surviving prices for two non-food animal products in addition to wool, which was discussed previously with cloth. These include sheepskins and sponges. The five extant sheepskin prices (Table 126) vary dramatically, with a high value of 40 dr. and a low value of perhaps only .08 dr. The texts could be a century apart in their dates, though, so the different in price could be attributed to the general increase in prices that occurred at the end of the third century. One price of fleeces is listed in Table 127, and sponges are listed in Table 128. Both sponge prices come from the same text (P. Cairo Zen. 1 59012), which makes clear that soft sponges were more expensive than hard sponges. Beyond that, no further analysis is possible due to a lack of data.

Table 7.126: Price of Sheepskins

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Egypt	ὤια	.08 dr./sheepskin	25 sheepskins = 2 dr.	BGU 6 1495, 44
3rd. cent.	Fayyum	ὤα		sheepskin = 1 ob.	P. Petrie 3 142, 3
210, Phamenoth	Tebtunis (Fayyum)	ὤα	.5 ob.	20 sheepskins at a rate of .5 ob. [...]	P. Tebt. 3 884 Fr. 1, 1/14
210, Phamenoth	Tebtunis (Fayyum)	ὤα		sheepskin, looking = 4 ob.	P. Tebt. 3 884 Fr. 1, 1/19
(about 200)	Fayyum	ὤα	40 (dr.)	1? sheepskin = 40 (dr.)	P. Tebt. 3 885, 51

Table 7.127: Price of Fleeces

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
218, Phamenoth 27	Magdola (Medinet Nehas)	πόκος		118 fleeces at 4 dr. 5 ob. 2 chalkoi per fleece	P. Enteux. 2, 3

Table 7.128: Price of Sponges

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
259, Artemisios	Fayyum?	σπόγγος τραχύς (hard sponges)	8 dr./phormos	1 phormos-basket = 8 dr.	P. Cairo Zen. 1 59012, 3/56
259, Artemisios	Fayyum?	σπόγγος μαλακός (soft sponges)	12 dr./phormos?	1 phormos? = 12 dr.	P. Cairo Zen. 1 59012, 3/57

Beeswax (κηρός) might also be considered a sort of non-food animal product, and its prices are listed in Table 129, below. These data reveal a great deal of variation in the price of wax, although many source texts are not securely dated, and the specific dynamics of this variation are thus difficult to unravel. One interesting example that does have a date can be noted in P. Cairo Zen. 5 59823 (253 BCE), which records confusion regarding the price of wax:

Προμηθίων Ζήνωνι χαίρειν.	Promethion to Zenon, greetings.
ἔγραψάς μοι περὶ τοῦ κηροῦ ὅτι καθίσταται τὸ τά(λαντον) α σὺν τῶι τέλει τῶι κατὰ Μέμφιν (δραχμὰς) μδ, σὺ δὲ ὅτι πυνθάνοιο εἶναι παρ᾽ ἡμῖν (δραχμὰς) μ. μὴ οὖν πρόσεχε τοῖς ληροῦσιν, πωλεῖται γὰρ ⟦παρ᾽ ἡμεῖ[ν]⟧ ἐνταῦθα (δραχμὰς) μη.	You wrote to me about the wax, (to say) that the (price per) talent, including the toll at Memphis, costs 44 drachmas, but you are told that with us it is 40 drachmas. Now, do not pay attention to these babblers; for with us here (it is) 48 drachmas.
[κα]λῶς οὖν ποιήσεις ἀποστε[ίλας] ἡμῖν ὅσον πλεῖστον δύνηι. δέδωκα δὲ κα[θ]άπερ μοι ἔγραψας Αἰγύπτωι τῶι παρ᾽ ὑμῶν εἰς τὴν τιμὴν τοῦ κ̣[ηροῦ] ἀργυρίου (δραχμὰς) φ, κ̣[αὶ] τὸ λοιπὸν δὲ ὃ ἂν ἦι ὧι ἂν ἐπιστείλῃς διορθώσομαι παραχρῆμα.	Therefore please send to us as much as you can. I have given your agent Aigyptos, as you wrote, 500 drachmas towards the price of the wax, and the rest, however much it is, I will pay immediately to whomever you should instruct (me to).
καὶ μέλιτος δέ μοι ληφθήτωσαν με(τρηταὶ) ε.	And of honey, let 5 metretes be procured for me.
ἐπαινῶ δέ σου τὴν εὔνοιαν καὶ τὴν προθυμίαν ἣν ἀεὶ εἰς ἡμᾶς ἔχεις. καὶ σὺ δ᾽ ἐάν του χρείαν ἔχηις τῶν καθ᾽ ἡμᾶς, μὴ ὄκνει γράφειν.	I applaud your goodwill and willingness which you always have towards us. And for you, if you should have need of anything of ours, do not hesitate to write.

ἔρρωσο. (ἔτους) λγ, Φαρμοῦθι ιθ. v Ζήνωνι.	Farewell. Year 33, Pharmouthi 19. (Address): To Zenon

This very polite letter was sent to Zenon from Promethion, known to be a banker and businessman in Mendes with whom Zenon had extensive business dealings.[80] The exact mechanics of the business deal discussed in this letter are difficult to parse. The deal regards wax, which Promethion seems be obtaining through Zenon, since he gives Zenon's agent a whopping 500 drachmas as a partial payment towards his purchase of wax. The cost of that wax, however, is a matter of disagreement. Zenon has been told that the cost, including the internal customs toll at Memphis, was 40 drachmas per talent for Promethion, where the usual cost is 44 drachmas. Promethion is now correcting that information, claiming that he actually incurred a cost of 48 drachmas per talent. Thus, including the toll, the perceived price of wax varied between 40 and 48 drachmas in this one letter, regarding one business deal: variation of 20%. Despite the confusion, these men were still engaging in a large volume of trade in wax; the 500-drachma partial payment would cover over 10 talents of wax if the 48-drachma costs were accurate. Thus there was uncertainty regarding prices, but this uncertainty does not seem to have deterred Zenon and Promethionfrom their deal in wax.

Even greater variation is visible between the source texts listed in Table 129. The lowest price of was .5417 dr./mina, with a high value of 1.7917 dr./mina: an increase of 1.25 dr., or 230.7550% from the lower to the higher value. The lack of precise dating for the higher of these prices precludes a more rigorous analysis of the degree to which this increase represents change over time or simultaneous variability. The reasons for such variability are not directly evident in

[80] Bagnall and Derow, *The Hellenistic World*, 161.

the texts. However, it might be possible that wax used for different purposes had some qualitative differences that affected its price. The most expensive wax was used for bronze-casting, but wax was used for other purposes, such as in sealings. Differences in the power of the parties involved in wax transactions, or perhaps the volume of those transactions, may also have had an impact on price levels. Furthermore, the above letter mentions domestic tolls paid on wax, so it is possible that wax was more expensive when it had to be transported from nome to nome.

Table 7.129: Price of Wax

Date	*Location*	*Commodity*	*Unit Price (per mina of wax)*	*Original Price*	*Source Text*
(3rd c.)	Tebtunis (Fayyum)	κήρωμα	5 ob.	wax tablet: 5 ob.	P. Tebt. 3 1078 descr. vo., 27
(263-229)	Fayyum?	κηρός	.6667 dr.	15 minas wax = 10 dr.	P. Cairo Zen. 5 59847, 26
(263-229)	Fayyum?	κηρός	1.7917 dr.	wax for bronze-casting: 1 dr. 4.75 ob. per mina	P. Cairo Zen. 4 59662, 5
(263-229)	Fayyum?	κηρός	1.6667 dr.	6 minas wax at a rate of 1 dr. 4 ob. = [10 dr.]	P. Cairo Zen. 4 59767, 6-7
(263-229)	Philadelphia? (Fayyum)	κηρός	.4333 dr. (26 dr./talent)	11 talents wax at a rate of 26 (dr.) = 286 dr.	P. Cairo Zen. 4 59790, 21
255/4, Pachons-Payni	Fayyum?	κηρός	.5417 dr.	25.75 minas wax at a rate of 3.25 ob. = 13 dr. 5 ob.	P. Cairo Zen. 4 59764, 11
253, Pharmouthi 19	Mendes? (Lower Egypt)	κηρός	.7333 dr. (44 dr./talent, inc. tax)	usual price of 1 talent wax, including the toll at Memphis = 44 dr.	P. Cairo Zen. 5 59823, 2
253, Pharmouthi 19	Mendes? (Lower Egypt)	κηρός	.6667 dr. (40 dr./talent)	Zenon has been told that the price with Promethion is 40 dr.(/talent)	P. Cairo Zen. 5 59823, 3
253, Pharmouthi 19	Mendes? (Lower Egypt)	κηρός	.8 dr. (48 dr./talent)	but Promethion says his costs are 48 dr.(/talent)	P. Cairo Zen. 5 59823, 4

Table 7.129: Price of Wax (contd.)

Date	*Location*	*Commodity*	*Unit Price (per mina of wax)*	*Original Price*	*Source Text*
248/7	Fayyum?	κηρός	.8 dr.	20 minas wax = 16 dr.	P. Mich. Zen. 61, 26
(late 3rd c. BCE)	Elephantine (Upper Egypt)	κηροῦ		wax ... 2 dr.	Greek medical papyri (GMP) 2 11, 1

Prices also survive for some non-food plant products. One key commodity in this category was papyrus rolls (χάρτης); the papyrus prices are listed in Table 130. As a product commonly used by state officials, papyrus is sometimes thought to be a state production monopoly (like sesame oil) or perhaps subject to state production quotas in addition to non-state production (like cloth).[81] This possibility must be kept in mind but has not been conclusively demonstrated. Five such prices come from P. Cairo Zen. 4 59687 and show absolute consistency, with a price of .5833 dr. per roll. However, a higher price of .6667 dr. is attested from P. Cairo Zen. 1 59012: an increase of 14.2980%. While papyrus prices thus did show some variability, that variability was quite minor in comparison with other commodities. This lack of variability suggests strongly that the state might have effectively intervened in stabilizing papyrus prices.

Table 7.130: Price of Papyrus Rolls

Date	*Location*	*Commodity*	*Unit Price (per roll)*	*Original Price*	*Source Text*
(about 259)	Palestine? or Alexandria?	χάρτης	.6667 dr.	60 papyrus rolls = 40 dr.	P. Cairo Zen. 1 590102/20
(258-256)	Fayyum?	(χάρτης)	.5833 dr.	10 papyrus rolls = 5 dr. 5 ob.	P. Cairo Zen. 4 59687, 9
257 or 258	Fayyum?	χάρτης	.5833 dr.	60 papyrus rolls = 35 dr.	P. Col. Zen. 1 4, 2/?

[81] Brian Muhs, personal communication, February 22, 2018.

Table 7.130: Price of Papyrus Rolls (contd.)

Date	*Location*	*Commodity*	*Unit Price (per roll)*	*Original Price*	*Source Text*
(258-256)	Fayyum?	χάρτης	.5833 dr.	60 papyrus rolls = 35 dr.	P. Cairo Zen. 4 59687, 6
(258-256)	Fayyum?	χάρτης	.5833 dr.	10 papyrus rolls = 5 dr. 5 ob.	P. Cairo Zen. 4 59687, 7
(258-256)	Fayyum?	χάρτης	.5833 dr.	10 papyrus rolls = 5 dr. 5 ob.	P. Cairo Zen. 4 59687, 8
256, Choiak 28	Fayyum	χάρτης		400 dr. in silver have been paid to Iatrokles for the papyri which are being manufactured in Tanis for Apollonios	PSI 4 333, 13-15
250, Choiak 1	Fayyum?	χάρτης	1.1667 dr./roll	5 papyri = 5 dr. 5 ob.	PSI 6 572, 3

Other plants and plant products that were not consumed as food, also have extant prices, namely roses, violets, crowns, reeds, wood, willow, fir resin, and vine props (Tables 131-142). Unfortunately, no substantive analysis of most of these prices is possible, either because the prices do not list quantities or because only one example is attested. In any case, these prices are included here for the sake of completeness.

Table 7.131: Price of Roses

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(263-229)	Philadelphia (Fayyum)	ῥόδον		.75 ob.	P. Cairo Zen. 4 59735, 5
252	Philadelphia (Fayyum)	ῥόδον		60 dr.*	P. Cairo Zen. 2 59269, 7
252	Philadelphia (Fayyum)	λυχνίς (rose campion, used in garlands)		13 dr.	P. Cairo Zen. 2 59269, 39

* No quantity is specified, but this does represent all the roses from one garden from one year.

Table 7.132: Price of Violet

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(270-258?)	Fayyum	ἴον		violet = 2 ob.	SB 8 9860b, 4
255/4, Pachons-Payni	Fayyum?	ἴον	2.5 dr./mina	1.5 (minas) violet at 2 dr. 3 ob. (per mina) = 4.5 ob.	P. Cairo Zen. 4 59764, 14

Table 7.133: Price of Crowns

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	στέφανοι		crowns = 1 ob.	P. Petrie 3 142, 28
(3rd c.)	Tebtunis (Fayyum)	στέφανοι		crowns: an obol	P. Tebt. 3 1078 descr. vo., 26
(mid-3rd c.)	Fayyum	στέφανοι		crowns: 4 ob.	SB 12 10863, 1-2
(mid-3rd c.)	Fayyum	στέφανοι		crowns: 1 ob.	SB 12 10863, 4
(mid-3rd c.)	Egypt	στεφάνια		crowns = .25 ob.	SB 24 16067 Fragment e, 3
246/5	Fayyum	στέφανος	3.5 dr.	a crown: 3 dr. 3 ob.	PSI 4 388, 5
231, Thoth 19 or 206, Thoth 19	Fayyum	στέφανος		crown = 3 ob.	P. Petrie 3 136, 3/23
(about 200)	Fayyum	στέφανοι		crowns = 1 (dr.)	P. Tebt. 3 885, 17

Table 7.134: Price of Ivy

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
257, Choiak 2	Herakleopolis (Upper Egypt)	κισσός		for ivy: .75 ob.	P. Sorb. 1 16, 13

Table 7.135: Price of Rue

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
210, Phamenoth	Tebtunis (Fayyum)	πήγανον		rue = .5 ob.	P. Tebt. 3 884 Fr. 1, 1/8

Table 7.136: Price of Reeds/Rushes

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
230 or 205, Thoth	Thebes (Upper Egypt)	θρύα		.5 ob + 2 chalkoi	O. Bodl. 1 307, 12
253, Tybi	Fayyum?	θρύα		3 ob.	P. Col. Zen. 1 43, 5
253, Payni	Fayyum?	θρύα		2 dr. 5 ob.*	P. Col. Zen. 1 43, 10
246, Tybi 30	Philadelphia? (Fayyum)	θρύα		1.5 ob.	P. Col. Zen. 2 80, 19
(223-218)	Fayyum	θρύον	3 dr./reed	4 reeds which were worth 12 dr.	P. Sorb. 3 106, 6-7

* No quantity is specified, but it should be roughly the amount of reeds necessary to caulk a small boat.

Many prices of wood survive (Table 137), especially from travel accounts. Not many quantities are given, so unit prices are difficult. Within SB 26 16504 (257 BCE), unit prices varied from .25 to .6667 dr. per piece of timber, but these pieces varied in size, at least between 6- and 8-cubit lengths. Within UPZ 2 158 A, no quanitites were given, but prices varied between 0.25 and 0.75 obols per purchase. It seems possible that wood prices could vary up to 3x, even within the same narrow period of times, perhaps because the wood supply was inelastic.

Table 7.137: Price of Wood

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Upper Egypt	ξύλον		firewood = 1.25 ob.	O. Strasb. 1 584, 4
3rd. cent.	Fayyum	ξύλα		wood = 1 chalkous	P. Petrie 3 137, 1/13
3rd. cent.	Fayyum	ξύλα		wood = 4 ob.	P. Petrie 3 139a, 2/4
3rd. cent.	Fayyum	ξύλα		wood = .5 ob.	P. Petrie 3 140a, 3
3rd. cent.	Fayyum	ξύλα		woos = .25 ob.	P. Petrie 3 140a, 5
3rd. cent.	Fayyum	ξύλα		wood = .25 ob.	P. Petrie 3 140d, 3
3rd. cent.	Fayyum	ξύλα		wood = .25 ob.	P. Petrie 3 142, 5
3rd cent., Phaophi 5	Thebes (Upper Egypt)	ξύλον		wood = 2 1/2 1/4 ob.	UPZ 2 158 B, 1/10
(mid-3rd c.)	Fayyum	ξύλα		wood: .5 ob.	SB 12 10863, 1
(mid-3rd c.)	Fayyum	ξύλα		wood: .75 ob.	SB 12 10863, 5
(mid-3rd c.)	Fayyum	ξύλα		wood: .5 ob.	SB 12 10863, 15
(257, Phaophi 2)	Fayyum	ξύλον	.3636 dr.	timber pieces: 33 6-cubit measures, at a rate of 4 dr. per [11] timber pieces = 33 timber pieces (for) 12 dr.	SB 26 16504, 5-7
(257, Phaophi 2)	Fayyum	ξύλον	.3333 dr.	another 6 (timber pieces), 6-cubit measures = 2 dr.	SB 26 16504, 8
(257, Phaophi 2)	Fayyum	ξύλον	.5 dr.	16 timber pieces, 8-cubit measures, at a rate of 3 ob. = 8 dr.	SB 26 16504, 9-10
(257, Phaophi 2)	Fayyum	ξύλον	.25 dr.	9 timber pieces, at a rate of 1.5 ob. = 2 dr. 1.5 ob.	SB 26 16504, 11-12
(257, Phaophi 2)	Fayyum	ξύλον	.6667 dr.	2 timber pieces, at a rate of 4 ob. = 1 dr. 2 ob.	SB 26 16504, 13-14
(257, Phaophi 2)	Fayyum	ξύλον	.5 dr. per 8-cubit measure	4 timber pieces at a rate of 8 cubits for 3 ob. = 8 dr.	SB 26 16504, 15-16

Table 7.137: Price of Wood (cont.)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
243, Epeiph 30	Thebes (Upper Egypt)	ξύλον		wood = 1/2 1/4 ob.	UPZ 2 158 A, 2/9
243, Mesore 1	Thebes (Upper Egypt)	ξύλον		wood = 1/2 ob.	UPZ 2 158 A, 2/14
243, Mesore 2	Thebes (Upper Egypt)	ξύλον		wood = 1/2 ob.	UPZ 2 158 A, 3/20
243, Mesore 3	Thebes (Upper Egypt)	ξύλον		wood = 1/2 1/4 ob.	UPZ 2 158 A, 4/25
243, Mesore 4	Thebes (Upper Egypt)	ξύλον		wood = 1/2 ob.	UPZ 2 158 A, 5/37
243, Mesore 5	Thebes (Upper Egypt)	ξύλον		wood = 1/2 ob.	UPZ 2 158 A, 7/47
243, Mesore 6	Thebes (Upper Egypt)	ξύλον		wood = 1/2 ob.	UPZ 2 158 A, 8/55
243, Mesore 8	Thebes (Upper Egypt)	ξύλον		wood = 1/4 ob.	UPZ 2 158 A, 12/77
243, Mesore 9	Thebes (Upper Egypt)	ξύλον		wood = 1/2 ob.	UPZ 2 158 A, 12/81
243, Mesore 11	Thebes (Upper Egypt)	ξύλον		wood = 1/2 ob.	UPZ 2 158 A, 15/101
243, Mesore 12	Thebes (Upper Egypt)	ξύλον		wood = 1/4 ob.	UPZ 2 158 A, 17/117
243, Mesore 13	Thebes (Upper Egypt)	ξύλον		wood = 1/4 ob.	UPZ 2 158 A, 18/123
243, Mesore 14	Thebes (Upper Egypt)	ξύλον		wood = 1/4 ob.	UPZ 2 158 A, 19/132

Table 7.137: Price of Wood (cont.)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
243, Mesore 15	Thebes (Upper Egypt)	ξύλον		wood = 1/2 ob.	UPZ 2 158 A, 21/141
243, Mesore 16	Thebes (Upper Egypt)	ξύλον		wood = 1/2 ob.	UPZ 2 158 A, 22/148
243, Mesore 18	Thebes (Upper Egypt)	ξύλον		wood = 1/2 ob.	UPZ 2 158 A, Vo 2/168

Table 7.138: Tamarisk Wood

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(240 or 215), Epeiph 5	Fayyum	ξύλα μυρίκινα	3 dr. and 2 dr.	30 wood, with 20 at a rate of 3 dr. = 60 dr., and 10 at a rate of 2 dr. = 20 dr., = total 80 dr.	SB 16 12823, 9-14

Table 7.139: Price of Willow

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(332-30)	Thebes (Upper Egypt)	*tȝ(.t) ʕ.t*	6 deben/mḏ.t = 72 deben/artaba?	0.5 *mḏ.t* = 3 deben	O. Leiden Dem. 204, 2

Table 7.140: Price of Wood Ashes

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(270-258?)	Fayyum	σποδός		wood-ashes = 4 dr.	SB 8 9860b, 4

Table 7.141: Price of Fir Resin

Date	*Location*	*Commodity*	*Unit Price (per metretes)*	*Original Price*	*Source Text*
(Ptolemaic)	Thebes (Upper Egypt)	*sfy*	8.3333 dr.	3 hin = 90 deben	O. Leiden Dem. 96, 1/5

Table 7.142: Price of Vine-Props

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
247, Phaophi 23	Fayyum?	χάραξ		1.5 ob.	P. Col. Zen. 2 76, 6-7
247, Phaophi 23	Fayyum?	χάραξ	.00006667 dr.	65,000 vine-props at 4 ob. per 10,000 = 4 dr. 2 ob.	P. Col. Zen. 2 76, 6-7

Table 143 records five prices of water; however, they are not dated securely enough to permit a substantive analysis.

Table 7.143: Price of Water

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Upper Egypt	ὕδωρ		water = 2 ob.	O. Strasb. 1 584, 3
3rd. cent.	Fayyum	ὕδωρ		4 ob.	P. Petrie 3 137, 2/12
3rd. cent.	Fayyum	ὕδωρ		water = .25 ob.	P. Petrie 3 142, 26
243, Mesore 18	Thebes (Upper Egypt)	ὕδωρ		water = 1 ob.	UPZ 2 158 A, 25/157
210, Phamenoth	Tebtunis (Fayyum)	ὕδωρ		water = .75 ob.	P. Tebt. 3 884 Fr. 1, 1/9

I was also able to find prices for commodities based on earth and stone (Tables 144-149). These include earth from Samos, lye, stones, gravel, asphalt, and raw pitch. Only stones (Greek λίθος) yielded more than one price, so the other commodities are not able to be analyzed. In the case of λίθος, rates are given of 68.8333 dr. (from 263-229 BCE) and .1667 dr. (from 255/4 BCE). However, the volumes intended in these rates are unclear; I cannot be certain if they were intended to be the price per stone or some other volume or weight of stones. The type of stone is also unclear. Thus I do not think even these λίθος prices are truly comparable to each other.

Table 7.144: Price of Earth

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
259, Artemisios	Fayyum?	γῆς Σαμίας (Samian earth)	10 dr./stamnos	2 stamnoi at a rate of 10 (dr./stamnos), making 20 (dr.)	P. Cairo Zen. 1 59012, 2/45

Table 7.145: Price of Lye

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
243, Mesore 16	Thebes (Upper Egypt)	κονία		lye = 2 dr. 3 ob.	UPZ 2 158 A, 22/154

Table 7.146: Price of Stones

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(263-229)	Fayyum?	λίθος	66.8333 dr.?*	125? stones (at a rate of) 68 dr. 5 ob. = 284 dr.	P. Cairo Zen. 4 59760, 2-3
(263-229)	Fayyum?	πέτρα	.01 dr.	400 stones per 4 dr.	P. Lond. 7 2054, 13
255/4	Fayyum?	λίθος	.1667 dr.	1162 stones at a rate of 1 ob. = 193 dr. 4 ob.	P. Cairo Zen. 4 59757, 3

* The math in this case does not work out properly, and this price seems far too high.

Table 7.147: Price of Gravel

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(263-229)	Fayyum?	χάλιξ	.25 dr./naubion	1.5 ob. per naubion	P. Lond. 7 2054, 5-6

Table 7.148: Price of Asphalt

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(263-229)	Fayyum?	ἄσφαλτος	1 dr./mina	2 minas asphalt = 2 dr.	P. Cairo Zen. 5 59847, 27-28

Table 7.149: Price of Raw Pitch

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(late 3rd c. BCE)	Elephantine (Upper Egypt)	πίσσης		raw pitch, .25 [dr.]	Greek medical papyri (GMP) 2 11, 2

Many more prices survive for bricks, likely made of mud (Table 150). Brick prices were remarkably consistent, with a rate of .0015 dr. per brick almost universally. Most of these prices only come from a few texts (P. Cairo Zen. 3 59480, P. Col. Zen. 1 36, and P. Cairo Zen. 5 59825), so the consistency in brick prices might not be too surprising, but nonetheless, there is less variation in the price of bricks than in almost any other commodity. Only one outlier exists; in P. Zen. Dem. 15 descr. + PSI 5 546, bricks are about third the usual price, at only .0004 dr./brick. There is no clear contextual reason why bricks should be so cheap in this text, so I am not currently able to explain the reasons for this low price.

Brick prices were not regulated by the Ptolemaic state, but consistency in their price is not particularly surprising. Bricks were made of mud, a readily available resource, with no real supply constraints. They could be made quickly, unlike crops that needed to grow over the course of a year, so it seems that demand could probably be met without too much difficulty. Even if demand for bricks varied as construction projects came about and were completed, a rise in demand would not necessarily lead to a rise in prices because more bricks could be produced quickly in response to that demand.

Table 7.150: Price of Bricks

Date	*Location*	*Commodity*	*Unit Price (per brick)*	*Original Price*	*Source Text*
302, Thoth	Djeme, Thebes west (Upper Egypt)	*tby qpy*	.00005 deben/brick	2000 vaulting brikcs, at a rate of 1000 for .5 silver qite = 1 silver qite	P. Phila. Dem. 30, 1/2
302, Thoth	Djeme, Thebes west (Upper Egypt)	*tby n qt*	.00005 deben/brick	6000 bricks for building, at a rate of 4000 bricks for 2 silver qite = 3 silver qite	P. Phila. Dem. 30, 1/3
3rd. cent.	Fayyum	πλίνθος	.0015 dr./brick	at a rate of 15 dr. for 10,000 bricks, buy 30,000 bricks for 45 dr. (corrected from "for 20,000 bricks, 30 dr. in bronze")	P. Petrie 3 46 (1), 24
3rd. cent.	Fayyum	πλίνθος	.0080 dr./brick	5000 bricks = 40 dr.	P. Petrie 3 46 (4), 7
(263-229)	Fayyum?	πλίνθος	.0015 dr.	5500 bricks = 8 dr. 1.5 ob.	P. Cairo Zen. 3 59480, 6-7
(263-229)	Fayyum?	πλίνθος	.0004 dr.	3000 bricks at 2.5 ob. per 1000 = 1 dr. 1.25 ob.	P. Zen. Dem. 15 descr. + PSI 5 546, 8-9
(260-240)	Fayyum	πλίνθος	.0080 dr./brick	2000 bricks at the rate (of 80 dr.) for 10,000 bricks = 16 dr.	P. Petrie 3 46 (3), 3-4
(260-240)	Fayyum	πλίνθος	.0080 dr./brick	9960 bricks at a rate (of 80 dr.) for 10,000 bricks = 79 (dr.) 4 ob.	P. Petrie 3 46 (3), 13
254, Payni 1	Philadelphia? (Fayyum)	(πλίνθος)	.0015 dr.	20,000 bricks = 30 dr.	P. Col. Zen. 1 36, outer/2
254, Payni 1	Philadelphia? (Fayyum)	(πλίνθος)	.0015 dr.	10,000 bricks = 15 dr.	P. Col. Zen. 1 36, outer/3
254, Payni 1	Philadelphia? (Fayyum)	(πλίνθος)	.0015 dr.	10,000 bricks = 15 dr.	P. Col. Zen. 1 36, outer/4

Table 7.150: Price of Bricks (cont.)

Date	*Location*	*Commodity*	*Unit Price (per brick)*	*Original Price*	*Source Text*
254, Payni 1	Philadelphia? (Fayyum)	(πλίνθος)	.0015 dr.	10,000 bricks = 15 dr.	P. Col. Zen. 1 36, outer/5
254, Payni 1	Philadelphia? (Fayyum)	(πλίνθος)	.0015 dr.	10,000 bricks = 15 dr.	P. Col. Zen. 1 36, outer/6
254, Payni 1	Philadelphia? (Fayyum)	(πλίνθος)	.0015 dr.	10,000 bricks = 15 dr.	P. Col. Zen. 1 36, inner/12
254, Payni 1	Philadelphia? (Fayyum)	(πλίνθος)	.0015 dr.	10,000 bricks = 15 dr.	P. Col. Zen. 1 36, inner/13
254, Payni 1	Philadelphia? (Fayyum)	(πλίνθος)	.0015 dr.	10,000 bricks = 15 dr.	P. Col. Zen. 1 36, inner/14
254, Payni 1	Philadelphia? (Fayyum)	(πλίνθος)	.0015 dr.	10,000 bricks = 15 dr.	P. Col. Zen. 1 36, inner/15
254, Payni 1	Philadelphia? (Fayyum)	πλίνθος	.0015 dr.	20,000 bricks = 30 dr.	P. Col. Zen. 1 36, inner/11
252, Pharmouthi 2	Fayyum?	πλίνθος	.0015 dr.	10,000 bricks = 15 dr.	P. Cairo Zen. 5 59825, 14

One price was identified for nails, another construction material, and it is listed in Table 151. The lack of data for comparison makes any further analysis impossible, however.

Table 7.151: Price of Nails

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
253, Tybi	Fayyum?	ἦλος		nails = 3.5 ob.	P. Col. Zen. 1 43, 7

Prices also survive for various dyes, used as paints in construction projects discussed in the Zenon archive. These paints include yellow ochre, red ochre, other red dye, lapis lazuli (blue), and white lead (Tables 152-156). For most of the paints, only one price survives, so no comparative analysis of variability or change is possible. However, within one text (P. L. Bat. 20 22), there was clear variation in the price of red dye, ἐρυθρύδανον, that seems to emphasize the existence of uncertainty in the price of this dye:

τὸ δὲ ἐρυθρύδα[ν]ο̣[ν] γίνωσκε συν-ηγορασμένου ⟦τ̣οῦ παρὰ σοῦ ἐκ (δραχμῶν) κε⟧ \ὅσου ἔφη χρείαν ἔχειν τ̣ο̣ παρὰ σοῦ (τάλαντα) γ ἐκ [(δραχμῶν)] κε/ τὸ τάλαντον, ἐπωλεῖτο δὲ ἀνὰ (δραχμὰς) λ.	And regarding the red dye, you must know that your agent bought as much as he said it was necessary to have, 3 talents at 25 drachmas per talent, but it was sold at a rate of 30 drachmas.

In this letter from Ammonios to Zenon, Ammonios tells Zenon that his agent was buying up as much red dye as he thought they needed, but he ended up paying 30 drachmas per talent where he had expected to pay only 25 drachmas (an increase of 20% from the expected price). Thus we see that expectations did not meet reality, but still, the agent did not perceive the price to be so high that he would change his mind. As the agent for a powerful, wealthy estate, he was still able to buy the red dye he felt he needed, even though red dye would never be a literally necessary purchase.

Table 7.152: Price of Yellow Ochre

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
about 255/4	Fayyum?	ὤχρα	8 dr.?	1 mina yellow ochre at 8 dr. = 4 dr.*	P. Cairo Zen. 4 59764, 13

* The math in this case does not work out properly.

Table 7.153: Price of Red Ochre

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(263-229)	Fayyum?	μίλτος	.1667 (dr./mina)	.5 (mina?) red ochre = (2 ob.?)	P. Cairo Zen. 5 59847, 28-29
255/4, Pachons-Payni	Fayyum?	μίλτος	60.1667 dr./mina(??)	.5 (mina?) 3 ob. red ochre = 30 dr. 1/2 ob.(?)	P. Cairo Zen. 4 59764, 15

Table 7.154: Price of Red Dye

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
257, Tybi 7	Fayyum?	ἐρυθρύδα[ν]ο̣[ν]	25 dr./talent	3 talents red dye = 75 dr.	P. L. Bat. 20 22, 6-7
257, Tybi 7	Fayyum?	ἐρυθρύδα[ν]ο̣[ν]	30 dr./talent	3 talents red dye = 90 dr.	P. L. Bat. 20 22, 7

Table 7.155: Price of Lapis Lazuli

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
255/4, Pachons-Payni	Fayyum?	κύανος	.8333 dr./mina	2.625 minas lapis lazuli at a rate of 5 ob. = 2 dr. 1.25 ob.	P. Cairo Zen. 4 59764, 12

Table 7.156: Price of White Lead

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
about 255/4	Fayyum?	ψιμύθιον	1.0833 dr./mina	5.375 minas white lead at a rate of 1 dr. .5 ob. = 5 dr. 5 ob.	P. Cairo Zen. 4 59764, 10

Some prices for precious metals also survive (Tables 157-159), but not with enough data points to allow for analysis.

Table 7.157: Price of Gold

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(early 2nd c.)	Herakleopolis? (Upper Egypt)	χρυσίου	6000 dr./talent	uncoined gold, 3 (τεταρτῶν) at a rate of 1500 dr./tetarte	P. Tebt. 3 890 , 4/89
(early 2nd c.)	Herakleopolis? (Upper Egypt)	χρυσίου	3600 dr./talent	uncoined gold, 1.5 tetartes, at a rate of 900 (dr./tetarte) = 2250 dr.	P. Tebt. 3 890 , 12/208

Table 7.158: Price of Silver

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(early 2nd c.)	Herakleopolis? (Upper Egypt)	ἀργυρίου	200 dr./talent	uncoined silver, 32 at a rate of 1600 for 8 talents = 3200	P. Tebt. 3 890 , 4/84-86

Table 7.159: Price of Copper Flakes

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(late 3rd c.)	Elephantine (Upper Egypt)	λεπιδ[ίου χ]ᾳλκοῦ		copper flakes, 2 dr.	Greek medical papyri (GMP) 2 11, 4

The extant prices for potter's clay and for some finished ceramic vessels are listed in Tables 160-161. For clay, only one price survives, so no comparative analysis is possible. However, three prices still exist for keramia-jars, and these show extreme variability, with a low price of only .1 dr. and a high of 16.6667 dr.: an increase from low to high of 16566.6667%. Since all three prices date to the mid-third century, the difference cannot be explained as a result of accounting differences alone. It is possible that some jars were considerably better than others, but given the extreme difference (as opposed to differences of 10x from animals that were not commoditized), I suspect that there was actually a different context surrounding the more expensive jars. It is also highly plausible that the extremely high value was in reference to the contents of the jars rather than the jars themselves.

Table 7.160: Price of Potter's Clay

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(about 200)	Fayyum	κέραμος	10 (dr.)	potter's clay (no quantity specified) = 10 (dr.)	P. Tebt. 3 885, 55

Table 7.161: Price of Keramia-Jars

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(263-229)	Fayyum?	κεράμιον	.4688 dr.	128 keramia = 60 dr.	P. Lond. 7 2038, 14-15
(243-241)	Fayyum?	κεράμιον	.1 dr. bronze	2700 keramia = 270 dr. bronze	P. Cairo Zen. 3 59366, 19
(252-246?) or 254?	Fayyum?	κεράμιον	16.6667 dr.	6 keramia = 100 dr.	P. Cairo Zen. 3 59417, 19

My initial hypothesis regarding the price of these 'unmanaged commodities' was that, if the Ptolemaic state were able to effectively stabilize commodity prices, then the prices of these unamanged, unregulated goods would show the highest degree of variation of all commodities in Ptolemaic Egypt. However, my results reveal a more complex situation.

There was certainly extreme variability in the price of many animals, with some animals fetching a price ten times higher than others at the same time. This extreme variability leads me to believe that most animals were not truly seen as interchangeable commodities: the price variability was probably a result of perceived qualitative differences between animals. As non-commodities, animals no longer fit within the scope of the present analysis.

Even more interesting is the fact that other commodities showed more stability in their price than expected. The price of bricks, papyrus rolls, and fish showed little (less than 20%) or no variability. Other commodities, such as fodder, honey, and cheese, varied in their price by around 50% regularly. Wax varied the most, with a difference of 230% between the lowest and highest prices. The variation displayed in the price of commodities in this section was, for the most part, actually lower than the variation seen in the price of the crops on the sowing schedule discussed earlier in this chapter; the prices of wheat, barley, and emmer, showed simulataneous variability of between 200-500%. It is possible that the prices of unmanaged commodities varied less because

supply was more consistent throughout the year, but this explanation does not fully explain the difference, since some products, like honey, may have displayed some seasonal variability.

Letters regarding the price of cheese and of wax further show that prices were somewhat unpredictable; within one text, expected prices varied by 40% or 20% from actual prices. Nonetheless, there is no evidence that unpredictable prices stopped deals.

Thus, the prices of those unamanged commodities that really were commodities showed plenty of variation, but not as much variation as did commodities with supervised production. As these prices could vary, expected prices often did not match reality, but transactions still carried on.

7.3.5 Conclusion

The initial question that organized this chapter regards the extent to which the state was able to successfully intervene in price stability to outweigh the many unknowns and shocks to supply and demand that otherwise would have made prices volatile. I hypothesized that, if the state were indeed effective, then commodities more tightly regulated by the Ptolemaic state would have more consistent, predictable prices than would those commodities that were less directly managed by the state. In the end, though, the data revealed that most Ptolemaic prices were highly volatile. Even those prices ostensibly fixed by the Revenue Laws, like sesame and castor seeds and oils showed variation of as much as 50% around the same period of time. This level of variability is actually not much different from variability seen in the price of unamanged commodities, like honey and cheese. The least variability (around 15%) was found in the case of common products like bricks and papyrus rolls, as well as fish and safflower seeds and oil. Non-commodities, such as cloth and animals, showed extreme variability in their pricing; a further

investigation of the prices of such differentiable products in the Ptolemaic period would likely show a great deal of variability and unpredictability, although such an analysis is outside the scope of the present study.

The price data I have collected are not without their problems. In particular, readers must be cautious not to draw strong conclusions about variability from only a few data points. Those commodities for which the most data were available, wine and wheat, also showed great variability, and I suspect that part of the reason for their high variability levels was simply that more data points presented more possibilities for strange prices to appear. Despite the many problems with the extant data, these data were collected after a thorough search through all the Greek and Demotic texts of the period; they do not represent a sample but the entire field of data. Vicissitudes of natural preservation of course mean the extant data do not represent all prices recorded at the time. The vast majority of prices paid in the period certainly were not written down at all. The data should not be assumed to be perfectly accurate representations of the prices paid, but they still hint at the wild variability in Ptolemaic prices.

7.4 Conclusions: Commodity Price Variability in Ptolemaic Egypt

The above analysis demonstrates that Ptolemaic commodity prices were highly variable and unpredictable. The prices people actually paid for commodities moved in very different ways, at different levels, from those prices recorded in official texts like the Revenue Laws papyrus. Likewise, traditional valuations like those values for grains recorded in penalty prices moved in a manner far more regular and predictable than did actual market prices. Much textual evidence presented in this chapter further shows that the predictions individuals made about prices they

would be able to achieve were often quite inaccurate. Ptolemaic people themselves fell into the trap of placing too much trust in official or traditional understandings of price.

Clearly institutional regulation alone cannot explain Ptolemaic price variability. The reasons for price variability were likely quite varied themselves, and I was not able to justify each of the prices listed in the tables above. Some of the differences may have been due to regional variation or to the specifics of the deals, such as power differences between the parties involved. There may also have been perceptible differences in the quality of certain seeming commodities that were simply not recorded in the source texts. However, as discussed in the introduction to this chapter, in general economic terms, often high volality in commodity prices is related to inelasticity of supply and demand. When supply levels cannot adjust quickly to meet a rise in demand, for example, prices can shoot up. It seems possible that such inelastic supply, in particular, could have been one partial cause of Ptolemaic price volatility. The historical implications of this variability are immense and will be discussed further in the final chapter of this dissertation, Chapter 8.

CHAPTER EIGHT

Conclusions

8.1 Introduction

The original question of this dissertation was: how and why did prices fluctuate in Ptolemaic Egypt? Naturally there are a number of factors that would have impacted the supply of and demand for commodities, with environmental factors playing the largest role in determining the size of harvests and the supply of agricultural produce. However, rather than tracking inundation levels and the quality of the harvests over the course of the Ptolemaic period, my dissertation takes the approach of the New Institutional Economics. Through a variety of institutions outlined in Chapter 4, the Ptolemaic state ostensibly intervened in order to stabilize prices. My core question surrounded the effectiveness of these interventions: was the Ptolemaic state able to use these institutional levers to successfully override the numerous other forces at play that would otherwise make prices volatile?

Put simply, no. If the state's interventions were effective, then I would have expected those commodities that were more directly regulated to have displayed more stable prices than those that were less regulated or not regulated at all. But as my research in Chapter 7 demonstrates, prices were actually quite variable across all levels of regulation. In the absence of a clear difference in variability for prices that were regulated vs. not, I must argue that these interventions did not have a significant impact on stabilizing commodity prices.

8.2 Implications of this Finding

This finding begs the question, *why* were these interventions ineffective? *Why* was the Ptolemaic state unsuccessful in manipulating prices to be artificially stable? Questions of *why* are

generally impossible to answer with definitive certainty in the field of ancient history. However, it is possible to explore possible reasons using qualitative evidence as a support for the data. I will break this question down in order to explore these possibilities: (1) Did the state not try to be effective--i.e., did it not enforce its regulations? (2) Or on the contrary, did the state make a strong effort to stabilize prices but fail in that attempt?

Regarding enforcement, let us consider the levels of management discussed in Chapter 7: (1) monopolized commodities, (2) commodities under price regulation, and (3) commodities with supervised production. With regard to category (1), monopolized commodities, although P. Rev. outlines the rules for the commodity monopolies surrounding seeds and seed oils, there is a little evidence that these laws were enforced, especially at the retail level in individual villages. P. Petrie 2 38 B (217 BCE) notes an example of overcharging for oil:[1]

Ὧρος Ἁρμάει χαίρειν. προσπέπτωκέ μοι παρὰ πλειόνων τῶν ἐκ τοῦ νομ[οῦ] καταπεπλευκότων τὸ ἔλαιον π[ωλ]εῖσθαι πλείονος τιμῆς τῆς ἐν τῶι προστάγμα[τι] διασεσαφημένης, παρὰ δὲ σοῦ οὐθ[ὲ]ν ἡμῖν προσπεφώνηται οὐδ' Ἰμούθηι τ[ῶι] υἱῶι ἐπὶ τῶν τόπων μεταδεδώκα[τ]ε. ἔτι οὖν καὶ νῦν διασάφησόν μοι, πῶς πωλε[ῖται] τὸ ἔλαιον ἐν τοῖς κατὰ σὲ τόποις, ὅπως ἀνενέγκωμεν ἐπὶ Θεογένην τὸν διοικητήν. καὶ εἰς τὸ λοιπὸν δ' ἐπι[μ]ελὲς ὑμῖν γι[νέ]σθω, ἐάν τι τοιοῦτο γίνηται ἢ παραλογεύωνται οἱ γεωργοὶ καὶ οἱ ἄλλοι ἢ ἐὰν ἄλλο τι ἀδίκημα γίνηται, γράφειν πρὸς ἡμᾶς ἢ Ἰμούθηι τῶι υἱῶι ἐπὶ τῶν τόπων ἐπιδιδόναι, ὅπω[ς] διὰ τούτου πέμπηται ἡμῖν καὶ ἀναφέρωμεν ἐπὶ τὸν διοικητήν. ἔρρωσο. (ἔτους) ε Παῦνι ις.	Horos to Harmais, greetings. I have heard from many who have sailed down from the nome that oil is being sold for a higher price than that prescribed in the ordinance, but you have said nothing to me nor to Imouthes my son, who is on the spot. Even at this late time, then, inform me how the oil is sold in your toparchy, so that I can report to Theogenes the dioiketes. And from now on be careful, if such a thing should happen or the cultivators and the others should suffer extra extortion or if any other injustice should occur, to write to me or to report to Imouthes my son on the spot, so that it may be sent to me through him and **I may report to the dioiketes.** Farewell. Year 5, Pauni 16.

[1] Bagnall and Derow, *The Hellenstic Period*, 196-197 (Text 116).

While this example does demonstrate that people were overcharging for oil, it also demonstrates the *expectation* that the dioiketes would intervene in such high pricing. In fact, P. Lille Gr. 1 3 (216 BCE), which Bagnall and Derow think was probably attached to this same instance, consists of a warning letter to oil sellers that they will be sent to the dioiketes for punishment if they continue to overcharge. I know of no hard textual evidence to demonstrate that individual oil merchants were arrested, brought to the dioiketes, and punished, but this evidence does suggest that if the price seemed to be generally too high in a certain nome, that high price might draw the attention of authorities and that in that case there would be an expectation of enforcement.

For category (2), commodities under price regulation, there is also some circumstantial evidence, for enforcement of the regulation of myrrh prices. P. Tebt. 1 35 (267 BCE) is an official letter to that effect:[2]

Ἀπολλώνιος [τ]οῖς ἐν τῆι Πολέμωνος μεριδος ἐπιστάταις καὶ τοῖς ἄλλοις τοῖς ἐπὶ χρειῶν τεταγμένοις χαίρειν. τῆς ἀναδεδομένης κατὰ κώμην ζμύρνης μηδένα πλεῖον πρασσεισιν τῆς μνᾶς ἀργυ(ρίου) (δραχμῶν) μ, ἐν χα(λκῶι) (ταλάντων) γ Β, καὶ τούτοις καταγωγί\μ/ου τῶι (ταλάντωι) (δραχμῶν) σ, ταῦτα δὲ διαγρ(άφειν) ἕως γ τοῦ Φαρμοῦθι τῶι ἀπεσταλμένωι τουτωι χάριν πράκτορι. τὸ δ' ὑποκείμενον πρόγραμμαἐκτεθήι τῶι καὶ διὰ τῆς τοῦ κωμογραμματέως γνώμης, ὃς κ[α]ὶ μεθ' ὑμῶν ὑπὸ τὴν ἐντολὴν {ε} ὑπογράφει· ἠι ὅτι ὁ παρὰ ταῦτα ποιῶν ἑ[α]υτὸν ⟦ε̣.⟧ αἰτιάσεται. πεπόμφαμεν δὲ τούτων χάριν καὶ τοὺς μαχαιροφόρους. ἔρρωσθε. (ἔτους) ς Φαρμοῦθι β.	Apollonios to the epitstatai in the division of Polemon and the other officials, greetings. For the myrrh distributed in the villages no one shall exact more than 40 drachmas of silver for a mina, or in bronze 3 talents 2000 drachmas, and 200 drachmas per talent for carriage; which sum shall be paid not later than Pharmouthi 3 to the collector sent for this purpose. Let the following notice be published with the concurrence of the komogrammateus, who shall sign below the circular with you. Anyone acting contrary to these orders will render himself liable to accusation. **We have therefore also sent the sword-bearers**. Farewell. Year 6, Parmouthi 2.

[2] Bagnall and Derow, *The Hellenstic Period*, 197 (Text 117).

Most of this letter is a regulation rather than a clear example of enforcement; however, the mention at the end that the μαχαιροφόροι ("sword-bearers") have been sent is a more concrete demonstration that enforcement may have been imminent. It therefore seems reasonable to assume that there was, at least in some cases, an expectation of enforcement.

Moving on to category (3), commodities with supervised production, I know of no specific examples of criminal liability for a failure to heed the sowing schedules, for example. P. Yale 1 36 (190 BCE), mentions that causing a delay would mean being sent to the dioiketes, but I have not found any evidence that that actually occurred.[3]

Ἀπολλώνιος λέοντι χαίρειν. τῆς παρ᾽ Ἀθηνοδώρου τοῦ διοικη[τοῦ] ὑπόκειταί σοι τ᾽ ἀντίγραφον. ἐπιτελέσας οὖν τὴν διαγραφ[ὴν τοῦ] σπόρου μετὰ τῶν εἰθισμένων ἀκολούθως τοῖς ἐπε[σταλμένοις] ἔχ᾽ ἐν ἑτο[ί]μωι, ἵνα πρὸ τοῦ ὡρισμένου καιροῦ καὶ αὐτ[οὶ] ἐπιδῶμεν Λευκίππωι τῶι ἀρχιφυλακίτηι, γινώσκων ὅ [τι ἐὰν] ὑστέρημα γένηται καταποσταλήσει πρὸς τὸν διοικητ[ήν]. ἔρρ(ω)σ(ο). (ἔτους) ιε, Μ[εσορὴ .]	Apollonios to Leon, greeing, A copy of the letter from Athenodoros, the dioiketes, is appended for you below. Accordingly, having prepared the sowing schedule with the usual persons in compliance with the instructions, hold it in readiness, so that we may personally hand it over to Leukippos, the chief of police, before the stipulated time; knowing that **if a delay occurs, you will be sent down to the dioiketes**. Farewell. Year 15, Mesore

Still, the very mention of the police in a letter regarding the sowing schedule indicates that enforcement by the police would not have been unexpected.

Granted, these are only a few short examples that hint at the enforcement of the state's regulations, but they do permit some tentative insights. I do not think enforcement was seen as unexpected or unwarranted; especially in the case of the monopolies, there actually seems to be surprise and frustration when the regulations were not being enforced. However, it also seems likely that enforcement was carried out haphazardly: for example, when an entire nome was known for having high prices, or in certain exceptional situations that required uncommon

[3] Bagnall and Derow, *The Hellenstic Period*, 172 (Text 106).

support (e.g., the μαχαιροφόροι). I do not think there is evidence to support a view that village police were working hard to enforce stable prices within small-scale local marketplaces on a regular, day-to-day basis. To return to our original question (Did the state not try to be effective--i.e., did it not enforce its regulations?), I would suggest that the state did retain the rights to enforce its regulations but probably did not do so at a large scale on a regular basis.

We must also consider other reasons the state may have instituted price regulations other than to actually stabilize prices, especially in the case of P. Rev. Remember that this text regarded private contracting of commodity monopolies. The private contractors were the ones who would have had the most interest in the price of oil, since this price would have served as their expected return on their investment in the monopoly. It is therefore also possible that the 'fixed prices' in P. Rev. were designed to assure potential bidders on the monopoly of their returns. In that case, notes on enforcement would be designed to minimize the perceived risk of the investment—not actually to stabilize prices on a large scale. However, this perceived risk minimization would only have been able to be believed if enforcement was a possibility that did take place at least occasionally. Therefore the expectation of enforcement noted, for example, in P. Petrie 2 38 B shows that a contractor could have some expectation that his investment would not be wildly risky. Even more, the fact that P. Petrie 2 38 B mentions *over*-charging highlights that, if anything, the contractor might expect a higher return than the one quoted based on the ordained prices. The state may have developed price-regulating regimes out of a concern with protecting its revenues (e.g., revenues from private contracting of commodity monopolies).

Despite this concern, we cannot write off the possibility that the state did want to stabilize prices more broadly. Other than basic human decency and a desire to avoid seeing others struggle, why might price stability have been a concern? Peter Garnsey has written about the political implications of famine, albeit not in a Ptolemaic context, and his ideas may be of use towards this

question.[4] He argues that most food crises in antiquity were not caused by shocks to the actual supply of food, but rather by speculation surrounding the perceived possibility of a supply shock in the future.[5] That is, the supply of grain existed, but people would hoard their grain rather than consuming or selling it if they believed a supply crisis was imminent—i.e., the actual elasticity of the grain supply was lower than its potential elasticity (to use the terms I outlined in Chapter 7). If they did not hoard their grain, they may have wanted to sell it at exorbitant prices. In classical Athens, those wealthy enough to have grain reserves were encouraged to donate their grain in crisis as a sign of euergetism that brought them greater political power and social capital. On the contrary, in Rome, the state took on this role. Garnsey notes that euergetism was "(almost) absent" and that "it is a legitimate suspicion that hoarding and speculation in necessities by wealthy landowners and traders were standard occurrences that were soft-pedalled by the upper-class sources, and rarely formed the subject of an annalistic notice."[6] That is, while there may have been a great deal of talk about speculation, in reality, the state simply found euergetism to be "not compatible with Roman political practice."[7] Instead, elected magistrates were the ones tasked with maintaining and distributing grain reserves because of the political and social power derived from this sort of patronage.[8] That is, in Rome, the state took on the responsibility for maintaining an actually elastic supply of basic necessities.

Stabilizing prices through encouraging an elastic supply of basic necessities might have made political sense in Ptolemaic Egypt as well, especially given the threat of revolts that became more significant towards the early second century. Given Garnsey's arguments about the different

[4] Peter Garnsey, *Famine and Food Supply in the Graeco-Roman World: Responses to Risk and Crisis* (Cambridge: Cambridge University Press, 1988).
[5] Garnsey, *Famine and Food Supply*, 8-16.
[6] Garnsey, *Famine and Food Supply*, 176-177.
[7] Garnsey, *Famine and Food Supply*, 176-177.
[8] Garnsey, *Famine and Food Supply*, 177.

approaches of the Greeks and Romans, how might the Ptolemaic state have approached these concerns? That is, would the state have encouraged wealthy elites to engage in euergetism or rather have centralized grain reserves for distribution during crises? A future study of the early Ptolemaic evidence should investigate the qualitative evidence for euergetism and state grain donations more closely in order to be able to answer this question more precisely. The Ptolemaic state did maintain grain reserves, as did the temples and private individuals. I know of no public commentary similar to that from Rome, in which wealthy individuals were accused of being speculators for spending their grain during food crises. Therefore I might tentatively suggest that the Ptolemaic system represented a blend of Garnsey's Greek and Roman systems, with no social discouragement of supplying grain when needed. Nonetheless, future studies would be required to validate this hypothesis.

The interventions of the state to manipulate prices towards stability, outlined in Chapters 4 and 7 of this dissertation, may have been ineffective because they did not target the crux of the problem. The Ptolemies used interventions like the sowing schedule to manage the actual supply of staples, and they regulated prices without consistent enforcement—perhaps to encourage their own revenue levels to stay high. Thus while the state addressed actual supply and prices, the actual elasticity of supply and demand did not play a major role in the Ptolemies' interventions. That is, the state did not have clear, strong policies to discourage speculation and hoarding. It is possible, then, that faced with a serious crisis like the Fourth Syrian War, actual supply elasticity was lower than its potential, leading to some cost-push inflation through speculation, as was discussed in Chapter 4. Likewise, on a more regular basis, we have witnessed a great deal of evidence for inaccurate expectations, asymmetric access to information, and a general sense of confusion around prices. In the absence of clear information on prices, individuals would have been more likely to hoard or speculate. The state's interventions did not override this dearth of information or

encourage people in other ways to make their potentially elastic supply truly elastic. This failure may have been one contributing cause to the high volatility of Ptolemaic prices.

8.3 Originality and Significance of the Contribution

8.3.1 Historical Significance: Comparison to Previous Studies of Ptolemaic Prices

While there have been previous studies of Ptolemaic prices, my approach and findings are original and significant. Most of the previous research into Ptolemaic prices that I outline in Chapter 3's literature review focused on the question of the Ptolemaic inflation.[9] In Chapter 6, I highlight the possibility of real cost-push inflation, in addition to accounting changes, in Ptolemaic Egypt. In doing so, I take a position contrary to the most recent article on the topic from Sitta von Reden, who believed the supposedly stepped nature of the price increases made inflation a less viable explanation than accounting only.[10] She based this view on the assumption that penalty prices were 'normal prices' around which market prices would move—an assumption that I have proved to be erroneous.

Some of the best-known studies of Ptolemaic prices focused on these penalty prices, which did increase in a stepped manner.[11] However, my research has shown that penalty prices did not move according to the same patterns as non-penalty prices. Sitta von Reden did make this same observation in 2015, but she nonetheless believed that market prices were derived from "normal prices" that were reflected in the penalty prices.[12] On the contrary, I argue here that since penalty prices cannot be extrapolated to represent actual market prices, these were different systems of pricing—and that ultimately, there was no sense of "normal price" in Ptolemaic Egypt.

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[9] See 3.3.2 "Review of Literature on Ptolemaic Prices."
[10] von Reden, "Grain prices in the eastern Mediterranean (c. 420-30 BC)," 169-171.
[11] See 3.3.2 "Review of Literature on Ptolemaic Prices."
[12] von Reden, "Grain prices in the eastern Mediterranean (c. 420-30 BC)," 166.

The primary originality of my approach is in my focus on variability. While I take a perspective on the inflation question in Chapter 6, I dig deeper into contemporaneous prices and short-term volatility in Chapter 7. The price increases that occurred throughout the Ptolemaic period, and especially in the late third century, were quite noticeable and have been analyzed for decades. However, variability is more subtle; it tends to come to the surface more readily when working with a larger data set, as with the broadest possible swathe of data that became the corpus of my project. As a result, where von Reden noted, based her privileging of penalty prices, that "such regional stability of price expectation over several generations, and even centuries, suggests a large degree of institutional pressure and little impact of changing economic trends and market forces," I have been able to show that the prices did indeed vary significantly. The economic and monetary landscape was much more volatile and complicated than von Reden and others have previously thought.

This question of variability has a two-fold significance. First, it reflects the actual lived experience of individuals in Ptolemaic Egypt. As we have seen through multiple letters that show dashed expectations around prices, this volatility was coupled with a sense of surprise and confusion—one that is often overlooked in studies of ancient economics but that is crucial for understanding how and why people made the choices they did. Furthermore, at a higher level, price volatility gets at the question of the efficacy of the Ptolemaic state itself. To what extent did these kings care about the well-being of their subjects and attempt to minimize chaos in pricing? If they did attempt to stabilize prices and were unsuccessful in doing so, that lack of efficacy may have been a symptom of a broader political problem.

Future research into the historical significance of this volatility should explore price volatility in other ancient societies, including later Ptolemaic Egypt, so we can better calibrate the relative degree of variability within the early Ptolemaic period.

8.3.2 Theoretical Significance

This dissertation was written with questions that extended beyond Ptolemaic history towards questions of how ancient economies worked more generally; I must continue to beg for the patience of my committee of historians in reading chapters on economic theory for a humanities dissertation, but I believe these theoretical questions are critical. I wrote the dissertation through the lens of the New Institutional Economics (NIE), the approach I learned through the passion of my greatest teachers, Brian Muhs and Joe Manning. The NIE approach is based on the idea that economic decisions are shaped by social and political institutions. Since I was analyzing the Ptolemaic economy through this lens, I was interested in the degree to which Ptolemaic state institutions were able to manipulate pricing behaviors. If these institutions were capable and strong, then I would have expected their manipulations to have been quite effective, but this initial hypothesis was proven wrong.

This negative result does not imply that the approach of the NIE is faulty. Institutions do influence economic behavior. The very existence of P. Rev. and the enforcements outlined earlier in this conclusion indicate that the Ptolemaic state believed their regulations and interventions would have an impact, even if those laws were not actually followed precisely. However, the Ptolemies' interventions were pushing against incredibly powerful factors, such as climate patterns themselves. Moreover, we have seen that this was a society with extreme gaps in access to information about pricing. In such an environment, no state interventions could be perfectly effective at manipulating prices artificially, but I believe the NIE still holds as a theoretical approach, with some special considerations in an ancient context.

As was discussed in Chapter 3, before the NIE came into prominence in ancient economic history, ancient prices were generally assumed to be stable, either because of tradition and social pressure (e.g., Polanyi's "embeddedness") or state control (e.g., Préaux's royal economy model of

the Ptolemaic period).[13] I have demonstrated that both of these models fail to explain Ptolemaic pricing activity. The general confusion over proper prices indicates that there was no strong tradition of pricing. The large differences between prescribed prices and actual prices further indicate that the state's attempts to stabilize these prices were not perfectly successful.

It is perhaps more accurate, then, to keep in mind two insights. First, there was a serious dearth of information available to Ptolemaic actors and a great deal of confusion over what prices 'should' be, as we have seen through ad hoc pricing based on limited information, the acceptance of unfavorable prices due to the sunk costs of transportation, and possible speculation during the Fourth Syrian War. Moreover, the control the Ptolemaic state claimed to hold over commodity prices, most notably in P. Rev., was probably not actually as actionable as it may seem, given the power of environmental factors in shaping supply. At a higher level, the role of uncertainty has been underestimated in investigations of ancient economies. Ancient actors were no more/less 'rational' than people today, but they did not have as easy access to pricing information and had to make decisions based on other factors, such as the opinions of trusted individuals. Moving forward, we must continue to explore differential access to information and what role that access may have played in profit-seeking or speculative behavior, and we must not underestimate macro environmental factors. The management of risk and uncertainty in ancient economies, coupled with the development of more detailed environmental histories, is ripe for future study.

[13] For further discussion and detailed references, see 3.2 "The Applicability of Modern Economic Theories to the Ancient World."

APPENDIX ONE

Publications Consulted

Appendix 1.1 Introduction

The following appendix constitutes a list of every papyrological publication I consulted in the process of collecting the price data that provide the raw material of this dissertation. Not every publication on this list contained texts that contained prices. The full corpus I checked—including texts with and without prices—is listed here. For a list of those texts that included prices and that are therefore cited in the body of this dissertation, see Appendix 2, "Texts Cited." Texts that did not include prices but that still have historical relevance—i.e., texts that are discussed in the body of the dissertation but that do not contain prices in the price tables—are not listed in Appendix 2 but are rather cited as any other publication; their bibliographic information is included in footnotes and in the main bibliography of the dissertation. The price data themselves are listed in Appendix 3, "The Price Data." These appendices are intended to reference and explain my process for collecting the price data.

Appendix 1.2 Methodology

The core intent of this dissertation was to gather together as much data as possible on commodity prices from early Ptolemaic Egypt. To reach that goal, my first step was to try to identify as many texts as possible that met the following criteria: 1. dating to the early Ptolemaic period (332-186 BCE), 2. written in a language I can read (Greek, Demotic, or Egyptian in other scripts), and 3. from Egypt. Complications to these criteria quickly arose:

1. In the case of (1), the date range, many texts cannot be precisely dated: i.e., they are known to be only "Ptolemaic" or perhaps to date to sometime roughly in the 2nd century BCE; others have been dated even more broadly (e.g., to sometime in the first millennium BCE). For the purposes of the mere collection of price data, I chose to err on the side of preparing as complete a record of data as possible, collecting prices from all texts that *could* have fallen within the range 332-186 BCE, even if it were possible that they might not have fallen within this range. For example, I checked texts with broad dates to the "Ptolemaic period" or to the "2nd century BCE"--even though it is possible that such texts could have dated to after 186 BCE--because they *could* have dated to between 332 and 186 BCE. However, for the actual analysis of the price data (i.e., tracking price fluctuations and variability), I only included texts with secure, precise dates within the period in question. Within the price tables in the analytical chapters (Chapters 6 and 7), unreliably-dated prices are set apart and marked so the reader can be aware that they are not a part of the core analysis.
2. In the case of (2), language, I was forced to omit some texts because they were written in a language I, personally, am unable to read (i.e, 38 in Aramaic and 1 in Hebrew). Further explanation of my "checking" methodology" might help to explain why these texts were omitted. As I checked each text, I read as much of the text as was published. For Greek texts, this typically meant reading the transcribed Greek (although usually not the original papyrus) and identifying prices from that transcription. For Egyptian texts, I typically read a transliteration of the text alongside a photo and checked the transliteration against the original Demotic

from the photo of the text itself, noting corrections where necessary. In some cases (more commonly for Demotic than for Greek texts), translations were included in the publications. I consulted these translations but ultimately tabulated prices based on my own judgement of the proper translation. As was discussed in Chapter 5, the terminology surrounding prices and value units in this period was often quite complex and variable, especially in Demotic. Translations of terms like *ḥḏ* were very commonly incorrect due to changes in how this term has been interpreted over time (e.g., it is usually a "deben," not a "silver piece"). For that reason, even though publications of texts written in Aramaic and Hebrew may have included translations, I did not have the ability to judge the accuracy of those translations, so I did not check these texts for price data. Nonetheless, it should be noted that the sample of texts in languages I could not read was negligible and very unlikely to skew the results of the analysis of price data. For example, according to an advanced search on the Trismegistos database, as of this writing (in February 2018), 38 texts that otherwise meet my criteria for inclusion were written in Aramaic and 1 was written in Hebrew.[1] Out of a total of 8557 texts that I was able to check, these 39 texts represent only ~0.5% of the total sample. A future, more complete investigation should include the Aramaic and Hebrew material, but the omission of this material in the present dissertation is unlikely to change the overall argument about price variability.

[1] Search on Trismegistos Texts Advanced Search, www.trismegistos.org/tm/search.php (July 12, 2017). The parameters of this search were: Limit: to Egypt only, Language: Aramaic, Date: -332 to -186 (not strict).

3. As for (3), the location within Egypt, two complications exist. First, the exact territory that constituted "Egypt" was in flux throughout the Ptolemaic period, and at times external territories, such as Cyprus, were a part of the Ptolemaic kingdom.[2] For the present dissertation, I only included texts from Egypt proper—that is, the Nile valley, Delta, Fayyum, oases, and surrounding deserts. Texts from external territories, such as Cyprus, Libya, and Coele-Syria were not included because the complexity associated with assessing the power dynamics in each of these regions would have been beyond the scope of this dissertation. This dissertation thus covers prices from Egypt in the early Ptolemaic period, *not* prices from the entire Ptolemaic kingdom between these dates. The second complication regarding (3), location, concerns the definition of a text's "location." For example, some letters from the Zenon archive were composed in Egypt but sent to Palestine, or vice versa. Ultimately, as much as possible, in my analysis I tied "location" to the particular price mentioned within a text, not to the text itself. In situations in which the location of the price itself was unclear, I treated these prices similarly to those of uncertain date. That is, I collected the data but did not include it in my analysis., It must be noted as well that I only checked texts found in Egypt. It is certainly possible that some texts found in other parts of the Mediterranean world could reference contemporary prices charged in Egypt, but it was impractical to check all texts from the broader Mediterranean in case they could contain an Egyptian price. It is possible that future, more comprehensive, region-wide price

[2] For further discussion of the difficulty of defining "Egypt" in this period, see 4.2.5 "Boundaries of the 'Egyptian' Economy."

studies could collect, for example, all Mediterranean prices from the Hellenistic period, and fill in this possible gap.

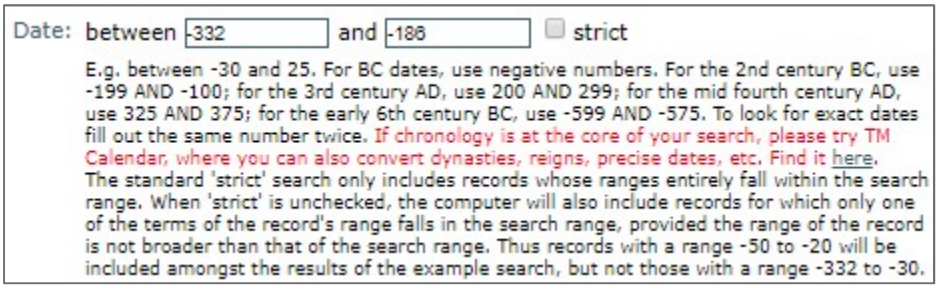
These three criteria: date, language, and location, are admittedly quite broad, but my goal for this initial investigation of Ptolemaic prices was to identify as broad a range of data as possible. Future studies can then delve into even greater detail and nuance in their analyses of this large corpus.

With these criteria identified, I was then able to compile a list of as many relevant texts as possible that I should check for prices. The large scale of this project (and the obviously limited amount of time available for a dissertation, as opposed to a massive, long-term reference project like the Chicago Demotic Dictionary Project or Trismegistos) made it necessary to employ an external database to obtain the list of texts to check. To this end, I chose to use Mark Depauw's Trismegistos Texts database (TM), which provides metadata on published texts from Egypt from between 800 BCE and 800 CE and which "wants to be a platform where information can be found about all texts from antiquity."[3] Within TM, I ran Advanced Searches to pull together my initial lists of texts to check.[4] I used the checkbox to limit my search to "Egypt only," and in the Date box I included texts between -332 and -186, with the "strict" box unchecked so as to allow in records for texts that might only partially fall in this date range (see Figures X and Y, below, for screenshots of these search criteria in TM).[5]

[3] "Trismegistos Texts: About." www.trismegistos.org/about.php. (accessed July 12, 2017).
[4] Trismegistos Advanced Search. www.trismegistos.org/tm/search.php. I compiled my core list of texts to check from searches on July 7, 2016; texts added to TM after this date are not consistently included. As I later happened upon new texts that fit my criteria, I did add them, but these additions were not systematic or complete.
[5] See criteria (1) and (3) above for explanations of the reasoning behind these search parameters.

Figure 1: Screenshot of Egypt Limitation in Trismegistos

Figure 2: Screenshot of Date Search Box in Trisgmegistos



Initially, I did not specify a language in my search, because I assumed the vast majority of texts would be in languages I could read, and I planned to exclude texts in languages I did not know as I progressed through the list. Since the search box was set up in such a way that I would need to check for each language actively (i.e., type in each language I wanted to search for), I knew that I might miss some languages by simply failing to search for them. Therefore an approch initially searching inclusive of all languages, with the plan to exclude texts manually later, seemed the most conservative and reliable. This first search without regard to language yielded a total of 10,759 texts.

My next challenge was to pull this list of texts from Trismegistos into my own Excel database that I could use as my own working checklist. This task quickly became more challenging than expected, and I was forced to make some concessions along the way. TM limits each page of search results to 50 records—obviously far too few for my purposes. Luckily, TM also allows users to export their search results to .csv files, which are compatible with Excel. I followed this

procedure, only to find that TM limits the export to only 5000 records--a little less than half of my list. In order to be able to export the full list into an Excel-compatible format, I needed to split my initial search into many smaller searches, each yielding less than 5000 records, then add these smaller searches together to make as inclusive a list as possible, then delete all the duplicate records. Over the course of July 2016, I ran dozens of smaller searches, limiting the date range and/or the language of my search parameters in as many ways as possible. After pulling all this data into my Excel database and deleting all the duplicate entries, I arrived at a total of 10,430 texts (less than the 10,759 texts from my initial search). I was missing 327 texts, or ~3% of my initial search. After many efforts to recover these records through more TM searches, to no avail, I was forced to abandon my goal of pulling in all the textual metadata digitally.

As I manually checked the 10,430 texts that I did find through TM, I was able to add back in missing texts as I found them. My process for such manual checking was as follows. As I came to a new text in my master list of 10,430 texts, I found an edition in which it was published and added that publication's bibligraphic information to this Appendix 1, "Publications Consulted." I then checked to ensure that I had captured the full list of relevant texts from that publication. For most publications, I was able to do this check manually, but for publications that consist of thousands of texts (only a small portion of which would be relevant), such as the *Sammelbuch griechischer Urkunden aus Aegypten*, I did this secondary check through TM. I used the same advanced search parameters discussed above, with the added limitation to just those texts published in the given publication. For example, rather than manually read all 6,260 untranslated Greek texts in volume 1 (out of 26 volumes!) of the *Sammelbuch griechischer Urkunden aus Aegypten (SB)*, I ran a TM advanced search with the following parameters: Limit: to Egypt only, Publication: SB 1, Date: -332 to -186 (not strict). This search yielded a new list of 636 texts within

volume 1 of the *Sammelbuch* that were worth searching: a much more practical, manageable number! I then manually checked these 636 texts to ensure that each one did indeed fit my criteria for inclusion, and I added them to my master list of relevant texts if they did fit these criteria.

Ultimately, my approach to compiling the most complete list of early Ptolemaic texts possible within the time constraints of this project consisted of a digital search followed by manual checks. It must be kept in mind that, because digital searches through TM were such a major component of this project, the completeness of my checklist of texts was dependent to a certain degree on the completeness of TM and on how well it functions as a search engine. For example, texts that have not been added to TM yet would not have appeared in my searches and therefore are not included in my checklist. Likewise, if all the texts in a certain publication happened to be among the 716 texts that went missing as I attempted to export records from TM to Excel (given the 5000-record limit imposed by TM), then it is likely that I missed that publication and did not add it to my checklist. I consistently checked the main previous studies of Ptolemaic prices to ensure that I captured all the data that was previously known, but other than those lists, I relied on TM to generate the primary list of publications I needed to check.[6]

One further note should be made regarding the effects of using TM to help generate the checklist of early Ptolemaic texts: the initial list was reliant on the metadata listed for texts in TM (such as texts' dates). This is perhaps an obvious point, but the metadata in TM might differ from

[6] I especially made sure to include all the relevant material in the following previous studies: Klaus Maresch, *Bronze und Silber: Papyrologische Beiträge zur Geschichte des Währung im ptolemäischen und römischen Ägypten bis zum 2. Jahrhundert n. Chr.* (Cologne: Westdeutscher Verlag, 1996); Hélène Cadell and Georges Le Rider, *Prix du blé et numéraire dans l'Égypte Lagide de 305 à 173,* Papyrologica Bruxellensia 30 (Brussels: Fondation Égyptologique Reine Élisabeth, 1997); Sitta von Reden, "Grain prices in the eastern Mediterranean (c. 420-30 BC)," in Dominic Rathbone and Sitta von Reden, "Mediterranean grain prices in classical antiquity," in *A History of Market Performance: From Ancient Babylonia to the modern world*, ed. by R. J. van der Spek, Bas van Leeuwen, and Jan Luiten van Zanden (London: Routledge, 2015), 156-170.

the metadata listed in texts' original publications, since the metadata in TM is updated as new corrections are made while the original publications are static records of original interpretations. For example, if in its original publication, a text was dated to the reign of Ptolemy I (and would therefore seem to fit my criteria), but more recently was redated to the reign of Ptolemy VIII (outside the date range of this project), the text is not actually relevant to the present project and would not appear in the checklist of texts generated by TM. TM's updates are based on new publications and corrections in the relevant Berichtigungsliste. As I checked through each publication, I also checked each text (to make sure it fit criteria 1-3) against the information in TM and all the other core databases of modern papyrology, such as the Heidelberger Gesamtverzeichnis (HGV) and Papyri.info, both of which include references to more recent corrections of the original publication (such as the relevant Berichtigungsliste).[7] I would have seen that the hypothetical text mentioned above was redated to Ptolemy VIII, so I would not have included it in my text checklist. For that reason, it is expected that readers should be familiar with the main reference databases of modern papyrology and that those wishing to re-check my data will check publications alongside their updated metadata in TM.

Some readers might be frustrated by the large and necessary involvement in this project of digital databases of papyrological material. They might have preferred that I check all publications manually from the beginning rather than relying on TM to generate the initial checklist. However, the modern papyrological database projects like TM, HGV, and Papyri.info are incredible resources that are making 'big data' studies of ancient sources more feasible and

[7] cf. Heidelberger Gesamtverzeichnis der griechischen Papyrusurkunden Ägyptens, http://aquila.zaw.uni-heidelberg.de/start; Papyri.info (particularly the Papyrological Navigator), papyri.info.

practical than ever before.[8] This dissertation would not have been possible as a doctoral project even twenty years ago, without the databases, simply because it would have taken far too much time to check all publications manually. In approaching this project, I fully admit that I am standing on the shoulders of those who have gathered the metadata before me, and I consider their work to be a massive boon to the future of papyrology. Their gathering of metadata allowed me to focus my own energies on reading and interpreting the prices within the list of texts that the databases helped to generate.

In the end, despite my best efforts, I found it was not feasible for me to identify an absolutely complete list of all early Ptolemaic texts from Egypt. As discussed previously, some textual records became missing in the course of my Trismegistos searches and exports, and I was unable to locate them again. In other cases, I do have records of texts in my Excel database, but I was unable to access their publications in time to meet official dissertation deadlines. At the end of this project, if I re-do my initial Trismegistos search today, in early July 2017, I now find a list of 11,342 records: hundreds more texts have been added to TM in the past year alone. Of course, as time progresses, more and more texts will be published, and these numbers will hopefully continue to swell. In the future, it would be ideal to construct a massive price database online in a manner that could be constantly updated as new texts were accessed and published. Due the temporal limitations particular to a dissertation, however, the present project represents a large but necessarily incomplete collection of data. The present dissertation should not be considered a final, complete tabulation of all early Ptolemaic prices, but rather as my attempt to collect as much data

[8] Naturally, these 'big databases' can be prone to error, given the large amount of material they work with. For that reason, I checked the accuracy of all the information included in TM against the original publications and subsequent updates in the relevant Berichtigungsliste. TM was just incredibly useful to source the list of texts I needed to check for prices.

as possible from this time and place--much more Ptolemaic price data than has been collected before, but not a complete collection. I hope my readers will grant me some leeway, however, in knowing that I was able to consult 8557 texts (82% of my final Excel database of 10,430 texts) – 1140 were excluded for being published as a description only, 559 were not published, and 119 had publications forthcoming only, and 55 were published but not possible for me to access within the time frame of the project.). The number of texts consulted will always be incomplete, but I did check a large majority of early Ptolemaic texts, including all those mentioned in previous studies of prices.

This appendix is essentially a bibliography of the publications I consulted as I checked my master list of 10430 texts. Publications I was not able to access or that I was not able to check for other reasons are not included in this appendix.

Within publications that are on this list and that I was able to manually consult, there were some texts that I was not able to fully check for prices. Some texts on the master checklist were not fully published. For the most part, I did not check for prices those texts that were published without a full text edition (i.e., texts that were only described or for which only a photo or drawing was included). Some publications of descripta, such as P. Tebt. 3, did include portions of the text in those descripta, and some of those portions of text did include prices and were included. However, in general, texts published only as descripta, photos, or hand copies (i.e., not as full editions) were later excluded. The core reason behind such exclusions was the time limitation of a dissertation. For example, to include data from a Demotic text only published in the form of a photograph long ago would essentially mean to compose a new edition of that text, and given the broad scope of the project, too many texts would need new editions for such work to be feasible within the scope of this project. All publications I consulted, including ones within which texts

ended up being published incompletely (and that therefore were not checked for prices), are listed in this Appendix 1.

The present bibliography in this Appendix 1, "Publications Consulted," is limited to those publications of text editions I consulted as I built my database of prices, the data that is the raw material for the final chapters of this dissertation. For a complete list of all references consulted over the course of this project, including secondary historical or theoretical analyses, see the main Bibliography.

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APPENDIX TWO

Texts Cited for Price Data

Appendix 2.1 Introduction

The following appendix constitutes a list of every text (found in the publications listed in Appendix 1) that I found to contain at least one price that I cited in the body of this dissertation (with the price data themselves listed in Appendix 3). Texts that I consulted but that I found not to contain relevant prices are omitted from this list, even if they have historical relevance to the dissertation. Texts that are discussed and cited in the body of this dissertation for their historical interest but not for their prices are not listed here but can be found rather in the main Bibliography.

This Appendix 2 has two purposes: 1. to outline the criteria by which I judged whether a text had relevant commodity prices that should be cited in the body of the dissertation, and 2. to explain the sigla used to name texts in those citations and to provide a clear way for readers to find those texts and re-check my data independently.

Appendix 2.2 Methodology

Appendix 2.2.1 Criteria for Inclusion

Some further parameters must be mentioned. In Chapter 2, a 'price' was defined as a quantitative assessment of value in a given social context.[1] Many more texts included prices, based on this broad definition, than are included here. The first criterion for inclusion in this dissertation is that the text needed to show clearly what the price was for. I excluded from my data set those

[1] For further discussion of the definition of "price," see 2.4.1 "Definitions: Value vs. Price."

prices that were from texts too fragmentary to clarify what thing the price referenced. For example, if a text included the phrase "5 drachmas" but was broken off on either side of that price in a way that made it impossible to tell what the 5 drachmas were valuing, that price was excluded from my analysis and is not included here. Similarly, many texts mention certain individuals' giving certain amounts of money to other individuals, but the reasons for those transfers of money are unknown; I have excluded these prices as well. However, I did not expect perfect clarity from these ancient texts. It was commonplace for values to be attached to certain things but for the text to not mention the quantity of that thing. For example, a text might mention a certain number of drachmas as the value of myrrh but not state how much myrrh, exactly, fetched that price. In such cases, unit prices were impossible to calculate, but I thought the general scale of those prices might still be useful, so I included them nonetheless. As long as the price referenced a clear thing, I included it, even if the quantity of that thing was not clearly mentioned.

While all prices are interesting and worthy of future study, the present dissertation focuses only on commodity prices, so only those texts containing commodity prices were cited in the body of the dissertation and therefore are listed here.[2] For that reason, many texts that did contain prices (in the sense of quantifications of payments and/or assessments of the value of things) are not included here. Among these non-commodity prices are taxes, prices of unique or non-commoditized goods (like jewelry), payments made for unclear reasons, and penalties and fines for given misdeeds.

[2] As was explained in Chapter 7, I am using the standard economic defintion of a "commodity" as a thing that is undifferentiable from other things of that same type. For example, wheat was a commodity because one artaba of wheat was generally interchangeable with any other artaba of wheat. Necklaces, on the other hand, would not have been commodities, since one necklace might be viewed as a very different thing (with a very different price) from another necklace. For further discussion, see 7.2.1 "Scope of the Analysis: A Classification of Goods."

Likewise, in the end, due to time constraints, I was forced to limit the scope of the present project to exclude a new collection of data on wages for labor (even if that labor may have been unskilled and therefore commoditized). Other excluded price data include rents of land and other real estate prices; securities; assorted fees; as well as interest, loans, and the price of credit. I have made notes of these non-commodity prices as I have found them, and in future studies I will be able to analyze the full range of Ptolemaic prices. Nonetheless, this dissertation is limited in its scope to commodity prices only.

I made a few exceptions to this general rule of including only prices of commodities in order to draw out particular insights in the body of my argument. In my analysis of inflationary trends in Chapter 6, I used prices mentioned in marriage documents as one indicator of possible inflation.[3] The extent to which these prices could be considered "commodity" prices was discussed in that chapter, and some, like the oft-mentioned price of the woman's *ỉnw*-cloth, probably were in reference to unique goods. Likewise, I included an analysis of cloth prices in Chapter 7 because the Ptolemaic state was involved in setting some quotas for cloth production.[4] I listed prices for various types of cloth and clothing in Chapter 7, but the extent to which clothing items were commodities was initially unclear. The result of that analysis was to show that clothing was probably not an undifferentiated commodity good. A similar analysis of other things whose commodity-status was initially unclear, such as the prices of building materials, basic household goods, prepared foods, and animals, was also included in Chapter 7.[5] In general, then, I did not include prices of non-commodity goods, except in the case of cloth (for its historical significance) and goods whose differentiability was initially unclear to me. Those texts containing those

[3] See 6.2.6 "Standard Social Payments."
[4] See 7.3.4 "Commodities with Supervised Production: Wine, Agricultural Staples, Beer, and Cloth"
[5] See 7.3.5 "Unmanaged Commodities: (Almost) Everything Else."

particular non-commodity prices that were cited in the price tables in Chapters 6 and 7 of the dissertation are listed in this appendix, but all other texts containing non-commodity prices are omitted.

There are four reasons why a text found in the publications listed in Appendix 1, "Publications Consulted" could not be listed here in Appendix 2, "Texts Cited"; it either:

1. did not fit into the general scope of this project based on the three criteria outlined in Appendix 1 (date, language, and location) based on current knowledge as expressed in TM as of July 2017 as was not checked;
2. did meet those criteria but was not published fully enough to check, as was discussed in Appendix 1;
3. did meet the criteria for scope and was fully published and checked but did not contain any prices; or
4. did meet the criteria for scope, was fully published and checked, and did contain prices, but those prices were unclear or in relation to non-commodities outside the purview of the present price analysis as outlined above.

Given the large number of texts I checked over the course of this project, it would be impractical to list every checked text in the dissertation, along with details on why it was or was not included; these four rules can be assumed to apply in the case of all texts not listed in this appendix. For the vast majority of texts, if a reader were to look up the text independently, it should be immediately clear why the text was not included.

Appendix 2.2.2 Text Identification

One difficulty in a dissertation that includes papyrological material in both Demotic and Greek is the different conventions used in naming and referencing texts in these two languages. While Demotists typically refer to texts by their inventory number, Classicists prefer to reference texts by their publication information. For example, one ostracon containing a Demotic receipt for the yoke tax would be labeled by Demotists as O. BM EA 5739, since it is held in the British Museum's Egyptian collections with the inventory number 5739. The benefit of this system is that this inventory number is essentially stable unless the ostracon were transferred to a new museum and given a new inventory number (a less common occurrence). However, Classicists would argue that the inventory number is not of much use to the average scholar who simply wants to look up the text without traveling to the British Museum; to them, it is more efficient to refer to the text as O. Taxes 2 6, since it was published in volume 2 of Brian Muhs' work on Taxes--*Receipts, Scribes and Collectors in Early Ptolemaic Thebes (O. Taxes 2)*—within Muhs' publication, the text is numbered 6. This naming system is convenient, but as texts are re-published in more new editions, the same text can be referenced using many names. There are logical arguments behind both naming conventions.

Since this dissertation includes texts in both languages, I could have easily found myself using both naming conventions within this one project, but I wanted to use a consistent naming system. The names I have used for texts throughout this dissertation are the names currently assigned to them in the Trismegistos Texts database (TM). For example, the text discussed above is named O. Taxes 2 6 in TM, so that is the name I have used here. This choice was simply for the sake of consistency and convenience. Most (but not all) of the names TM assigns are based on publications rather than inventory numbers, regardless of the language of the text. In this

Appendix, readers can look up the name of a publication (e.g., BGU 10) that I used to name texts in the dissertation, and find the full bibliographic details of that publication. Under each, I have listed the texts from that publication that were cited in the body of this dissertation (e.g., BGU 10 1943).

As I was working on the dissertation, some cited texts were re-published, and their names have already begun changing in TM. To enable more convenient referencing, then, I have also included each text's Trismegistos (TM) number here. The TM number is a stable identifier with a stable URL on TM. As TM explains, the "number does not change when the text is re-edited or interpreted in a different way …. The only way in which it can disappear is if the database turns out to contain double entry or if two fragments are joined. Even in those cases, however, track is kept of the number in the so-called old number database, and the user is re-directed towards the currently valid number."[6] Therefore, as long as the TM database remains in existence, readers of this dissertation will be able to easily look up the most up-to-date information about each text by simply searching TM using the TM number.[7] In my own construction of my price database in Excel, I also used TM numbers as the core stable identification numbers for each text. Thus the list of texts cited below is organized by the primary name used in the dissertation (TM's name based on publication information), with each text's TM number next to its publication number. A quick search of the TM number on Trismegistos will yield a list of all other publications of the text.

A second common punctuation mark readers will see in text names below is the plus sign (+). The plus sign is conventionally used to connect two fragments of the same text that have been

[6] Trismegistos, "Stable identifiers." http://www.trismegistos.org/about_identifiers.php (accessed July 12, 2017).
[7] Such a search by TM number is quite convenient as a Quicksearch at www.trismegistos.org/index2.php.

joined since their publication. For example, BGU 6 1266 + BGU 14 2386 means that two fragments of the same text were initially published separately, one as text number 1266 in volume 6 of the BGU, then later another as text 2386 in volume 14 of the BGU. In this dissertation, I only use plus signs to link names of texts that have been joined.

Appendix 2.2.3 Publication of Revisions and Corrections

More information is included next to each text to reference further corrections made to the original publication of the text as well as later discussions of the text relevant to the purposes of this dissertation. A brief discussion of my methodology in checking texts for price data might be helpful in this regard. As I worked through the list of relevant texts to check (as explained in Appendix 1), I wanted to check not only the publication that gave the text its name but also other corrections made to the primary edition and possible secondary discussions of the text. To this end, I first searched for each text on TM by its TM number. I also looked the text up based on its primary publication, checking other publications as listed in TM if the first publication was unclear.

To make sure I had the most up-to-date readings, I checked each text in the relevant *Berichtigungsliste*. Within the field of papyrology, *Berichtigungsliste* are publications that compile all the most recent revisions and corrections made to editions of ancient texts. As the website of the current project of the *Berichtigungsliste der Griechischen Papyrusurkunden aus Ägypten* (BL) explains, "the aim of the *Berichtigungsliste* is to collect from all the published papyrological literature all the corrections that have been proposed for the readings and interpretations of Greek documentary texts, to check them if necessary on photographs of the papyri c.q. ostraca, and to

present them in a clear and critical manner."[8] The TM page of each Greek text links to the Heidelberger Gesamtverzeichnis (HGV) and Papyri.info, other databases of textual metadata that list those volumes and pages of the BL that include corrections to and additional info regarding that particular text. Corrections and revisions made to Demotic texts are published likewise in Den Brinker, Muhs, and Vleeming's *Berichtigungsliste of Demotic Documents* (or BL Dem.).[9] The BL Dem. is not yet linked through TM or other online databases, but it can be easily referenced in print. It can be assumed that every reading I present in this dissertation has been checked against the BL and/or BL Dem.; any corrections that are my own suggestions are explained in the body of the dissertation.

In the entries below, after first listing each text's identifying information, I have provided references to those volumes of the BL that cite revisions and corrections made to that text. I have not repeated the content of the references contained within the BL, due to the large number of BL references that would quickly accumulate, but the citations to relevant volumes and pages should provide enough information for the reader to locate those references as needed.

It can be assumed, then, that all texts cited in this dissertation have been checked against corrections made in the BL and BL Dem. as of July 2017 (through volume 12 of the BL). Corrections listed there have already been rolled into the readings presented in the body of the dissertation.

The following abbreviations are used throughout this Appendix for commonly cited publications of corrections and revisions:

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[8] Universiteit Leiden Papyrological Institute, "Berichtigungsliste der Griechischen Papyrusurkunden aus Ägypten (BL)." http://www.hum.leiden.edu/papyrological-institute/project-berichtigungsliste/berichtigungsliste.html (accessed July 12, 2017).

[9] A. A. Den Brinker, B. P. Muhs, and S. P. Vleeming, eds., *A Berichtigungsliste of Demotic Documents, Parts A-C* (Leuven: Peeters, 2005).

BL = *Berichtigungsliste der griechischen Papyrusurkunden aus Ägypten.*

- 1 = I. Band, edited by Friedrich Preisigke (Strassburg-Berlin-Leipzig, 1913-1922).
- 2 = II. Band, edited by Friedrich Bilabel (Selbstverlag, 1929-1933).
- 3 = III. Band, edited by M. David, B. A. van Groningen and E. Kiessling (Leiden: Brill, 1956-1958).
- 4 = IV. Band, edited by M. David, B. A. van Groningen and E. Kiessling (Leiden: Brill, 1964).
- 5 = V. Band, edited by E. Boswinkel, M. David, B. A. van Groningen and E. Kiessling (Leiden: Brill, 1969).
- 6 = VI. Band, edited by E. Boswinkel, P. W. Pestman and H.-A. Rupprecht (Leiden: Brill, 1976).
- 7 = VII. Band, edited by E. Boswinkel, W. Clarysse, P. W. Pestman and H.-A. Rupprech. (Leiden: Brill, 1986).
- 8 = VIII. Band, edited by P. W. Pestman, H.-A. Rupprecht, and F. A. J. Hoogendijk (Leiden: Brill, 1992).
- 9 = IX. Band, edited by P. W. Pestman, H.-A. Rupprecht, F. A. J. Hoogendijk, N. Kruit, and A. M. F. W. Verhoogt (Leiden: Brill, 1995).
- 10 = X. Band, edited by P. W. Pestman, H.-A. Rupprecht, A. M. F. W. Verhoogt, F. A. J. Hoogendijk, and N. Kruit (Leiden: Brill, 1998).
- 11 = XI. Band, edited by H.-A. Rupprecht, A. M. F. W. Verhoogt, N. Kruit, J. Hengstl, and L. E. Tacoma (Leiden: Brill, 2002).

- 12 = XII. Band, edited by H.-A. Rupprecht, K. A. Worp, F. A. J. Hoogendijk, M. J. Bakker, and J. Hengstl (Leiden: Brill, 2009).

BL Dem. = A. A. Den Brinker, B. P. Muhs, and S. P. Vleeming (eds.), *A Berichtigungsliste of Demotic Documents* (Leuven: Peeters, 2005).

- A = Papyrus Editions.
- B = Ostrakon Editions and Various Publications.
- C = Index of New and Rejected Readings.

BL Konkordanz = *Berichtigungsliste der griechischen Papyrusurkunden aus Ägypten: Konkordanz und Supplement*

- 1-7 = *Konkordanz und Supplement zu Band I-VII*, edited by W. Clarysse, R. W. Daniel, F. A. J. Hoogendijk, and P. van Minnen (Leuven: Peeters, 1989).
- 8-11 = *Konkordanz zu Band VIII-XI*, edited by M. J. Bakker, A. V. Bakkers, F. A. J. Hoogendijk, and N. Kruit. (Leiden: Brill, 2007).

Appendix 2.2.4 Publication of Relevant Discussions

In each entry below, after listing references to the relevant BL volumes, I cite where the text appears in the main previous publications that list Ptolemaic prices, namely those of Maresch, Cadell and Le Rider, and von Reden. If a text was not included in any of those price lists, then obviously no references are given.

TM links to other databases, such as HGV and Papyri.info, will also provide more information on further discussions of each cited text. I have only listed these further discussions where those discussions are relevant to my citations and my purposes here. For example, when I cite a text's price that was also listed by Maresch, I cite Maresch's reference. But if there is scholarly literature about some other part of the text not relevant to the price, I have not listed it here. Readers interested in finding all such possible discussions of each text can do so through TM searches and following TM's links to other partnered databases.

Some texts have also been published in translation, aside from their proper papyrological publications. Where I consulted those translations, I have cited them here as well.

The following abbreviations are used throughout this appendix for those previous collections of Ptolemaic prices that I cite frequently:

Cadell and Le Rider, *Prix du blé* = Hélène Cadell and Georges Le Rider, *Prix du blé et numéraire dans l'Égypte Lagide de 305 à 173,* Papyrologica Bruxellensia 30 (Brussels: Fondation Égyptologique Reine Élisabeth, 1997).

Maresch, *Bronze und Silber* = Klaus Maresch, *Bronze und Silber: Papyrologische Beiträge zur Geschichte des Währung im ptolemäischen und römischen Ägypten bis zum 2. Jahrhundert n. Chr.* (Cologne: Westdeutscher Verlag, 1996).

von Reden, "Grain prices" = Sitta von Reden, "Grain prices in the eastern Mediterranean (c. 420-30 BC)," in Dominic Rathbone and Sitta von Reden, "Mediterranean grain prices in classical antiquity," in *A History of Market Performance: From Ancient Babylonia to the modern world*,

ed. by R. J. van der Spek, Bas van Leeuwen, and Jan Luiten van Zanden (London: Routledge, 2015), 156-170, plus following tables.

The following abbreviations are used for collections of translations of texts that I cite frequently:

Austin, *Hellenistic World* (2nd ed.) = Michel Austin, The Hellenistic World from Alexander to the Roman Conquest: A Selection of Ancient Sources in Translation, 2nd ed. (Cambridge: Cambridge University Press, 2006).

Bagnall & Derow, *Hellenistic Period* = Roger S. Bagnall and Peter Derow, *The Hellenistic Period: Historical Sources in Translation*. 2nd edition. Malden, MA: Blackwell, 2004

Sel. Pap. 1 = Arthur S. Hunt, *Select Papyri, vol. 1.* Loeb Classical Library 266. Cambridge: Harvard, 1932.

Full bibliographic information for all references listed here can be found in the main Bibliography of this dissertation.

Appendix 2.3 List of Texts Cited for Prices

Each entry explains the text's identity, then references basic corrections and revisions, then references its appearance in previous publications of Ptolemaic prices, then references further discussion and interpretations relevant to an analysis of the prices. Each entry is organized as follows:

- Number (or page number) as used in the name assigned in TM = TM number. BL references. Alternate dates (if not listed in BL). Listings in previous publications of Ptolemaic prices (Maresch, Cadell and Le Rider, von Reden). Other discussions (if relevant to prices and if not already listed in BL). Translations consulted (aside from those given in publications already listed).

Acta Orientalia 23 = Wolja Christian Erichsen and Charles Francis Nims, "A Further Category of Demotic Marriage Settlements," *Acta Orientalia* 23 (1958): 119-133.

- p. 123-124 no. B. See P. Heverträge 30 + Acta Orientalia 23 (1958), p. 123-124 no. B.
- 31 + Acta Orientalia 23 (1958) p. 126 no. A. See P. Heverträge 30 + Acta Orientalia 23 (1958), p. 126 no A.

Aegyptus 92 (2012) = Hermann Harrauer and Rosario Pintaudi, "'Mein Haus ist leer!': Enteuxis gegen die eigene Frau P. Vindob. Barbara Inv. 34," *Aegyptus* 92 (2012): 3-12.

- p. 3-12 = TM 47288.

BGU 6 = Wilhelm Schubert and Ernst Kühn*, Papyri und Ostraka der Ptolemäerzeit*, Aegyptische Urkunden aus den Staatlichen Museen zu Berlin, Griechische Urkunden (BGU) 6 (Berlin: Weidmannsche Buchhandlung, 1922).

- 1226 = TM 2660. BL 2.2, 31; BL 6, 15. Prices listed in Maresch, *Bronze und Silber*, 184; Cadell and Le Rider, *Prix du blé*, 28 no. 7; von Reden, "Grain prices," Table A8.9 no. 4.
- 1228 = TM 2662. BL 8, 44. Prices listed in Maresch, *Bronze und Silber*, 184; Cadell and Le Rider, *Prix du blé*, 28 no. 8; von Reden, "Grain prices," Table A8.9 no. 5. See also A. Monson, "Harvest Taxes on Cleruchic Land in the Third Century BC," in *Proceedings of the 27th International Congress of Papyrology, Warsaw, 29 July – 3 August 2013*, ed. Tomasz Derda, Adam Łajtar, and Jakub Urbanik (Warsaw: University of Warsaw, 2016) vol. 3, 1615–1631, esp. 1626–1629.
- 1262 = TM 2665. BL 6, 16; BL 8, 44. Prices listed in Maresch, *Bronze und Silber*, 184; Cadell and Le Rider, *Prix du blé*, 30 no. 28; von Reden, "Grain prices," Table A8.9 no. 11.
- 1263 = TM 4547. Copy of BGU 6 1264, BGU 14 2384, P. Frankf. 2. BL 8, 44; BL 9, 26. Prices listed in Cadell and Le Rider, *Prix du blé*, 30 no. 34.
- 1264 = TM 2666. Copy of BGU 6 1263, BGU 14 2384, P. Frankf. 2. BL 3, 20; BL 8, 44; BL 9, 26. Prices listed in Maresch, *Bronze und Silber*, 184; Cadell and Le Rider, *Prix du blé*, 30 no. 34; von Reden, "Grain prices," Table A8.9 no. 12.
- 1265 = TM 4548. BL 3, 20; BL 6, 16; BL 7, 19; BL 12, 19. Prices listed in Maresch, *Bronze und Silber*, 185; Cadell and Le Rider, *Prix du blé*, 30 no. 35; von Reden, "Grain prices," Table A8.9 no. 16.

- 1266 + BGU 14 2386 = TM 2667. BL 2.2, 32; BL Konkordanz 1-7, 37; BL 9, 27. Prices listed in Maresch, *Bronze und Silber*, 186; Cadell and Le Rider, *Prix du blé*, 31 no. 41.
- 1267 = TM 4549. BL 8, 44. Alternative dates: before 266/5 BCE, or before 228/7 BCE. Prices listed in Maresch, *Bronze und Silber*, 184; Cadell and Le Rider, *Prix du blé*, 30 no. 27; von Reden, "Grain prices," Table A8.9 no. 8.
- 1275 = TM 2671. BL 2.2, 33; BL 3, 20; BL 6, 16; BL 7, 20; BL 11, 27. Prices listed in Maresch, *Bronze und Silber*, 186; Cadell and Le Rider, *Prix du blé*, 30 no. 31. On the meaning of ἀργυρίου in line 18, see Cadell & Le Rider, *Prix du blé*, 42 (BL 11, 27). For a restoration of the lacuna on line 18, see Reekmans, *Ptolemaic Copper Inflation*, 61, n. 1, and 68, n. 3 (BL 3, 20). On the reading of the number on line 24, see Fritz Uebel, *Die Kleruchen Ägyptens unter den ersten sechs Ptolemäern* (Berlin: Akademie-Verlag, 1968), 325, n. 6 (BL 6, 16; BL 7, 20).
- 1277 = TM 2673. BL 3, 20; BL 5, 16; BL Konkordanz 1-7, 37; BL 8, 44; BL 11, 27. Prices listed in Maresch, *Bronze und Silber*, 186; Cadell and Le Rider, *Prix du blé*, 30 no. 30.
- 1278 = TM 2674. BL 2.2, 32. Prices listed in Maresch, *Bronze und Silber*, 186; Cadell and Le Rider, *Prix du blé*, 30 no. 32.
- 1283 = TM 2675. BL 2.2, 32; BL 3, 20; BL 7, 20.
- 1290 = TM 4555. BL 9, 26. Prices listed in Maresch, *Bronze und Silber*, 192-193. For a further discussion of dating, see Reekmans, *Ptolemaic Copper Inflation*, 70 & 108. See also R. A. Hazzard, "A Note on the Ptolemaic Bronzes in Series 6," *Chronique d'Égypte* 91 (2016): 135–144.
- 1495 = TM 7389. BL 7, 21.

BGU 7 = Paul Viereck and Friedrich Zucker, *Papyri, Ostraka und Wachstafeln aus Philadelphia im Fayûm,* Aegyptische Urkunden aus den Staatlichen Museen zu Berlin, Griechische Urkunden (BGU) 7 (Berlin: Weidmannsche Buchhandlung, 1926).

- 1501 = TM 4751. BL 3, 21; BL 11, 28. Alternative dates: 206/205 BCE or 189/188 BCE. Prices listed in Maresch, *Bronze und Silber*, 188.
- 1505 = TM 4755. BL 3, 21; BL 11, 28. Alternative dates: February 11 – March 12, 206 BCE or February 7 – March 7, 189 BCE. Prices listed in Cadell and Le Rider, *Prix du blé*, 31 no. 45.
- 1506 = TM 4756. BL 3, 21; BL 11, 28. Alternative dates: December 13, 206 – January 11, 205 BCE or December 8, 189 – January 6, 188 BCE. Prices listed in Maresch, *Bronze und Silber*, 188.
- 1511 = TM 4761. BL 3, 21; BL 11, 28. Alternative dates: 210-204 BCE or 193-187 BCE. For further references on dating, see P. W. Pestman, *A Guide to the Zenon Archive*, P. L. Bat. 21A (Leiden: Brill, 1981), 74.
- 1516 = TM 4766. BL 3, 21; BL 11, 28. Alternative date: 210-204 BCE or 193-187 BCE. Prices listed in Maresch, *Bronze und Silber*, 188. See also T. Reekmans, "Monetary History and the Dating of Ptolemaic Papyri," *Studia Hellenistica* 5 (1948): 20; P. W. Pestman, *A Guide to the Zenon Archive*, P. L. Bat. 21A (Leiden: Brill, 1981), 74; Christelle Fischer-Bovet and Willy Clarysse, "Silver and bronze standards and the date of P. Heid. VI 383," *Archiv für Papyrusforschung* 58 (2012): 39, n. 9.
- 1520 = TM 4770. BL 3, 21; BL 11, 28. Alternative dates: 210-204 BCE or 193-187 BCE. Prices listed in Maresch, *Bronze und Silber*, 188. See also T. Reekmans, "Monetary

History and the Dating of Ptolemaic Papyri," *Studia Hellenistica* 5 (1948): 20; P. W. Pestman, *A Guide to the Zenon Archive*, P. L. Bat. 21A (Leiden: Brill, 1981), 74; Maresch, *Bronze und Silber*, 99; Christelle Fischer-Bovet and Willy Clarysse, "Silver and bronze standards and the date of P. Heid. VI 383," *Archiv für Papyrusforschung* 58 (2012): 39, n. 9.

- 1523 = TM 4773. BL 3, 21; BL 11, 28. Alternative dates: 210-204 BCE or 193-187 BCE. See also T. Reekmans, "Monetary History and the Dating of Ptolemaic Papyri," *Studia Hellenistica* 5 (1948): 20; P. W. Pestman, *A Guide to the Zenon Archive*, P. L. Bat. 21A (Leiden: Brill, 1981), 74; Maresch, *Bronze und Silber*, 99; Christelle Fischer-Bovet and Willy Clarysse, "Silver and bronze standards and the date of P. Heid. VI 383," *Archiv für Papyrusforschung* 58 (2012): 39, n. 9.
- 1532 = TM 4782. BL 3, 21; BL 11, 28. Alternative dates: 210-204 BCE or 193-187 BCE. Prices listed in Maresch, *Bronze und Silber*, 182; Cadell and Le Rider, *Prix du blé*, 31 no. 46; von Reden, "Grain prices," Table A8.6 no. 16 & 17. See also T. Reekmans, "Monetary History and the Dating of Ptolemaic Papyri," *Studia Hellenistica* 5 (1948): 20; P. W. Pestman, *A Guide to the Zenon Archive*, P. L. Bat. 21A (Leiden: Brill, 1981), 74; Maresch, *Bronze und Silber*, 99; Christelle Fischer-Bovet and Willy Clarysse, "Silver and bronze standards and the date of P. Heid. VI 383," *Archiv für Papyrusforschung* 58 (2012): 39, n. 9.
- 1536 = TM 4786. BL 3, 21; BL 11, 28. Alternative dates: 210-204 BCE or 193-187 BCE. Prices listed in Maresch, *Bronze und Silber*, 181; Cadell and Le Rider, *Prix du blé*, 31 no. 47; von Reden, "Grain prices," Table A8.6 no. 15. See also T. Reekmans, "Monetary History and the Dating of Ptolemaic Papyri," *Studia Hellenistica* 5 (1948): 20; P. W.

Pestman, *A Guide to the Zenon Archive*, P. L. Bat. 21A (Leiden: Brill, 1981), 74; Maresch, *Bronze und Silber*, 99; Christelle Fischer-Bovet and Willy Clarysse, "Silver and bronze standards and the date of P. Heid. VI 383," *Archiv für Papyrusforschung* 58 (2012): 39, n. 9.

- 1537 = TM 4787. BL 3, 21; BL 4, 8; BL 11, 28. Alternative dates: 210-204 BCE or 193-187 BCE. Prices listed in Maresch, *Bronze und Silber*, 188. See also T. Reekmans, "Monetary History and the Dating of Ptolemaic Papyri," *Studia Hellenistica* 5 (1948): 20; P. W. Pestman, *A Guide to the Zenon Archive*, P. L. Bat. 21A (Leiden: Brill, 1981), 74; Maresch, *Bronze und Silber*, 99; Christelle Fischer-Bovet and Willy Clarysse, "Silver and bronze standards and the date of P. Heid. VI 383," *Archiv für Papyrusforschung* 58 (2012): 39, n. 9.
- 1558 = TM 4808. BL 3, 21; BL 6, 17; BL 11, 28. Alternative dates: 210-204 BCE or 193-187 BCE. See also T. Reekmans, "Monetary History and the Dating of Ptolemaic Papyri," *Studia Hellenistica* 5 (1948): 20; P. W. Pestman, *A Guide to the Zenon Archive*, P. L. Bat. 21A (Leiden: Brill, 1981), 74; Maresch, *Bronze und Silber*, 99; Christelle Fischer-Bovet and Willy Clarysse, "Silver and bronze standards and the date of P. Heid. VI 383," *Archiv für Papyrusforschung* 58 (2012): 39, n. 9.

BGU 10 = W. Müller, *Papyrusurkunden aus ptolemäischer Zeit,* Berliner Griechische Urkunden (BGU) 10 (Berlin: Akademie-Verlag, 1970).

- 1943 = TM 2676. BL 8, 50. Prices listed in Maresch, *Bronze und Silber*, 185; von Reden, "Grain prices," Table A8.9 no. 15.

- 1944 = TM 2677. BL 8, 50. Prices listed in Maresch, *Bronze und Silber*, 185, 186, 187; Cadell and Le Rider, *Prix du blé*, 30 no. 36; von Reden, "Grain prices," Table A8.9 no. 17.
- 1946 = TM 2679. BL 8, 50; BL 9, 29. Prices listed in Maresch, *Bronze und Silber*, 185; Cadell and Le Rider, *Prix du blé*, 31 no. 39; von Reden, "Grain prices," Table A8.9 no. 20.
- 1959 = TM 2683. BL 12, 22f. Prices listed in Maresch, *Bronze und Silber*, 184; Cadell and Le Rider, *Prix du blé*, 30 no. 33.
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- 59326 + P. Lond. 7 2002 + P. Cairo Zen. 3 59326 bis. = TM 970 = P. Cairo Zen. 3 p. 290-291 (59326) = CPS 225. BL 8, 78; BL 9, 52.
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- 59765. See P. Cairo Zen. 4 59754 + P. Cairo Zen. 4 59763 + P. Cairo Zen. 5 59765.
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- 17 = TM 2770. BL Dem. A, 189.
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P. Heid. Gr. 6 = Ruth Duttenhöffer, *Ptolemäische Urkunden aus der Heidelberger Papyrus-Sammlung: (P. Heid. VI)*, Veröffentlichungen aus der Heidelberger Papyrus-Sammlung n.F., Nr. 7 (Heidelberg: C. Winter, 1994).

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P. Heid. Gr. 8 = Demokritos Kaltsas. *Dokumentarische Papyri des 2. Jh. v. Chr. aus dem Herakaleopolites: (P. Heid. VIII).* Veröffentlichungen aus der Heidelberger Papyrus-Sammlung n.F., Nr. 10. Heidelberg: C. Winter, 2001.

- 412 = TM 47290.

P. Hels. 1 = Jakko Frösén, et al, *Papyri Helsingienses I: Ptolemäische Urkunden (P. Hels. I),* Commentationes Humanarum Litterarum 80 (Helsinki: Societas Scientarum Fennica, 1986).

- 3 = TM 41394. BL 9, 105.

P. Hibeh 1 = Bernard P. Grenfell and Arthur S. Hunt, *The Hibeh Papyri, Volume I* (London: Egypt Exploration Fund, 1906).

- 31 = TM 8185.
- 32 = TM 7815. BL 7, 68.
- 34 = TM 8186. BL 11, 95; BL 12, 91.
- 36 = TM 8188.
- 37 = TM 7818.
- 40 = TM 8191. BL 8, 151.
- 51 = TM 8202. BL 6, 52.
- 63 = TM 8213.
- 65 = TM 8215.
- 67 = TM 8217. BL 8, 151.
- 68 = TM 8218
- 73 = TM 8222. BL 11, 95.
- 84a = TM 2817. BL 9, 108.
- 86 = TM 8233. BL 11, 95.
- 90 = TM 2820. BL 11, 95.
- 99 = TM 2826. BL 11, 95.

- 100 = TM 8235.
- 102 = TM 8237. Sel. Pap. 2 347.
- 110 Ro. = TM 2827. BL 8, 151.
- 111 = TM 8241.
- 124 descr. = TM 7825.

P. Hibeh 2 = E. G. Turner, *The Hibeh Papyri, Volume II* (London: Egypt Exploration Fund, 1955).

- 264 = TM 5220.

P. Köln Ägypt. 1 = Dieter Kurth, Heinz-Josef Thissen, and Manfred Weber. *Kölner Ägyptische Papyri (P. Köln Ägypt.)*. Oplanden: Westdeutscher Verlag, 1980.

- 7 = TM 2846. BL Dem. A, 236-237.

P. Köln Gr. 5 = Michael Gronewald, Klaus Maresch und Wolfgang Schäfer. *Kölner Papyri Band 5 (P.Köln V)*. Opladen: Westdeutscher Verlag, 1985.

- 217 = TM 3178.
- 221 Ro descr. + P. Köln Gr. 5 221 A-H Ro descr. = TM 92274. BL 8, 157; BL 9, 114; BL 11, 104. For discussion, see Katelijn Vandorpe and Willy Clarysse, "Viticulture and Wine Consumption in the Arsinoite Nome (P. Köln V 221)," *Ancient Society* 28 (1997): 67-73.
- 221 A-H Ro. descr. See P. Köln Gr. 5 221 Ro descr. + P. Köln Gr. 5 221 A-H Ro descr.

P. Köln Gr. 8 = Michael Gronewald, Klaus Maresch, and Cornelia Eva Römer, *Kölner Papyri (P. Köln), Band 8* (Opladen: Westdeutscher Varlag, 1991).

- 346 = TM 41540. See Willy Clarysse, "Notes on Papyri," *Zeitschrift für Papyrologie und Epigraphik* 168 (2009): 243-246.

P. L. Bat. 20 = P. W. Pestman (ed.), *Greek and Demotic Texts from the Zenon Archive*, Papyrologica Lugduno-Batava 20 (Leiden: Brill, 1980).

- 22 = TM 1853.
- 30 = TM 1861. BL 8, 204. Alternative dates: April 5, 242 BCE or April 4, 241 BCE (year uncertain).
- 62 = TM 1893. BL 8, 204; BL 10, 115.

P. L. Bat. 33 = Bärbel Kramer and Dieter Hagedorn, "13-14. Aus dem Archiv eines Pfandleihers," in *Sixty-Five Papyrological Texts, Presented to Klaas A. Worp on the Occasion of his 65th Birthday (P. L. Bat. 33)*, Papyrologica Lugduno-Batava 33, edited by F. A. J. Hoogendijk and B. P. Muhs, 77-89. Leiden: Brill, 2008.

- 13 = TM 115547.
- 14 = TM 115548.

P. Lille Gr. 1 = Pierre Jouguet, Paul Collart, Jean Lesquier, and Maurice Xoual, *Papyrus Grecs, Tome Premier, Fascicles I-III* (Paris: Institut papyrologique de l'université de Lille, 1907-1923).

- 6 = TM 3213.
- 37 = TM 3239.
- 58 = TM 3255.

P. Loeb = Wilhelm Spiegelberg, *Die demotischen Papyri Loeb* (München: Beck, 1931).

- 3 = TM 46042. BL Dem. A, 271.
- 18 = TM 43405. BL Dem. A, 273.

P. Lond. 7 = T. C. Skeat, *Greek Papyri in the British Museum (Now in the British Library), Volume VII: The Zenon Archive* (London: British Museum Publications, 1974).

- 1267. See P. Cairo Zen. 2 59176 + P. Lond. 7 2167
- 1937 = TM 2375.
- 1943 = TM 1510
- 1944 = TM 1509.
- 1974 + PSI inv. 3038 Ro. ined. = TM 1537.
- 1977 = TM 1540.
- 1994 = TM 1556
- 1995 = TM 1557

- 1996 = TM 1558.
- 2002. See P. Cairo Zen. 3 59326 + P. Lond. 7 2002 + P. Cairo Zen. 3 59326 bis.
- 2006 = TM 1568
- 2016 = TM 1578
- 2053 = TM 1615
- 2054 = TM 1616
- 2140 Ro. = TM 1700
- 2167. See P. Cairo Zen. 2 59176 + P. Lond. 7 2167.
- 2175 = TM 2397

P. Mich. Zen. = Campbell Cowan Edgar, *Zenon Papyri in the University of Michigan collection*. University of Michigan Studies, Humanistic Series 24. Ann Arbor: University of Michigan Press, 1931.

- 1 = TM 1907.
- 2 = TM 1908. BL 11, 135.
- 28 = TM 1928.
- 30 = TM 1930.
- 34 = TM 1934.
- 61 = TM 1961.
- 90 = TM 1989.

P. Petrie(2) 1 = Willy Clarysse, *The Petrie papyri*, 2nd edition. Brussel : Comité Klassieke Studies, Subcomité Hellenisme, Koninklijke Academie voor Wetenschappen, Letteren en Schone Kunsten van België, 1991.

- 13 = TM 47308. BL 10, 159.

P. Petrie 3 = John Mahaffy and J. Gilbart Smyly, *The Flinders Petrie Papyri III*, Cunningham Memoirs 11 (Dublin: Academy House, 1905).

- 36d = TM 7436. BL 11, 177; BL 12, 159.
- 46 (1) = TM 7457.
- 46 (3) = TM 7459.
- 46 (4) = TM 7460. BL 8, 279.
- 47 a = TM 7462. BL 11, 177.
- 80a = TM 7536. BL 11, 178.
- 135 = TM 7602.
- 136 = TM 7603.
- 137 = TM 7604.
- 138 = TM 7605.
- 139 a = TM 7697.
- 140 d = TM 7606.
- 142 = TM 7608. BL 9, 211.

P. Phil. Dem. = Mustafa El-Amir. *A Family Archive from Thebes. Demotic Papyri in the Philadelphia and Cairo Museum from the Ptolemaic Period*. Cairo: General Organisation for Govt. Print. Offices, 1959.

- 14. See P. Eheverträge 13 + P. Phil. Dem. 14.
- 25. See P. Eheverträge 20 + P. Phil. Dem. 25
- 30 = TM 46172.

P. Recueil = P. W. Pestman, Jan Quaegebeur, J. S. Vos. *Recueil des textes démotiques et bilingues*. Leiden: Brill, 1977.

- 7 = TM 2733. BL Dem. A, 326.

P. Rev. = Jean Bingen, *La papyrus revenue laws: tradition grecque et adaptation hellénistique.* Opladen: Westdeutscher Verlag, 1978.

- p. 4-36 = TM 8859. BL 8, 289; BL 9, 225; BL 11, 186. English translation in Bagnall & Derow, *Hellenistic Period*, #114.

P. Ryl. Dem. = Francis Llewellyn Griffith, *Catalogue of the Demotic Papyri in the John Rylands Library Manchester I-III*, Manchester: University Press, 1909.

- 10. See P. Eheverträge 10 + P. Ryl. Dem. 10.

P. Sorb. 1 = Hélène Cadell. *Papyrus de la Sorbonne I.* Publications de la Faculté des Lettres et Sciences Humaines de Paris, Série Textes et Documents 10. Paris: Presses universitaires de France, 1966.

- 16 = TM 3131.
- 17 = TM 3132.
- 33 = TM 3148.

P. Sorb. 3 = Hélène Cadell, Willy Clarysse, and Robic Kennokka, *Papyrus de la Sorbonne III.* Paris: Presses de l'université Paris-Sorbonne, 2011.

- 106 = TM 2605.
- 133 = TM 121877.

P. Strasb. Gr. 7 = Jacques Schwartz, *Papyrus grecs de la Bibliothèque Nationale et Universitaire de Strasbourg, Nos. 661 à 680.* Strasbourg: Publications de la Bibliothèque Nationale et Universitaire de Strasbourg, 1978.

- 661 = TM 3959.

P. Tebt. 3 = Arthur S. Hunt, et al., *The Tebtunis Papyri, Volume III, Part I.* London: Oxford University Press, 1933.

- 701 = TM 5312. BL 9, 358; BL 10, 277.
- 794 = TM 5380. BL 3, 244.
- 796 = TM 5381.
- 815 = TM 7752. BL 8, 495; BL 9, 359; BL 100, 277; BL 11, 280.
- 884 = TM 4406. BL 10, 277; BL 11, 280.
- 885 = TM 5438. BL 9, 359.

- 889 = TM 7737. BL 11, 280.
- 890 = TM 5442. BL 8; 496, BL 9, 359; BL 11, 280.
- 891 = TM 7960. BL 9, 359.
- 997 descr. = TM 5494. BL 3, 247.
- 1062 descr. = TM 5522.
- 1077 descr. = TM 7869.
- 1078 descr. = TM 8046.
- 1079 descr. = TM 8047.
- 1086 descr. = TM 8054. BL 10, 278.

P. Tor. Botti = Guiseppe Botti, Jr., *L'archivio demotico da Deir el-Medineh (Catalogo del Museo Egizio di Torino. Serie Prima. Monumenti e Testi 1)*. Firenze: F. Le Monnier, 1967.

- 39 = TM 45110. BL Dem. A, 399-400.

P. Yale 1 = John F. Oates, Alan E. Samuel, and Charles Bradford Welles. Yale Papyri in the Beinecke Rare Book and Manuscript Library I. American Studies in Papyrology 2. New Haven: Yale University Press, 1967.

- 40 = 6203. BL 8, 513.

P. Zen. Dem. = Wilhelm Spiegelberg, *Die demotischen Urkunden des Zenon-Archivs*. Demotische Studien 8. Leipzig: J. C. Hinrichs, 1929.

- 1 + PSI 9 1001 = TM 2304. BL Dem. A, 407.
- 15 descr. + PSI 5 546 = TM 2316.

PSI inv. = unedited, with metadata from Trisgmegistos.

- 3038 Ro. ined. See P. Lond. 7 1974 + PSI inv. 3038 Ro. ined.

PSI 4 = Girolamo Vitelli and Medea Norsa, *Papyri greci e latini, Vol. IV (PSI 4)*. Pubblicazioni della Società Italiana per la ricerca dei Papiri greci e latini in Egitto. Firenze: Felice le Monnier, 1917.

- 332 = TM 2026. BL 9, 313; BL 10, 237; BL 11, 244.
- 333 = TM 2027. English translation in Naphtali Lewis, *Greeks in Ptolemaic Egypt*, 54-55.
- 348 = TM 2036. BL 9, 313; BL 10, 237.
- 368 = TM 2054. BL 8, 397.
- 386 = TM 2070. BL 9, 314; BL 10, 238.
- 396 = TM 2080. BL 8, 397.

PSI 5 = Girolamo Vitelli and Medea Norsa, *Papyri greci e latini, Vol. V (PSI 5)*. Pubblicazioni della Società Italiana per la ricerca dei Papiri greci e latini in Egitto. Firenze: Felice le Monnier, 1917.

- 512 = TM 2134. BL 10, 240.
- 531 = TM 2153. English translation in Thompson, *Memphis under the Ptolemies*, 90. French translation in Orrieux, *Les papyrus de Zenon*, 95.
- 543 = TM 2165.
- 546. See P. Zen. Dem. 15 descr. + PSI 5 546.

PSI 6 = Campbell Cowan Edgar, *Papyri greci e latini, Volume Sesto (PSI 6)*. Firenze: Stabilimento Tiografico E. Ariani, 1920.

- 551 = TM 2171. BL 10, 240.
- 571 = TM 2185.
- 572 = TM 2186. BL 11, 241.
- 583 = TM 2195.
- 599 = TM 2209. BL 8, 399. French translation in Orrieux, *Les papyrus de Zenon*, 142.
- 620 = TM 2228. BL 10, 242; BL 12, 252.

PSI 9 = Girolamo Vitelli and Medea Norsa, *Papyri greci e latini, Vol. IX (PSI 9)*. Pubblicazioni della Società Italiana per la ricerca dei Papiri greci e latini in Egitto. Firenze: Felice le Monnier, 1929.

- 1001. See P. Zen. Dem. 1 + PSI 9 1001.

Revue d'Égyptologie (RdE) 35 (1984) = Shafik Allam. "Un contrat de mariage (Pap.dém.Cairo J.6857)," *Revue d'Égyptologie* 35 (1984): 3-21, Taf. 1-3.

- p. 4-6 = TM 46094.

Revue égyptologique 5 (1888) = A. Cattaui, "Rapport sur une mission dans la Haute-Égypte: août – septembre 1886," *Revue égyptologique* 5 (1888): 78-85.

- p. 81 & pl. 20 [8087 new text] descr. See O. Taxes 2 157.

- p. 90 & pl. 24 [2433 descr.]. See P. Eheverträge 14 + Revue égyptologique 5 (1888), p. 90 & pl. 24 [2433] descr.

SB 3 = Friedrich Bilabel, *Sammelbuch griechischer Urkunden aus Ägypten, Dritter Band* (Berlin: De Gruyter, 1926).

- 6283a = TM 7247.
- 6283b = TM 91813.

SB 4 = Friedrich Bilabel, *Sammelbuch griechischer Urkunden aus Ägypten, Vierter Band* Heidelberg, De Gruyter, 1931.

- 7451 = TM 5692. BL 9, 247.

SB 6 = Emil Kiessling. *Sammelbuch griechischer Urkunden aus Ägypten, Sechster Band (Nr. 8964-9641)*. Wiesbaden: Harrassowitz, 1958-1963.

- 9068 = TM 6195. BL 8, 338; BL 9, 205.

SB 8 = Emil Kiessling. *Sammelbuch griechischer Urkunden aus Ägypten, Acter Band (Nr. 9642-10208)*. Wiesbaden: Harrassowitz, 1965-1967.

- 9860 = TM 65669. BL 8, 356.

SB 12 = Hans-Albert Rupprecht. *Sammelbuch griechischer Urkunden aus Ägypten, Zwölfter Band (Nr. 10764-11263).* Wiesbaden: Harrassowitz, 1976-1977.

- 10863 = TM 4370.

SB 14 = Hans-Albert Rupprecht and Joachim Hengstl. *Sammelbuch griechischer Urkunden aus Ägypten, Vierzehnter Band (Nr. 11264-12219)*. Wiesbaden: Harrassowitz, 1981-1983.

- 11963 = TM 4287. BL 9, 277; BL 12, 211.

SB 16 = Hans-Albert Rupprecht and Joachim Hengstl. *Sammelbuch griechischer Urkunden aus Ägypten, Sechzehnter Band (Nr. 12220-13084)*. Wiesbaden: Harrassowitz, 1988.

- 12811 = TM 4172. BL 10, 216.
- 12823 = TM 4176. BL 11, 221.

SB 18 = Hans-Albert Rupprecht and Joachim Hengstl. *Sammelbuch griechischer Urkunden aus Ägypten, Achtzehnter Band (Nr. 13083-14068)*. Wiesbaden: Harrassowitz, 1993.

- 13160 = TM 2529.
- 13619 = TM 2555. BL 9, 303; BL 11, 225.
- 14041 = TM 2620. BL 9, 310.
- 14042 = TM 2621.

SB 22 = Hans-Albert Rupprecht and Joachim Hengstl. *Sammelbuch griechischer Urkunden aus Ägypten, Zweiundzwanzigster Band (Nr. 15203-15874)*. Wiesbaden: Harrassowitz, 2001.

- 15236 = TM 78918. BL 11, 236; BL 12, 230.
- 15238 = TM 43153.

SB 24 = Hans-Albert Rupprecht and Joachim Hengstl. *Sammelbuch griechischer Urkunden aus Ägypten, Vierundzwanzigster Band (Nr. 15875-16340)*. Wiesbaden: Harrassowitz, 2003.

- 15971 = TM 79265.
- 16004 = TM 79281.
- 16067 = TM 79293.

SB 26 = Hans-Albert Rupprecht and Joachim Hengstl. *Sammelbuch griechischer Urkunden aus Ägypten, Sechsundzwanzigster Band (Nr. 16341-16831)*. Wiesbaden: Harrassowitz, 2006.

- 16504 = TM 761. BL 10, 240.

UPZ 1 = Ulrich Wilcken, *Urkunden der Ptolemäerzeit (ältere Funde) UPZ 1*. Leipzig: Walter de Gruyter & Co., 1927.

- 149 = TM 3541. BL 9, 364; BL 11, 287.

UPZ 2 = Ulrich Wilcken, *Urkunden der Ptolemäerzeit (ältere Funde) UPZ 1*. Leipzig: Walter de Gruyter & Co., 1934.

- 156 = TM 3557. BL 6, 202.
- 158 A = TM 3559.
- 158 B = TM 3632. BL 9, 364.

ZPE 182 (2012), p. 259-268 = Bauschatz, John. "Four (Three?) Ptolemaic Letters from the Duke University Papyrus Archive." *Zeitschrift für Papyrologie und Epigraphik* 182 (2012): 259-268.

- p. 263-264 = TM 131892.

APPENDIX THREE

The Price Data

Appendix 3.1 Introduction

The following lists contain all the prices cited in the body of this dissertation. For more bibliographic information on the source texts listed here, see Appendix 2: Texts Cited for Price Data. For more information on the commodities themselves, including translations and historical background, see Chapter 7.

These price lists are organized roughly by the type of commodity:

Note that in cases where the quantity of a good could not be determined, no unit prices is listed here, just the original price.

Appendix 3.2 Grains

Table 3.2.1. Wheat

Date	*Location*	*Commodity*	*Unit Price (per artaba of wheat)*	*Original Price*	*Source Text*
(4th cent.)	Herakleopolites (Upper Egypt)	*sw*	1.1667 dr.	400 (art.?) = 23.3333 deben	Enchoria 14 (1986), p. 21-22, 1/11
(Ptolemaic)	Thebes (Upper Egypt)	*sw*	30 dr.	1 art. = 1.5 deben	O. Leiden Dem. 139, x+3
(Ptolemaic)	Thebes (Upper Egypt)	*sw*	2640 dr.	1/6 art. = 22 deben; 1/24 art. = 5.5 deben	O. Leiden Dem. 139, x+6, x+8
(Ptolemaic)	Thebes (Upper Egypt)	*sw*	2400 dr.	1/12 art. = 10 deben; 1/24 art. = 5 deben	O. Leiden Dem. 139, x+7, x+9
(Ptolemaic)	Thebes (Upper Egypt)	*sw*	10 dr.	50(?) art. = 25 deben	O. Leiden Dem. 148, x+9
305, Tybi	Hermopolis (Upper Egypt)	*sw*		price of 6 artabas of wheat = 4 silver qite (ḥḏ qt(.t) 4(.t))	P. Loeb 18, 8
302, Thoth	Djeme, Thebes west (Upper Egypt)	*sw*	.00416667 deben/art.	Its provision for 12 days: 4 artabas of wheat per day, making a total of 48 artabas = 2 silver qite; Their food for 8 days: at the rate of 4 artabas of wheat per day, making a total of 32 (artabas of wheat) = 1 1/3 silver qite	P. Phila. Dem. 30, 1/5, 2/13
(299-200)	El-Lahun? (Fayyum)	πυρὸς	2 dr.	1405 art. = 2811 dr. .75 ob.; 185.5 art. = 371 dr.	P. Petrie 3 80 a, 2/16, 2/22
(271-246)	Herakleopolites (Upper Egypt)	(πυρὸς)	2 dr.	20 art. = 40 dr.	P. Hibeh 1 110 ro.
(271-246)	Herakleopolites (Upper Egypt)	πυρὸς	4.8333 dr.	294 art. = 1421 dr.	P. Hibeh 1 110 ro., 11
271, Daisios 20	Upper Egypt	πυρὸς	2.1667 dr.	70 art. = 151 dr. 4 ob.	P. Hibeh 1 99, 13-15
267, Phaophi 11	Egypt	(πυρὸς)	2 dr.	6 art. = 12 dr.	P. Hibeh 1 100, 6
(263-229)	Fayyum?	(πυρὸς)	4.3333 dr.	900 art. at 4 dr. 2 ob. per art.	P. Cairo Zen. 4 59753
(260-258)	Fayyum?	πυρὸς	1.5 dr.	6 art. = 9 dr.	P. Cairo Zen. 4 59698, 5

Table 3.2.1 Wheat (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of wheat)*	*Original Price*	*Source Text*
(260-236)	Fayyum	πυρὸς	1.5 dr.	15 art. = 22 dr. 2 ob.	P. Petrie 3 47 a, 3
(about 256, Epeiph 10?)	Philadelphia? (Fayyum)	[πυρὸς]	1.3333 dr. bronze	1 dr. 2 ob. bronze per artaba	P. Iand. Zen. 1, 4
256, Mecheir 5	Aphroditopolis (Upper Egypt)	πυρὸς	2.8571 dr.	241 art. at .1428 chrysous/art.	P. Mich. Zen. 28, 11
255/4, Mecheir 18 - Hathyr 4	Philadelphia? (Fayyum)	Θηβ(αίου) πυ(ροῦ)	1.5 dr.	10 art. = 15 dr.	P. Cairo Zen. 4 59745, 33
255/4, Mecheir 18 - Hathyr 4	Philadelphia? (Fayyum)	Συρ(ίου) πυ(ροῦ)	1.5 dr.	10 art. = 15 dr.	P. Cairo Zen. 4 59745, 39-40, 52
255/4, Mecheir 18 - Hathyr 4	Philadelphia? (Fayyum)	Συρ(ίου) πυ(ροῦ)	1.3333 dr.	9 art. = 12 dr.	P. Cairo Zen. 4 59745, 56-57
255/4, Mecheir 18 - Hathyr 4	Philadelphia? (Fayyum)	Θηβ(αίου) πυ(ροῦ)	1.5 dr.	20 art. = 30 dr.	P. Cairo Zen. 4 59745, 68
254, Hathyr 30	Fayyum?	πυρὸς	1.5 dr.	20 art. = 30 dr.	P. Cairo Zen. 3 59499, 3-4
254, Choiak 28	Fayyum?	πυρὸς	1.5 dr.	20 art. = 30 dr.	P. Cairo Zen. 3 59499, 5
254, Tybi 25	Fayyum?	πυρὸς	1.3333 dr.	22.5 art. = 30 dr.; 51 art. = 68 dr.	P. Cairo Zen. 3 59499, 7, 9
254	Philadelphia? (Fayyum)	πυρὸς	1.1667 dr.	5 art. = 5 dr. 5 ob.	P. Lond. 7 1974 + PSI inv. 3038 Ro ined., 37-38
252	Philadelphia (Fayyum)	(πυρὸς?)	5.3333 dr.	1 art. = 5 dr. 2 ob.	P. Cairo Zen. 3 59320
252	Philadelphia (Fayyum)	(πυρὸς?)	5.2780 dr.	90.5 art. 5 chous = 477 dr. 4 ob.	P. Cairo Zen. 3 59320
252, Pharmouthi 2	Fayyum?	πυρὸς	1.0417 dr.	60 art. at 1.0417 dr./art.	P. Cairo Zen. 5 59825, 6
252/1	Fayyum?	πυρός	2 dr. bronze	wheat: 1.5 artabas = 3 dr. bronze	PSI 6 571, 16
250, Xandikos	Philadelphia? (Fayyum)	πυρὸς	1.3333 dr. bronze	1 art. = 1 dr. 2 ob. bronze	P. Col. Zen. 1 54, 1/16, 2/33
250	Fayyum?	πυρὸς	3 dr.	135.25 art. = 405 dr. 4.5 ob.	P. Lond. 7 1996, 41
250	Fayyum?	πυρὸς	2 dr.	4.0833 art. = 8 ob.	P. Lond. 7 1996, 71

Table 3.2.1 Wheat (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of wheat)*	*Original Price*	*Source Text*
(249)	Fayyum?	πυρὸς	.5714 dr.	7 art. = 4 dr.	P. Cairo Zen. 3 59325, 1/18, 1/24
(249)	Fayyum?	πυρὸς	.5833 dr.	2 art. = 1 dr. 1 ob.	P. Cairo Zen. 3 59325, 2/34
(249)	Fayyum?	πυρὸς	.5729 dr.	8 art. = 4 dr. 3.5 ob.	P. Cairo Zen. 3 59325, 2/38
(249)	Fayyum?	πυρὸς	.5555 dr.	1.5 art. = 5 ob.	P. Cairo Zen. 3 59325, 2/44
(249-247)	Fayyum?	πυρὸς	2.8571 dr. silver	7 art. = 20 dr. silver	P. Cairo Zen. 3 59326 + P. Lond. 7 2002 + P. Cairo Zen. 3 59326 bis, 28
(237/6?)	Dios Polis (Upper Egypt)?	*sw*	5.5 qite/art.	1 artaba of wheat, 5 1/2 qite, 1 1/4 (obols), the tr 1 1/4 qite	Dodson e.a. (ed.), A good scribe and an exceedingly wise man. Studies W. J. Tait p. 25-56, 1/10
234, Thoth 9	Oxyryncha (Fayyum)	πυρὸς	6 dr.	500 art. = 3000 dr.	P. Heid. Gr. 6 383, 8, 20
222/3, Gorpaios 21	Themistou Meris (Fayyum)	πυρὸς	4 dr. silver	each artaba = 4 silver dr.	P. Tebt. 3 815, fr. 3, 14-15
212 or 195, Pachons 6	Memphis (Lower Egypt)	πυροῦ λευκοῦ	170 dr.	[x artabas] sold at a rate of 170 dr.	P. Köln 5 217, 5-6
212 or 195, Pachons 6	Memphis (Lower Egypt)	πυροῦ λευκοῦ	180 dr.	frequently the same wheat sells in the agora at a rate of 180 dr.	P. Köln 5 217, 6
212 or 195, Pachons 7	Memphis (Lower Egypt)	πυροῦ λευκοῦ	170 dr.	[x artabas] of the same wheat sold at a rate of 170 dr.	P. Köln 5 217, 7
212 or 195, Pachons 7	Memphis (Lower Egypt)	πυροῦ λευκοῦ	180 dr.	frequently the same wheat sells at a rate of 180 dr.	P. Köln 5 217, 8
212 or 195, Pachons 8	Memphis (Lower Egypt)	πυροῦ λευκοῦ	170 dr.	52 artabas of the same wheat at a rate of 170 dr.	P. Köln 5 217, 8
212 or 195, Pachons 8	Memphis (Lower Egypt)	πυροῦ λευκοῦ	180 dr.	frequently the same sells at a rate of 180 dr.	P. Köln 5 217, 9
212 or 195, Pachons 9	Memphis (Lower Egypt)	πυροῦ λευκοῦ	170 dr.	[x artabas of the same] at a rate of 170 dr.	P. Köln 5 217, 10
212 or 195, Pachons 9	Memphis (Lower Egypt)	πυροῦ λευκοῦ	180 dr.	frequently the same sells for [1]80 dr.	P. Köln 5 217, 10
212 or 195, Pachons 10	Memphis (Lower Egypt)	πυροῦ λευκοῦ	170 dr.	6 artabas of the same wheat at a rate of 170 dr.	P. Köln 5 217, 11

Table 3.2.1 Wheat (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of wheat)*	*Original Price*	*Source Text*
212 or 195, Pachons 10	Memphis (Lower Egypt)	πυροῦ λευκοῦ	180 dr.	frequently [the same wheat sells for 180 dr.]	P. Köln 5 217, 11
(210-204?) or (193-187?)	Philadelphia (Fayyum)	πυρὸς	166.6 dr.	100 art.? = 1666 dr.	BGU 7 1532, 11
(210-204?) or (193-187?)	Philadelphia (Fayyum)	πυρὸς	155 dr.	308 art. = 7 talents, 3740 dr.	BGU 7 1532, 12
(210-204?) or (193-187?)	Philadelphia (Fayyum)	πυρὸς	180 dr.	259 art. = 15 talents, 2740 dr.	BGU 7 1532, 13
(210-204?) or (193-187?)	Philadelphia (Fayyum)	(πυρὸς?)	160 dr.	35 art. at 160 dr. per art.	BGU 7 1536
(210-183)	Thebes (Upper Egypt)	(πυρὸς?)	180 dr.	47.5 art. = 427.5 deben	O. Leiden Dem. 100
206 or 189, Tybi	Philadelphia (Fayyum)	πυρὸς	87.7063 dr. bronze	117.5 art. = 1 talent, 4305 dr., 3 ob.	BGU 7 1505, 3
(about 205)	Elephantine (Upper Egypt)	*sw*	4.5 qite/art.	But do not let an end come to some little grain while its price is 4.5 qite per artaba of wheat here.	Depauw, The Demotic letter p. 348-350 vo., 6-7
(200?) or (176?)	Herakleopolites (Upper Egypt)	πυρὸς	100 dr.	517 art. at 100 dr./art.	BGU 20 2840, 16
(early 2nd c.)	Hermopolites (Upper Egypt)	σῖτος	2 dr. bronze per art.	10,000 art. wheat at a rate per artaba of 2 dr. of bronze = 10 talents, 1615 dr. (but this math doesn't seem to work out!)	SB 18 13619, 14-15
190/89	Herakleopolis (Upper Egypt)	πυρός	300 dr./art.	10,800 bronze drachmas as penalty price for 36 artabas of wheat	P. Heid 8 417, 21-22
186, Xandikos 2	Herakleopolis (Upper Egypt)	πυρός	300 dr./art.	loan agreement with a value of 100 artabas of wheat, i.e., 30,000 drachmas	P. Heid. 8 412, 13-14

Table 3.2.2. Wheat in Penalty Clauses

Date	*Location*	*Commodity*	*Unit Price (per artaba of wheat)*	*Source Text*
305, Tybi	Hermopolis (Upper Egypt)	*sw*	4 dr.*	P. Loeb 3, 16-19
286/5 or 266/5 or 228/7	Takona? (Upper Egypt)	πυρὸς	4 dr.	BGU 6 1267, 12-13
285/4, Dios	Peroe (Upper Egypt)	πυρὸς	4 dr.	P. Hibeh 1 84a, 8-9
(about 265), Hathyr 4	Egypt	(πυρὸς)	4 dr.	P. Hibeh 1 65
259, Choiak	Oxyrynchites (Upper Egypt)	(πυρὸς)	4 dr.	BGU 6 1226
258, Thoth	Oxyrynchites (Upper Egypt)	(πυρὸς)	4 dr.	BGU 6 1228
222, Choiak 13	Hiera Nesos (Fayyum)	πυρὸς	4 dr.	P. Enteux. 55, 16-17
222, Gorpaios	Tholthis (Upper Egypt)	πυρὸς	5 dr.	P. Hibeh 1 90, 15
216/5	Oxyrynchites (Upper Egypt)	πυρὸς	10 dr.	BGU 6 1262, 12
215/4, Audnaios	Tholthis (Upper Egypt)	πυρὸς	[10] dr.	BGU 10 1943, 12, 14
215/4	Tholthis (Upper Egypt)	[πυ]ρὸς	10 dr.	BGU 10 1959
215/4, Xandikos	Tholthis (Upper Egypt)	πυρὸς	10 dr.	BGU 10 1969, 8
215/4	Tholthis (Upper Egypt)	πυρὸς	[10 dr.]	BGU 14 2383, 12
215/4	Tholthis (Upper Egypt)	πυρὸς	10 dr.	BGU 14 2384, 10-11
215/4, Peritos	Tholthis (Upper Egypt)	πυρὸς	10 dr.	BGU 6 1263
215/4, Peritos	Tholthis (Upper Egypt)	πυρὸς	10 dr.	BGU 6 1264, 22-23
215/4, Peritos	Tholthis (Upper Egypt)	πυρὸς	10 dr.	P. Frankf. 2, 26
214/3	Tholthis? (Upper Egypt)	πυρὸς	10 dr.	BGU 10 1944, 12

Table 3.2.2. Wheat in Penalty Clauses (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of wheat)*	*Source Text*
214/3, Hyperberetaios	Tholthis (Upper Egypt)	πυρὸς	12 dr. bronze	BGU 14 2397, 10-11, 29
214/3	Tholthis (Upper Egypt)	πυρὸς	10 dr.	BGU 6 1265, 20
213, Panemos	Tholthis (Upper Egypt)	πυρὸς	10 dr.	P. Frankf. 1, 23-24, 75-76
213/2, Gorpaios	Tholthis (Upper Egypt)	πυρὸς	10 dr. bronze	BGU 10 1946, 12

* P. Loeb 3 records 1 deben for 5 artabas.

Table 3.2.3. Kakis

Date	*Location*	*Commodity*	*Unit Price (per artaba of kakis)*	*Original Price*	*Source Text*
(208-206?)	Memphis? (Lower Egypt)	κάκις*	7.5 dr.	2 art. = 15 dr.	UPZ 1 149, 24

* Maresch interprets this price as a reference to wheat, referencing Egyptian kᶜkᶜ. Maresch, Bronze und Silber, 181 & n. 4. See also LSJ 860b.

Table 3.2.4. Wheat Flour

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(299-200)	Egypt	σεμίδαλις		10 dr.	BGU 6 1495, 40

Table 3.2.5. Wheat Meal

Date	*Location*	*Commodity*	*Unit Price (per artaba of wheat flour)*	*Original Price*	*Source Text*
(259?)	Palestine?	ἄλευρον	4 dr.	5.5 art. = (22 dr.)	P. Cairo Zen. 1 59004 vo., 2/76

Table 3.2.6. Barley

Date	*Location*	*Commodity*	*Unit Price (per artaba of barley)*	*Original Price*	*Source Text*
(4th cent.)	Herakleopolites (Upper Egypt)	*ỉt*	.5833 dr.	800 (art.?) = 23.3333 deben	Enchoria 14 (1986), p. 21-22, 1/12
(Ptolemaic)	Thebes (Upper Egypt)	*ỉt*	10 dr.	8 art. = 2 deben	O. Leiden Dem. 156, 4
(3rd. cent.)	Fayyum	κριθή		barley (for the donkey???) = 4 ob.	P. Petrie 3 135, 7
(3rd. cent.)	Fayyum	κριθή		barley = .75 ob.	P. Petrie 3 139a, 2/3
(271-246?)	Herakleopolites (Upper Egypt)	κριθή	1.5833 dr.	88 art. = 139 dr. 2 ob.	P. Hibeh 1 110 ro., 15-16
(263-229)	Philadelphia? (Fayyum)	κριθή	4 dr. silver	15 art. barley at a rate of 4 drachmas silver = partial payment of 150 dr.	P. Cairo Zen. 4 59787, 29
(263-229)	Pelousion	κριθή		barley in Pelousion for the horses: 1 dr. 3.5 ob.	PSI 5 543, 1/5
(263-229)	Herakleopolis	κριθή	4 ob./art.	(in Herakleopolis), barley: 1.5 art. at 4 ob./art. = 1 dr.	PSI 5 543, 1/7
(263-229)	Kalamine	κριθή	5 ob./art.	in Kalamine for breakfast, an artaba of barley = 5 ob.	PSI 5 543, 1/9
(263-229)	Phakoussai	κριθή	3 ob./(art.)	in Phakoussai for dinner, (1 art.) of barley = 3 ob.	PSI 5 543, 1/10-11
(263-229)	The Isieioi	κριθή	1 dr./art.	in the Isieioi for breakfast, barley: 1 art. = 1 dr.	PSI 5 543, 1/13-14
(263-229)	Herakleopolis	κριθή	2 ob./art.	in Herakleopolis, barley: 1.5 art. = 3 ob.	PSI 5 543, 1/23
(263-229)	Isios	κριθή	5 ob./art.	in Isios, 1 aft. of barley = 5 ob.	PSI 5 543, 1/34
(263-229)	Naukratis	κριθή	2 ob./art.	in Naukratis, barley: 1.5 art. = 3 ob. for dinner	PSI 5 543, 2/35-36
(263-229)	Hermopolis	κριθή	2 ob./art.	in Hermopolis, barley: 1.5 art. = 3 ob. for breakfast	PSI 5 543, 2/41
(263-229)	Thegkours	κριθή	2 ob./art.	in Thegkours for dinner, barley: 1.5 art. = 3 ob.	PSI 5 543, 2/42

Table 3.2.6. Barley (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of barley)*	*Original Price*	*Source Text*
(263-229)	Thebachuth	κριθή	2 dr./art.	in Thebachuth, barley: 1.5 art. at 2 dr./art. = 3 dr.	PSI 5 543, 2/45
261, Epeiph 21	Oxyrynchites (Upper Egypt)	κριθή	<1 dr.	(1 art.) <1 dr. (hypothetical)	P. Hibeh 1 40, 6-8
(259)	Palestine? or Alexandria?	κριθή	2.8333 dr.	10 art. = 28 dr. 2 ob.	P. Cairo Zen. 1 59010, 2/21
257, Mecheir 8	Memphis? (Lower Egypt)	κριθή	1.2 dr.	3.3333 art. = 4 dr.	P. Lond. 7 1937, 4
252, Pharmouthi 2	Fayyum?	κριθή	.2 dr. silver	500 art. = 100 dr. silver = 108 dr. 2 ob. bronze	P. Cairo Zen. 5 59825, 10
251	Philadelphia (Fayyum)	κριθή	.6 art. wheat	576.6667 art. barley = 345 art. wheat	P. Lond. 7 1994, 80
251	Philadelphia (Fayyum)	κριθή	2.1667 art. wheat	159 art. barley = 344.5 art. wheat	P. Lond. 7 1994, 156
251	Philadelphia (Fayyum)	κριθή	2.1183 art. wheat	574.5 art. barley = 1217 art. wheat	P. Lond. 7 1994, 156
251	Philadelphia (Fayyum)	κριθή	.4718 art. wheat	2028.25 art. barley = 957 art. wheat	P. Lond. 7 1994, 156
251	Philadelphia (Fayyum)	κριθή	.6 art. wheat	421.6667 art. barley = 253 art. wheat	P. Lond. 7 1994, 191
251	Philadelphia (Fayyum)	κριθή	.5999 art. wheat	9628.5 art. barley = 5777 art. wheat	P. Lond. 7 1994, 199-200
251	Philadelphia (Fayyum)	κριθή	.6001 art. wheat	1899 art. barley = 1139.5 art. wheat	P. Lond. 7 1994, 213
251	Philadelphia (Fayyum)	κριθή	2.2256 art. wheat	3690.6667 art. barley = 8214 art. wheat	P. Lond. 7 1995, 60
251	Philadelphia (Fayyum)	κριθή	.8223 art. wheat	8650.6667 art. barley = 7119 art. wheat	P. Lond. 7 1995, 326
(250)	Fayyum?	[κριθή?]	.6667 dr.?	1329 art. = 886? dr.	P. Lond. 7 1996, 37
(250-211), Pharmouthi through Epeiph	Fayyum	κριθή		for the barley in Eleusis, which he owed(?) you, in the house of Korion: 11 dr.	P. Köln Gr. 8 346, 2/32-34

Table 3.2.6. Barley (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of barley)*	*Original Price*	*Source Text*
(late 3rd - early 2nd c.)	Fayyum	κριθή		barley = 170 dr.	SB 22 15238, 2/15-16
(249-246)	Fayyum?	κριθή	1.1111 dr.	9 art. = 10 dr. silver	P. Cairo Zen. 3 59326 + P. Lond. 7 2002 + P. Cairo Zen. 3 59326 bis, 103-107
(249)	Fayyum?	κριθή	.2083 dr.	2 art. = 2.5 ob.	P. Cairo Zen. 3 59325, 1/25
(249)	Fayyum?	κριθή	.2049 dr.	5.0833 art. = 1 dr. .25 ob.	P. Cairo Zen. 3 59325, 3/74
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	20 art. barley = 12 art. wheat	P. Agri. Dem. 1, 4/8
216, Thoth	Tebtunis (Fayyum)	*ỉt*	1.8 art. wheat	3.3333 art. barley = 6 art. wheat	P. Agri. Dem. 1, 4/13
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	8.3333 art. barley = 5 art. wheat	P. Agri. Dem. 1, 4/13
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.3 art. wheat	3.3333 art. barley = 1 art. wheat	P. Agri. Dem. 1, 4/14
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	13.3333 art. barley = 8 art. wheat	P. Agri. Dem. 1, 4/24
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	3.3333 art. barley = 2 art. wheat	P. Agri. Dem. 1, 5/17
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	10 art. barley = 6 art. wheat	P. Agri. Dem. 1, 6/4
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	15 art. barley = 9 art. wheat	P. Agri. Dem. 1, 6/11
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	18.6667 art. barley = 11.208333 art. wheat	P. Agri. Dem. 1, 6/17
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	8 art. barley = 4.833333 art. wheat	P. Agri. Dem. 1, 6/21
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	15 art. barley = 9 art. wheat	P. Agri. Dem. 1, 7/m9
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	6.6667 art. barley = 4 art. wheat	P. Agri. Dem. 1, 7/20
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	5 art. barley = 3 art. wheat	P. Agri. Dem. 1, Fr. 1/3
216, Thoth	Tebtunis (Fayyum)	*ỉt*	.6 art. wheat	5 art. barley = 3 art. wheat	P. Agri. Dem. 1, Fr. 1/4

Table 3.2.6. Barley (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of barley)*	*Original Price*	*Source Text*
216, Thoth	Tebtunis (Fayyum)	*ἰτ*	.6 art. wheat	34 art. barley = 20.4167 art. wheat	P. Agri. Dem. 2, 7/4
216, Thoth	Tebtunis (Fayyum)	*ἰτ*	.6 art. wheat	9.1667 art. barley = 5.5 art. wheat	P. Agri. Dem. 2, 7/5

Table 3.2.7. Barley Groats

Date	*Location*	*Commodity*	*Unit Price (per artaba of barley-groats)*	*Original Price*	*Source Text*
(260-258)	Fayyum?	ἄλφιτον	3 dr.	4 art. = 12 dr.	P. Cairo Zen. 4 59698, 12-13
(about 259)	Palestine? or Alexandria?	ἄλφιτον		30 dr.	P. Cairo Zen. 1 59010, 2/30
257, Artemisios	Fayyum?	ἄλφιτον		8 dr. silver	P. Cairo Zen. 1 59091, 4
(about 200)	Fayyum?	ἄλφιτον		5 (dr.)	P. Tebt. 3 885, 61

Table 3.2.8. Peeled Barley

Date	*Location*	*Commodity*	*Unit Price (per artaba)*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	πτισάνη		peeled barley = .5 ob.	P. Petrie 3 140d, 3, 5, 6

Table 3.2.9. Barley Wheat

Date	*Location*	*Commodity*	*Unit Price (per artaba of barley-wheat)*	*Original Price*	*Source Text*
251	Philadelphia (Fayyum)	κριθόπυρον	.5985 art. wheat	137 art. barley-wheat = 82 art. wheat	P. Lond. 7 1994, 130
251	Philadelphia (Fayyum)	κριθόπυρον	.5985 art. wheat	137 art. barley-wheat = 82 art. wheat	P. Lond. 7 1994, 170
251	Philadelphia (Fayyum)	κριθόπυρον	.6 art. wheat	20 art. barley-wheat = 12 art. wheat	P. Lond. 7 1994, 170

Table 3.2.9. Barley Wheat (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of barley-wheat)*	*Original Price*	*Source Text*
251	Philadelphia (Fayyum)	κριθόπυρον	.5999 art. wheat	4183.5 art. barley-wheat = 2510 art. wheat	P. Lond. 7 1994, 338-339
251	Philadelphia (Fayyum)	κριθόπυρον	.5294 art. wheat	8.5 art. barley-wheat = 4.5 art. wheat	P. Lond. 7 1994, 81
251	Philadelphia (Fayyum)	κριθόπυρον	.6 art. wheat	2897.6667 art. barley-wheat = 1738 art. wheat	P. Lond. 7 1995, 327
251	Philadelphia (Fayyum)	κριθόπυρον	.6 art. wheat	306.5 art. barley-wheat = 183.6667 art. wheat	P. Lond. 7 1995, 63

Table 3.2.10. Emmer

Date	*Location*	*Commodity*	*Unit Price (per artaba of emmer)*	*Original Price*	*Source Text*
257, Mecheir 4	Memphis? (Lower Egypt)	ὄλυρα	.8 dr.	5 art. = 4 dr.	P. Lond. 7 1937, 4
257, Mecheir 8	Memphis? (Lower Egypt)	ὄλυρα?	.8333 dr.	1 art. olyra = 5 ob.	P. Lond. 7 1937, 5-6
251	Philadelphia (Fayyum)	ὄλυρα	.4 art. wheat	1098 art. olyra = 439 art. wheat	P. Lond. 7 1994, 117
251	Philadelphia (Fayyum)	ὄλυρα	.4351 art. wheat	92.5 art. olyra = 40.25 art. wheat	P. Lond. 7 1994, 157
251	Philadelphia (Fayyum)	ὄλυρα	.1928 art. wheat	191.91666667 art. olyra = 37 art. wheat	P. Lond. 7 1994, 157
251	Philadelphia (Fayyum)	ὄλυρα	.4167 art. wheat	24 art. olyra = 10 wheat	P. Lond. 7 1994, 192
251	Philadelphia (Fayyum)	ὄλυρα	.3986 art. wheat	148 art. olyra = 59 art. wheat	P. Lond. 7 1994, 203
251	Philadelphia (Fayyum)	ὄλυρα	.4 art. wheat	172.25 art. olyra = 69 art. wheat	P. Lond. 7 1994, 85
251	Philadelphia (Fayyum)	ὄλυρα	.4422 art. wheat	480.5 art. olyra = 212.25 art. wheat	P. Lond. 7 1995, 331
251	Philadelphia (Fayyum)	ὄλυρα	3.6956 art. wheat	218.5 art. olyra = 807[.5] wheat	P. Lond. 7 1995, 61
249, Payni 6	Koites? or Oxyrynchites (Upper Egypt)	ὀλυρ(ῶν)	.4 dr.	10 art. = 4 dr.	P. Hibeh 1 102, 4
248, Hathyr 10	Oxyrynchites (Upper Egypt)	ὀλυρ(ῶν)	.32 dr.	25 art. = 8 dr.	P. Hibeh 2 264, 5

Table 3.2.10. Emmer (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of emmer)*	*Original Price*	*Source Text*
239, Tybi 19	Hawara (Fayyum)	*bt*	1 oipe emmer = .6667 oipe barley	I give you emmer: 36 by the (oipe of) 40 hin, making 24 barley (by the oipe of) 40 hin, [making em]mer, 36 by the oipe of) 40 hin again	P. Hawara 1, 3
235, Epagomenai 1	Hawara (Fayyum)	*bt*	1 oipe emmer = .6667 oipe barley	I give you emmer: 72 by the (oipe of) 40 hin, making 48 barley (by the oipe of) 40 hin, making emmer, 72 by the oipe of) 40 hin again	P. Hawara 2, 4
230, Mecheir	Akhmim (Upper Egypt)	*bt*	1 hin emmer = .6667 hin barley	emmer, 72 by the 40-hin measure = barley, 48 by the 40-hin meausre = emmer, 72 by the 40-hin measuer again	P. Eheverträge 17, 2
225, Mecheir	Thebes (Upper Egypt)	*bt*	1 hin emmer = .6667 hin barley	And I give you emmer, 36 by the 40-hin measure = barley, 24 by the 40-hin measure = emmer, 36 by teh 40-hin measure again	P. Eheverträge 19, 3
(late 3rd – early 2nd c.)	Tebtunis (Fayyum)	(ὄλυρα)	68 dr.	30 art. olyra = 2040 dr.; 25 art. olyra = 1700 dr	P. Tebt. 3 1079 descr., 56, 57
221, Tybi	Akhmim (Upper Egypt)	*bt*	1 hin emmer = .6667 hin barley	to total 10 deben = 50 staters = 10 deben again, emmer: 400 by teh 40-hin measure = barley, 266 2/3 = emmer [400 by teh 40-hin measure again]	P. Eheverträge 21, 3
210, Payni	Thebes (Upper Egypt)	*bt*	1 hin emmer = .6667 hin barley	I am giving you emmer, 36 with the (oipe) of 40 hin [=] barley, 24 with the (oipe) of 40 hin = emmer, 36 with the (oipe) of 40 hin [again]	P. Eheverträge 25 + P. Berl. Spieg. p. 7 no. 3075, 3
205/4	Fayyum?	*bt*	1 oipe emmer = .6667 oipe barley	I will give you emmer: [24] by the (oipe of) 40 hin = 16 barkley by the (oipe of) 40-hin = 24 emmer again	P. Köln Ägypt. 1 7, 3
201, Epeiph	Thebes (Upper Egypt)	*bt*	1 oipe emmer = .6667 oipe barley	and I will give you emmer, 36 by the 40-hin measure = 24 barley = 36 emmer by the 40-hin measure again	P. Eheverträge 27 + P. Berl. Spieg. p. 17-18 no. 3145, 2

Table 3.2.10. Emmer (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of emmer)*	*Original Price*	*Source Text*
199, Choiak	Philadelphia (Fayyum)	*bt*	1 oipe emmer = .6667 oipe barley	I will give you 72 emmer (by the oipe of) 40 (hin) = 48 barley (by the oipe of) 40 (hin) = 72 emmer (by the oipe of) 40 (hin) again	P. Eheverträge p. 148-150 no. 4 D + P. Eheverträge p. 150-152 no. 4 Z, 2
195/4	Fayyum	*bt*	1 oipe emmer = .6667 oipe barley	I will give you 72 emmer (with the oipe of) 40 hin = 48 barley (with the oipe of) 40 (hin) = 72 emmer (with the oipe of) 40 (hin) again	P. Eheverträge 31 + Acta Orientalia 23 (1958), p. 126 no. A, 3
(186 BCE)	Philadelphia (Fayyum)	*bt*	1 oipe emmer = .6667 oipe barley	and I will give you 48 emmer, (with the oipe of) 40 hin = 32 barley = 48 emmer (with the oipe of) 40 hin again	P. Eheverträge 30 + Acta Orientalia 23 (1958), p. 123-124 no. B, 4

Table 3.2.11 Emmer in Penalty Clauses

Date	*Location*	*Commodity*	*Unit Price (per artaba of emmer)*	*Source Text*
251	Philadelphia (Fayyum)	ὄλυρα	4 art. wheat	P. Lond. 7 1994, 117
(about 250)	Thothis? (Upper Egypt)	ὀλυρ(ῶν)	2 dr.	P. Hibeh 1 124 descr.
249, Payni 6	Koites? or Oxyrynchites (Upper Egypt)	ὀλυρ(ῶν)	2 dr.	P. Hibeh 1 102, 10
222, Gorpiaios	Tholthis (Upper Egypt)	[ὀ]λ̣υρῶν	4 dr.	P. Hibeh 1 90, 14-15
215/4	Tholthis (Upper Egypt)	ὄλυρ[α]	[4 dr.]	BGU 14 2393, [16]
215/4, Artemisios	Takona (Upper Egypt)	ὄλυρα	20 dr. silver	BGU 6 1266 + BGU 14 2386, 28
215/4, Xandikos	Tholthis (Upper Egypt)	ὄλυρα	4 dr. [silver]	BGU 6 1277, 12-13
215/4, Artemisios	Tholthis (Upper Egypt)	ὄλυρα	4 dr.	BGU 6 1278, 10-11, 28
214/3	Tholthis? (Upper Egypt)	[ὄλυρα]	4 dr.	BGU 10 1944, 13

Table 3.2.12 Generic Grain

Date	*Location*	*Commodity*	*Unit Price (per artaba of grain)*	*Original Price*	*Source Text*
(275-225)	Arsinoe epi tou zeugmatos (Upper Egypt)	σῖτος*	3 dr.	(penalty price? of) 3 dr. (per artaba?)	P. Sorb. 1 33, 15
(271-246)	Herakleopolites (Upper Egypt)	σῖτος	.3333 dr./sack	2 sacks (σάκκους) = 4 ob.	P. Hibeh 1 110 ro., 21
257	Memertha (Upper Egypt)	σῖτος?†	4 dr.	penalty price of 4 dr. per artaba	P. Sorb. 1 17, a.15
257	Memertha (Upper Egypt)	σῖτος?‡	4 dr.	penalty price of 4 dr. per artaba	P. Sorb. 1 17, b.16
248	Oxyrynchites (Upper Egypt)	σῖτος	2 dr.	penalty price of 2 dr. per artaba	P. Hibeh 1 86, 11-12
(199-175)	Hermopolites (Upper Egypt)	σῖτος	2 dr. bronze per art.	10,000 art. wheat at a rate per artaba of 2 dr. of bronze = 10 talents, 1615 dr.	SB 18 13619, 14-15

* Maresch and Cadell and Le Rider all list this price as a reference to wheat. Maresch p. 181. Cadell & Le Rider price 21.

† Maresch and Cadell and Le Rider all list this price as a reference to wheat. Maresch p. 184. Cadell & Le Rider price 11.

Table 3.2.13 Vetch

Date	*Location*	*Commodity*	*Unit Price (per artaba of vetch)*	*Original Price*	*Source Text*
251	Philadelphia (Fayyum)	ἄρακος	.6 art. wheat	190 art. arakos = 114 art. wheat	P. Lond. 7 1994, 116
251	Philadelphia (Fayyum)	ἄρακος	.6 art. wheat	190 art. arakos = 114 art. wheat	P. Lond. 7 1994, 169
244/3	Fayyum	ἄρακος	4 dr./art.	2 1/2 (artabas) at a rate of 4 dr. = 10 dr.	P. Lille Gr. 1 37, 6
244/3	Fayyum	ἄρακος	2.5 dr./art.	5 (artabas) at a rate of 2 dr. 3 ob. = 12 dr. 3 ob.	P. Lille Gr. 1 37, 6
240, Mecheir 29	Tholthis (Upper Egypt)	ἄρακος	6.6667 dr./art.	9 (artabas) at a rate of 6 dr. 4 ob. = 60 dr.	P. Strasb. Gr. 7 661, 9
240, Mecheir	Tholthis (Upper Egypt)	ἄρακος	6.5 dr./art.	16 (artabas) at a rate of 6 dr. 3 ob. = 104 dr. 1/2 ob.	P. Strasb. Gr. 7 661, 12
240, Mecheir	Tholthis (Upper Egypt)	ἄρακος	7.3333 dr./art.	3 (artabas) at a rate of 7 dr. 2 ob. = 22 dr. 1/2 ob.	P. Strasb. Gr. 7 661, 15

Appendix 3.3 Legumes and Nuts

Table 3.3.1 Lentils

Date	*Location*	*Commodity*	*Unit Price (per artaba of lentils)*	*Original Price*	*Source Text*
(263-229)	Fayyum?	φακός	26.6667 dr. bronze	3 art. lentils = 80 dr. bronze	PSI 6 620, 8-9

Table 3.3.2 Phaselos Beans

Date	*Location*	*Commodity*	*Unit Price (per artaba of phaselos)*	*Original Price*	*Source Text*
251	Philadelphia (Fayyum)	φάσηλος	.6667 art. wheat	.25 art. phaselos = .1667 art. wheat	P. Lond. 7 1994, 148
251	Philadelphia (Fayyum)	φάσηλος	.6667 art. wheat	.25 art. phaselos = .1667 art. wheat	P. Lond. 7 1994, 171

Table 3.3.3 Chickpeas

Date	*Location*	*Commodity*	*Unit Price (per artaba of chickpeas)*	*Original Price*	*Source Text*
(4th c.)	Memphis (Lower Egypt)	ἐ̣ρ̣ọβίνθων		chickpeas(?): 9 dr.	SB 14 11963, 2/4-5
(Ptolemaic)	Thebes (Upper Egypt)	*gfgf**	18 deben/*mḏ.t* = 216 deben/artaba	.5 *mḏ.t* = 9 deben	O. Leiden Dem. 204,1
255, Dios 12	Alexandria? (Lower Egypt)	ἐρέβινθος κριός	5 dr./art.	2 artabas = 10 dr.	P. Cairo Zen. 2 59192, 8
251	Philadelphia (Fayyum)	ἐρέβινθος	1.0425 art. wheat	155.75 art. chickpeas = 162.375 art. wheat	P. Lond. 7 1994, 118
231, Thoth 19 or 206, Thoth 19	Fayyum	ἐρέβινθος		chickpeas = 1.25 ob.	P. Petrie 3 136, 3/24
210, Phamenoth	Tebtunis (Fayyum)	ἐρέβινθος		chickpeas = 5 ob.	P. Tebt. 3 884 Fr. 1, 1/11
210, Phamenoth	Tebtunis (Fayyum)	[ἐρέβινθος] καθαρός		clean ones = 4.5 ob.	P. Tebt. 3 884 Fr. 1, 1/12

* The exact translation of *gfgf* is unknown but might be chickpeas. Cf. *gfg(?)*, CDD "G" 04:1 (May 25, 2004), p. 26.

Table 3.3.4 Nuts

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(263-229)	Fayyum?	κάρυον	32 (dr./art?)	2 art. at a rate of 32 (dr./art.?), making 134 (dr.?)	P. Cairo Zen. 4 59776, 4-5
(263-229)	Fayyum?	κάρυον		nuts = 2 ob.	P. Col. Zen. 2 94, 15
259, Artemisios	Fayyum?	σκληρός (hard nuts)	12 dr./art.	2 artabas = 24 dr.	P. Cairo Zen. 1 59012, 2/49-51
(mid-3rd c.)	Fayyum	καρύα		nuts: 2 ob.	SB 12 10863, 3
(mid-3rd c.)	Fayyum	καρύα		nuts: 1 chalkous	SB 12 10863, 18
231, Thoth 19 or 206, Thoth 19	Fayyum	κάρυον		nuts = 1 dr. 1 ob.	P. Petrie 3 136, 3/21
(about 200)	Arsinoites	κάρυον		10 (dr.)	P. Tebt. 3 885, 60

Appendix 3.4 Vegetables, Fruits, and Other Edible Plants

Table 3.4.1 Hay

Date	*Location*	*Commodity*	*Unit Price (per artaba of hay)*	*Original Price*	*Source Text*
(332-30)	Thebes (Upper Egypt)	*sm*		1.5 deben	O. Leiden Dem. 96, 2/5
(332-30)	Thebes (Upper Egypt)	*sm*		5 deben	O. Leiden Dem. 204, 5
(332-30)	Thebes (Upper Egypt)	*sm*		.5 deben	O. Leiden Dem. 209, x+11
(332-30)	Thebes (Upper Egypt)	*sm*		1 deben	O. Leiden Dem. 209, x+12
(332-30)	Thebes (Upper Egypt)	*sm*		3.5 deben	O. Leiden Dem. 211, 6

Table 3.4.2 Straw

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(Ptolemaic)	Thebes (Upper Egypt)	*tḥ*		5 qite	O. Leiden Dem. 211, 7
302, Thoth	Djeme, Thebes west (Upper Egypt)	*tḥ*	.005 deben/(bundle)	price for 20 (bundles of) straw for the mud: 1 qite	P. Phila. Dem. 30, 1/7

Table 3.4.3 Chaff

Date	*Location*	*Commodity*	*Unit Price (per artaba of chaff)*	*Original Price*	*Source Text*
(mid-3rd c.)	Tholthis? (Upper Egypt)	ἄχυρον	10 dr./art.	10 dr./artaba (in penalty clause)	P. Hamb. 4 239, 10-11
(286/5) or (266/5) or (228/7)	Takona? (Upper Egypt)	ἄχυρον	10 dr.	10 dr./artaba (in penalty clause)	BGU 6 1267, 12-13
(211-182)	Egypt	ἄχυρον	12.5 dr.	2 artabas = 25 drachmas	BGU 6 1290, 11

Table 3.4.4 Greens

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
252/1	Philadelphia? (Fayyum)	χλωρός		949 dr.	P. Cairo Zen. 2 59268, 1/3
(about 200)	Fayyum	χλοίη		1 (dr.)	P. Tebt. 3 885, 16
(about 200)	Fayyum	χλοῖον		2 (dr.)	P. Tebt. 3 885, 52

Table 3.4.5 Green Fodder (for Sheep)

Date	*Location*	*Commodity*	*Unit Price (per aroura of fodder land)*	*Original Price*	*Source Text*
(263-229)	Fayyum?	χλωρός	4 dr.		P. Cairo Zen. 4 59628, 4
(263-229)	Fayyum?	χλωρός	6 dr.		P. Cairo Zen. 4 59628, 5

Table 3.4.6 Fodder

Date	*Location*	*Commodity*	*Unit Price (per artaba of hay)*	*Original Price*	*Source Text*
(Ptolemaic)	Thebes (Upper Egypt)	*sm*		1.5 deben	O. Leiden Dem. 96, 2/5
(Ptolemaic)	Thebes (Upper Egypt)	*sm*		5 deben	O. Leiden Dem. 204, 5
(Ptolemaic)	Thebes (Upper Egypt)	*sm*		.5 deben	O. Leiden Dem. 209, x+11
(Ptolemaic)	Thebes (Upper Egypt)	*sm*		1 deben	O. Leiden Dem. 209, x+12
(Ptolemaic)	Thebes (Upper Egypt)	*sm*		3.5 deben	O. Leiden Dem. 211, 6
3rd. cent.	Fayyum	χόρτος		fodder = 1.5 ob.	P. Petrie 3 138, 1/4
3rd. cent.	Fayyum	χόρτος		fodder = 2 ob.	P. Petrie 3 138, 2/2
3rd. cent.	Fayyum	χόρτος		fodder = .5 ob.	P. Petrie 3 139a, 2/1
(263-256?)	Fayyum?	χόρτος		fodder: 61 dr. 1.5 ob.	PSI 6 551 vo., 16
(263-229)	Pelousion	χόρτος		fodder for the first day (of travel from Pelousion to Kanopus) = 5 ob.	PSI 5 543, 1/2

Table 3.4.6 Fodder (cont.)

Date	*Location*	*Commodity*	*Unit Price (per artaba of hay)*	*Original Price*	*Source Text*
(263-229)	Pelousion	χόρτος		fodder for the second day = 5 ob.	PSI 5 543, 1/3
(263-229)	Herakleopolis	χόρτος		in Herakleopolis, fodder: 4 ob.	PSI 5 543, 1/6
(263-229)	Phakoussai	χόρτος		(in Phakoussai), fodder = 2 ob.	PSI 5 543, 1/12
(263-229)	The Isieioi	χόρτος		(in the Isieioi) fodder = 2 ob.	PSI 5 543, 1/15
(263-229)	Bubastis	χόρτος καὶ κριθῶν		in Boubastis, fodder and barley: 1.5 art., a gift from Dionysodoros	PSI 5 543, 1/17-19
(263-229)	Pseptaos	κριθῶν … καὶ χόρτον		in Pseptaos with Diokles during the day, barley: 1.5 art. and fodder, for 3 days: a gift	PSI 5 543, 1/20-22
(263-229)	Herakleopolis (a different one?)	χόρτος		(in Herakleoplis), fodder: a gift	PSI 5 543, 1/24
(263-229)	Nathos	κρ(ιθῶν) … καὶ χόρτου		In Nathos, we passed for free, and from the komarch, for dinner, we had barley: 1 art. and fodder: 40 desmas = free.	PSI 5 543, 1/25-29
(263-229)	Nathos	χόρτος		(in Nathos), the (free) fodder was not enough, (so we bought more): 2 ob.	PSI 5 543, 1/29-30
(263-229)	village of Diokleous	χόρτος κριθαὶ		in the village of Diokleous, [5 ob.] for 2 days' fodder, barley = free	PSI 5 543, 1/31-33
(263-229)	Naukratis	χόρτος		from the komarch, fodder: 50 desmai = free	PSI 5 543, 2/37-38
(263-229)	Thegkours	χόρτος		(in Thegkours), fodder = 2 ob.	PSI 5 543, 2/43
(263-229)	Thebachuth	χόρτος		(in Thebachuth), fodder from the Herakleidos = free	PSI 5 543, 2/46-47
(263-229)	Hieranesos	χόρτος		in Hieranesos, fodder: 50 desmai from Stratonos = free	PSI 5 543, 2/48-49
221, Tybi 13	Memphis	χόρτος		5 dr. per aroura of grass	P. Enteux. 36, 2 & 4
(late 3rd - early 2nd c.)	Fayyum	χόρτος		Fodder = 15 dr.	SB 22 15238, 2/19

Table 3.4.7 Generic Vegetables or Herbs

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Upper Egypt	λάχανον	.0347 dr./vegetable	6 vegetables = 1.25 ob.	O. Strasb. 1 584, 5
3rd. cent.	Upper Egypt	λάχανον	.0298 dr./vegetables	7 vegetables = 1.25 ob.	O. Strasb. 1 603, 5
3rd. cent.	Fayyum	λάχανα		herbs = .5 ob.	P. Petrie 3 138, 1/9
3rd. cent.	Fayyum	λάχανα		herbs = .5 ob.	P. Petrie 3 139a, 2/2
3rd. cent.	Fayyum	λάχανα		herbs = .25 ob.	P. Petrie 3 140d, 2
3rd. cent.	Fayyum	λάχανα		herbs = 1 chalkous	P. Petrie 3 140d, 4
3rd. cent.	Fayyum	λάχανα		herbs = .25 ob.	P. Petrie 3 142, 25
(3rd c.)	Tebtunis (Fayyum)	λάχανα		herbs: .5 ob.	P. Tebt. 3 1078 descr. vo., 32
(263-229)	Fayyum?	λάχανον		vegetables = 1 chalkous	P. Col. Zen. 2 94, 11
243, Mesore 3	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, 4/28
243, Mesore 4	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, 5/34
243, Mesore 6	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, 8/57
243, Mesore 7	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, 11/70
243, Mesore 8	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, 11/75
243, Mesore 9	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, 13/84
243, Mesore 11	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, 15/103
243, Mesore 12	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, 17/115
243, Mesore 13	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, 18/121
243, Mesore 14	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, 19/133

Table 3.4.7 Generic Vegetables or Herbs (cont.)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
243, Mesore 15	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, 20/140
243, Mesore 16	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, 21/147
243, Mesore 18	Thebes (Upper Egypt)	λάχανα		vegetables = 1/4 ob.	UPZ 2 158 A, Vo 2/167
230 or 205, Thoth	Thebes (Upper Egypt)	λάχανα		3 ob.	O. Bodl. 1 307, 13
(before 210)	Ptolemais Hormou? (Fayyum)	λάχανα		herbs = 2 chalkoi	SB 4 7451, 7
(before 210)	Ptolemais Hormou? (Fayyum)	λάχανα		herbs = 2 chalkoi	SB 4 7451, 11
(early 2nd c.)	Tebtunis (Fayyum)	λάχανα		herbs: 1 dr.?)	P. Tebt. 3 1086 descr., 6

Table 3.4.8 Herbs, Oil, and Porridge

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(early 2nd c.)	Tebtunis (Fayyum)	λάχα(να(?)) ἔλ(αιον) ἀθά(ρη)		herbs, oil, and porridge: 1 (dr.?)	P. Tebt. 3 1086 descr., 11

Table 3.4.9 Lettuce

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	θρίδαξ		lettuce = 1 chalkous	P. Petrie 3 140d, 2
251	Philadelphia (Fayyum)	θρίδαξ	1 choinikes lettuce = 1 choinikes wheat	2 chokinkes lettuce = 2 choinikes wheat	P. Lond. 7 1994, 173

Table 3.4.10 Cabbage

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	κράμβη		cabbage = 4 ob.	P. Petrie 3 137, 1/8
3rd. cent.	Fayyum	ῥάφανος		cabbage = 1 chalkous	P. Petrie 3 137, 1/11
(3rd c.)	Tebtunis (Fayyum)	κράμβη		cabbage: .5 ob.	P. Tebt. 3 1078 descr. vo., 34
257, Choiak 1	Herakleopolis (Upper Egypt)	ῥάφανος		cabbages: .25 ob.	P. Sorb. 1 16, 7
243, Mesore 5	Thebes (Upper Egypt)	κράμβη		cabbage = .5 ob.	UPZ 2 158 A, 7/48
243, Mesore 11	Thebes (Upper Egypt)	κράμβη		cabbage = .5 ob.	UPZ 2 158 A, 14/98
(about 200)	Fayyum	κράμβη		5 (dr.)	P. Tebt. 3 885, 50

Table 3.4.11 Radishes

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	συρμός		radishes = 1 ob.	P. Petrie 3 138, 1/10
243, Mesore 11	Thebes (Upper Egypt)	συρμαία		Syrmaia radishes = 1/2 ob.	UPZ 2 158 A, 15/99

Table 3.4.12 Onions

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(Ptolemaic)	Thebes (Upper Egypt)	*ḥtt šn*		2.5 (value and volume units in lacunae)*	O. Leiden Dem. 213 vo., x+14
3rd. cent.	Fayyum	κρόμμυον		onions = .25 ob.	P. Petrie 3 140a, 6
252	Philadelphia (Fayyum)	κρόμμυον αὐτοφυῶν (wild onions)		90 dr.†	P. Cairo Zen. 2 59269, 5
(210-204?) or (193-187?)	Philadelphia (Fayyum)	κρόμμυον	1100 dr./art.	1 art. at a rate of 1100 dr./art.	BGU 7 1523, 3

* No quantity is specified.

† No quantity is specified.

Table 3.4.13 Leeks

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(252-243)	Philadelphia (Fayyum)	πράσον		28 dr. 4 ob.*	P. Cairo Zen. 2 59269, 27

* No quantity is specified.

Table 3.4.14 Garlic

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Egypt	σκόροδον		12 dr.	BGU 6 1495, 12
3rd. cent.	Egypt	σκόροδον		5 dr.	BGU 6 1495, 14
3rd. cent.	Fayyum	σκόροδον		garlic = 1 chalkous	P. Petrie 3 137, 1/12

Table 3.4.15 Fennel

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(Ptolemaic)	Thebes (Upper Egypt)	*šmr*		5 qite	O. Leiden Dem. 209, x+13

* No quantity is specified.

Table 3.4.16 Beets

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	σεῦτλον		beet = 1 chalkous	P. Petrie 3 137, 1/22
(about 200)	Fayyum	σεῦτλον	4 (dr./kotyla?)	4 (dr.?)	P. Tebt. 3 885, 39

Table 3.4.17 Peas

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(about 200)	Fayyum	πίσος		15 (dr.)	P. Tebt. 3 885, 54
(299-200)	Egypt	πίσος		8 dr.	BGU 6 1495, 4

Table 3.4.18 Olives

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(Ptolemaic)	Thebes (Upper Egypt)	*ḏyt*		1 deben 7.5 qite	O. Leiden Dem. 211, 5
302, Thoth	Djeme, Thebes west (Upper Egypt)	*ḏyt*	.1 deben	1 olive tree = 1 silver qite	P. Phila. Dem. 30, 3/34
(249-246)	Fayyum?	ἐλαία		100 dr. of silver	P. Cairo Zen. 3 59326 + P. Lond. 7 2002 + P. Cairo Zen. 3 59326 bis, 128
243, Mesore 3	Thebes (Upper Egypt)	ἐλαία		olives = 1/4 ob.	UPZ 2 158 A, 4/24

Table 3.4.19 Grapes for Eating

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(about 200)	Fayyum	τρώξιμος	3 (dr./kotyla?)	3 (dr.)	P. Tebt. 3 885, 15
(about 200)	Fayyum	τρώξιμος	3 (dr./kotyla?)	3 (dr.)	P. Tebt. 3 885, 38

Table 3.4.20 Mulberries

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
257, Daisios 21	Alexandria? (Lower Egypt)	συκάμινος		.5 ob.	P. Cairo Zen. 1 59083, 3

Table 3.4.21 Pomegranates

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
257, Daisios 21	Alexandria? (Lower Egypt)	ῥόα		.5 ob.	P. Cairo Zen. 1 59083, 4

Table 3.4.22 Pomegranate Seeds

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
259, Artemisios	Fayyum?	κόκκωνος	2 dr./art.	2 artabas = 4 drachmas	P. Cairo Zen. 1 59012, 2/50-51

Table 3.4.23 Figs

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(3rd-1st c.)	Thebes (Upper Egypt)	*qn(t)*		4 deben	O. Leiden Dem. 122 [1], 4
3rd. cent.	Fayyum	σῦκον		figs = 1 ob.	P. Petrie 3 140a, 7
3rd. cent.	Fayyum	σῦκον		figs = 1 dr.	P. Petrie 3 142, 18
(mid-3rd c.)	Fayyum	σῦκα		figs: 1.5 ob.	SB 12 10863, 8
(263-229)	Fayyum?	σῦκον		figs = 1 dr.	P. Col. Zen. 2 94, 14
(mid-3rd c.)	Egypt	σῦκα		figs = .5 ob.	SB 24 16067 Fragments g+i, 6
(early 2nd c.)	Tebtunis (Fayyum)	σῦκον		figs: 2 (dr.?)	P. Tebt. 3 1086 descr., 14

Table 3.4.24 Figs and Pomegranates (Undifferentiated)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(252-246)	Philadelphia (Fayyum)	[σ]ύκων καὶ ῥοῶν		20 dr. for one year	P. Cairo Zen. 2 59269, 9

Table 3.4.25 Dried Figs

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
259, Artemisios	Fayyum?	ἰσχάς	8 dr./ker.	9 keramia = 72 dr.	P. Cairo Zen. 1 59012, 1/21
231, Thoth 19 or 206, Thoth 19	Fayyum	ἰσχάς		figs = 1 ob.	P. Petrie 3 136, 3/22

Table 3.4.26 Dates

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Upper Egypt	βαλανεῖ		1 ob.	O. Strasb. 1 584, 6

Table 3.4.27 Date Palms

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(3rd c.)	Tebtunis (Fayyum)	φοῖνιξ		date palms: an obol	P. Tebt. 3 1078 descr. vo., 28
(late 3rd - early 2nd c.)	Fayyum	φοῖνιξ	200 dr.	For a date palm = 200 dr.	SB 22 15238, 2/18

Appendix 3.5 Spices and Aromatics

Table 3.5.1 Cinnamon

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(270-258?)	Fayyum	κιννάμωμον		cinnamon = 3 ob.	SB 8 9860a, 21

Table 3.5.2 Coriander

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(Ptolemaic)	Thebes (Upper Egypt)	*pr.t šw*		2.5 qite	O. Leiden Dem. 209, x+14

Table 3.5.3 Cumin

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(332-30)	Thebes (Upper Egypt)	*tpn*		5 qite	O. Leiden Dem. 209, x+13

Table 3.5.4 Fenugreek

Date	*Location*	*Commodity*	*Unit Price (per artaba of fenugreek)*	*Original Price*	*Source Text*
251	Philadelphia (Fayyum)	τῆλις	.5976 art. wheat	20.5 art. fenugreek = 12.25 art. wheat	P. Lond. 7 1995, 64

Table 3.5.5 Mustard

Date	*Location*	*Commodity*	*Unit Price (per hin of mustard)*	*Original Price*	*Source Text*
(Ptolemaic)	Thebes (Upper Egypt)	*ḫltn*	2 deben	1 hin = 2 deben	O. Leiden Dem. 204, 3

Table 3.5.6 Oregano

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(270-258?)	Fayyum	ὀρίγανον		oregano = 2 dr.	SB 8 9860a, 18-19

Table 3.5.7 Saffron

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(270-258?)	Fayyum	κρόκος		saffron = 3 ob.	SB 8 9860a, 20

Table 3.5.8 Generic Seasoning

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
257, Daisios 21	Alexandria? (Lower Egypt)	ἀρ]τύματα χλωρὰ		.5 ob.	P. Cairo Zen. 1 59083, 3
243, Mesore 2	Thebes (Upper Egypt)	ἄρτυμα		seasonings = 1/4 ob.	UPZ 2 158 A, 3/21
243, Mesore 3	Thebes (Upper Egypt)	ἄρτυμα		seasonings = 1/4 ob.	UPZ 2 158 A, 4/27

Table 3.5.9 Salt

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	ἅλς		salt = .25 ob.	P. Petrie 3 140a, 2
(mid-3rd c.)	Egypt	ἅλς		salt = .75 ob.	SB 24 16067 Fragments g+i, 6
257, Daisios 21	Alexandria? (Lower Egypt)	ἅλς		.25 ob.	P. Cairo Zen. 1 59083, 4
243, Mesore 1	Thebes (Upper Egypt)	ἅλς		salt = 1/4 ob.	UPZ 2 158 A, 3/16
243, Mesore 10	Thebes (Upper Egypt)	ἅλς		salt = 1/4 ob.	UPZ 2 158 A, 14/92

Table 3.5.10 Natron

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
213, Pachons 14	Fayyum	νιτρική		natron: 1 talent, 1458 dr 22 2 ob.; the fourth: 1194 4	P. Köln Gr. 6 269, 6-8

Table 3.5.11 Frankincense

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
243, Mesore 5	Thebes (Upper Egypt)	λιβανωτός		frankincense = 1/2 ob.	UPZ 2 158 A, 7/49
(late 3rd c. BCE)	Elephantine (Upper Egypt)	μάνν[ας]		frankincense powder, 2 dr.	Greek medical papyri (GMP) 2 11, 5

Table 3.5.12 Myrrh

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
305, Tybi	Hermopolis (Upper Egypt)	*ḥrꜣ*		price of myrrh: 1 deben 4 qite	P. Loeb 18, 7-8
224, Epeiph 26	Ghoran? Or Magdola? (Fayyum)	μύρα	10 dr.	myrrh = 10 drachmas	P. Coll. Youtie 1 7, 13
(late 3rd c.)	Fayyum	μύρον		2000 dr. as the price of myrrh	SB 18 14042, 6-7

Appendix 3.6 Seeds and Seed Oils

Table 3.6.1 Generic Oil: Greek ἔλαιον

Date	*Location*	*Commodity*	*Unit Price (per metretes of oil)**	*Original Price*	*Source Text*
3rd. cent.	Fayyum	ἔλαιον		oil = 4 ob.	P. Petrie 3 137, 1/4
3rd. cent.	Fayyum	ἔλαιον		oil = 4 ob.	P. Petrie 3 137, 1/9
3rd. cent.	Fayyum	ἔλαιον		oil = .5 ob.	P. Petrie 3 137, 1/14
3rd. cent.	Fayyum	ἔλαιον		oil = 4 ob.	P. Petrie 3 137, 1/16
3rd. cent.	Fayyum	ἔλαιον		4 ob.	P. Petrie 3 137, 1/21
3rd. cent.	Fayyum	ἔλαιον		oil = .5 ob.	P. Petrie 3 137, 2/4
3rd. cent.	Fayyum	ἔλαιον		oil = 4 ob.	P. Petrie 3 137, 2/10
3rd. cent.	Fayyum	ἔλαιον		oil = 4 ob.	P. Petrie 3 137, 2/16
3rd. cent.	Fayyum	ἔλαιον		oil = .25 ob.	P. Petrie 3 140a, 2
3rd. cent.	Fayyum	ἔλαιον		oil = .25 ob. 1 chalkous	P. Petrie 3 142, 6
(3rd c.)	Tebtunis (Fayyum)	ἔλαιον		oil: an obol	P. Tebt. 3 1078 descr. vo., 23
(3rd c.)	Tebtunis (Fayyum)	ἔλαιον		oil: 2 ob.	P. Tebt. 3 1078 descr. vo., 31
(263-229)	Memphis (Lower Egypt)	ἔλαιον	2.5 dr./chalmaian	price of a chalmaian of oil = 2 dr. 3 ob. (unit = χαλμαίας)	PSI 5 531, 7
(late 3rd - early 2nd c.)	Fayyum	ἔλαιον		Oil = 145 dr.	SB 22 15238, 2/21
230 or 205	Dios Polis (Thebes east)	ἔλαιον		3 ob.	O. Bodl. 1 307, 11
(before 210)	Ptolemais Hormou? (Fayyum)	ἔλαιον		oil = 1.5 ob.	SB 4 7451, 104
(before 210)	Ptolemais Hormou? (Fayyum)	ἔλαιον		oil = 1 ob.	SB 4 7451, 124

* Based on a metretes of 12 chous, as per P. Rev. 4-36, 40/12. 1 chous = 12 kotylai. D. Brent Sandy, *The Production and Use of Vegetable Oils in Ptolemaic Egypt*, BASP Supplement 6 (Atlanta: Scholars Press, 1989), 10. 1 chous had about the volume of 6 hin, based on the measurements in Chapter 5, p. 35.

Table 3.6.1 Generic Oil: Greek ἔλαιον (cont.)

Date	*Location*	*Commodity*	*Unit Price (per metretes of oil)**	*Original Price*	*Source Text*
(about 200)	Tebtunis (Fayyum)	ἔλαιον	5,760 dr.	40 (dr./kotyla)	P. Tebt. 3 885, 35
(about 200)	Tebtunis (Fayyum)	ἔλαιον	7,200 dr.	50 (dr./kotyla)	P. Tebt. 3 885, 59

Table 3.6.2 Generic Oil: Demotic *nḥḥ*

Date	*Location*	*Commodity*	*Unit Price (per metretes of sesame oil)**	*Original Price*	*Source Text*
(332-30)	Thebes	*nḥḥ […]*	16,200 dr.	4 hin oil = 45 deben (i.e., 11.25 deben/hin)	O. Leiden Dem. 177, 2/x+3 – x+4
(332-30)	Thebes	*nḥḥ mꜣᶜ*	21,600 dr. + 1 dr.	1.5 hin oil = 22.5 deben + .2 qite (i.e., 15 deben/hin + .5 qite)	O. Leiden Dem. 177, 2/x+5 – x+6
(332-30)	Thebes	*nḥḥ*	4,196.5715 dr.	35 hin oil = 102 deben (i.e., 2.914 deben/hin)	O. Leiden Dem. 96, 1/4
244, Epeiph 2	Polemonos Meris(?) (Fayyum)	*nḥḥ(?)*		oil(?) = 2 deben	Cahier de rech. de l'Inst. de pap. et égypt. de Lille (CRIPEL) 13 (1991), p. 40-41 & pl. 6-9, 25

* Based on a metretes of 12 chous, as per P. Rev. 4-36, 40/12. 1 chous = 12 kotylai. D. Brent Sandy, *The Production and Use of Vegetable Oils in Ptolemaic Egypt*, BASP Supplement 6 (Atlanta: Scholars Press, 1989), 10. 1 chous had about the volume of 6 hin, based on the measurements in Chapter 5, p. 35.

Table 3.6.3 Sesame Seeds

Date	*Location*	*Commodity*	*Unit Price (per artaba of sesame)*	*Original Price*	*Source Text*
259/8	Fayyum?	σήσαμον*	8 dr.	8 dr. per artaba of 30 choinikes	P. Rev. p. 4-36, 39/2-3, 53/16
251	Philadelphia (Fayyum)	σήσαμον	4 artabas wheat	286.875 artabas sesame = 1146.5 artabas wheat; 136.875 artabas sesame = 547.5 artabas wheat; 286.625 artabas sesame = 1146.6 artabas wheat; 1[3]6.875 artabas sesame = 547 artabas wheat; 30 artabas sesame = 120 artabas wheat; 6.5 artabas sesame = 26 artabas wheat; 1000 artabas sesame = 4000 artabas wheat	P. Lond. 7 1994, 137, 165, 190, 210, 344-345
251	Philadelphia (Fayyum)	σήσαμον	6 artabas wheat	7 artabas sesame = 42 artabas wheat	
251	Philadelphia (Fayyum)	σήσαμον	6 artabas wheat	111.0833 artabas sesame = 666.5 artabas wheat; 645.1667 artabas sesame = 3871 artabas wheat	
(about 250)	Philadelphia (Fayyum)	σήσαμον	6 dr.	229.3333 artabas sesame = 1376 drachmas	
237	Fayyum	σήσαμον	12 dr. bronze/art.	4.5 art. sesame at a rate of 12 dr. bronze. per artaba = 54 (dr. bronze)	
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	σήσαμον	6.8571 dr./art.	7/8 art. sesame worth 6 dr.	
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	σήσαμον	7 dr./art.	and of the 20 art. of Psenithos son of Pokas = 140 dr. They themselves, being present and being asked about this, did not agree.	
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	σήσαμον	8 dr./art.	and 7.75 (art. sesame were valued at) 8 (dr./art.) = 62 dr.; 15.5 art. (sesame) at 8 dr. = 124 dr.; he gave it to Phanesis, the grain-measurer, at 8 dr.(/art.) = 282 dr.; the 13.5 art. of the associations, the value was assessed at the rate of 8 dr./art.	

* Fixed price for sesame purchased form cultivators (per artaba of 30 choinikes). This sesame is clean for grinding, but if it has not been cleaned, the cultivator must pay an additional 7% in kind.

Table 3.6.4 Sesame Oil

Date	*Location*	*Commodity*	*Unit Price (per metretes of sesame oil)*	*Original Price*	*Source Text*
259/8	Fayyum?	σησάμινος	48 dr. bronze	48 dr. bronze per metretes, 2 obols per kotyla	P. Rev. p. 4-36, 40/12, 40/15
259/8	Fayyum?	σησάμινος	29.5 dr.	29 dr. 3 ob. (crossed out: 31 dr. 4 ob. 2 chalkoi)	P. Rev. p. 4-36, 53/14

* Based on a metretes of 12 chous, as per P. Rev. 4-36, 40/12. 1 chous = 12 kotylai. D. Brent Sandy, *The Production and Use of Vegetable Oils in Ptolemaic Egypt*, BASP Supplement 6 (Atlanta: Scholars Press, 1989), 10. 1 chous had about the volume of 6 hin, based on the measurements in Chapter 5, p. 35.

Table 3.6.5 Castor Seeds

Date	*Location*	*Commodity*	*Unit Price (per artaba of castor seeds)*	*Original Price*	*Source Text*
(263-229), Thoth	Philadelphia (Fayyum)	κροτών	1 dr.	100 artabas = 100 dr.	P. Cairo Zen. 4 59787, 53
259/8	Fayyum?	κροτών	4 dr.	1 artaba of 30 choinikes = 4 dr.	P. Rev. p. 4-36, 39/3-5, 53/17
256, Phaophi	Philadelphia (Fayyum)	*tgm**	3 dr.	1.5 qite per artaba	P. Zen. Dem. 1 + PSI 9 1001, 11
251	Philadelphia (Fayyum)	κροτών	2 art. wheat	11.5 artabas castor = 23 artabas wheat; 6.5 artabas castor = 13 artabas wheat; 2[5].1667 artabas castor = 50.3333 artabas wheat	P. Lond. 7 1994, 132, 202, 348-349
251	Philadelphia (Fayyum)	κροτών	2.0910 art. wheat	11 artabas castor = 23 artabas wheat	P. Lond. 7 1994, 163
251	Philadelphia (Fayyum)	κροτών	3 art. wheat	3 artabas castor = 9 artabas wheat	P. Lond. 7 1995, 67
251	Philadelphia (Fayyum)	κροτών	3 art. wheat	18 artabas castor = 54 artabas wheat	P. Lond. 7 1995, 330
223, Pauni	Fayyum	κροτών	4 dr./art.	4 dr./art.	Chrest. Wilck. 304, 12

* The price in this example seems perhaps more appropriate for castor seeds than oil. While tgm could be used for castor in either form, the pot-determinative used here could indicate the liquid form. Because of this ambiguity, I am listing this example under both castor seeds and castor oil.

Table 3.6.6 Castor Oil*

Date	*Location*	*Commodity*	*Unit Price (per metretes of castor oil)*	*Original Price*	*Source Text*
(Ptolemaic?)	Egypt	*tkm*	220 deben per artaba?	what he gave for 1 (artaba of *tkm*-oil?) out of silver (deben) 220	Enchoria 30 (2006-2007), p. 47 no. 1 , 7
3rd. cent.	Fayyum	κίκι		castor oil = .75 ob.	P. Petrie 3 139a, 2/6
(263-229)	Memphis (Lower Egypt)	κίκι	1.75 dr./chalmaian	and (price of a chalmaian) of castor oil = 1 dr. 4.5 ob. (unit = χαλμαίας)	PSI 5 531, 8
259/8	Fayyum?	κίκιον	19.3333 dr.	19 dr. 2 ob. per metretes	P. Rev. p. 4-36, 53/20
259/8	Fayyum?	κίκιον	20 dr.	20 drachmas per metretes (crossed out: 1 dr. 2 ob. [per kotyla?])	P. Rev. p. 4-36, 53/15
259/8	Fayyum?	κίκιον	30 dr.	30 drachmas per metretes, 2 obols per kotyla (corrected to 48 dr.)	P. Rev. p. 4-36, 40/13
259/8	Fayyum?	κίκιον	48 dr.	48 drachmas per metretes, 2 obols per kotyla	P. Rev. p. 4-36, 40/15, 40/16
257	Memphis? (found in Philadelphia)	κίκιον	48 dr.	4 dr. per chous	P. Col. Zen. 1 21, 4
257, Choiak 2	Herakleopolis (Upper Egypt)	κίκι		castor oil: 13 dr. of bronze	P. Sorb. 1 16, 12
256, Phaophi	Philadelphia (Fayyum)	*tgm*†	3 dr.‡	1.5 qite per artaba	P. Zen. Dem. 1 + PSI 9 1001, 11
(mid-3rd c.)	Egypt	κίκι		castor oil = .25 ob.	SB 24 16067 Fragments g+i, 9
243, Mesore 4	Thebes (Upper Egypt)	κίκι		castor oil = 1 ob.	UPZ 2 158 A, 5/36, 9/62, 12/78, 15/102, 18/124, 21/142
(about 200)	Tebtunis (Fayyum)	κίκιον	4,032 dr.	28 dr. per kotyla	P. Tebt. 3 885, 22
(about 200)	Tebtunis (Fayyum)	κίκιον	2,880 dr.	20 (dr. per kotyla)	P. Tebt. 3 885, 36
(about 200)	Tebtunis (Fayyum)	κίκιον		42 (dr.)	P. Tebt. 3 885, 58
(2nd cent.)	Tebtunis (Fayyum)	κίκιον	8,640 dr.	1 chous at a rate of 60 (dr. per kotyla), making 720 (dr.)	P. Tebt. 3 891, 14
(2nd cent.)	Tebtunis (Fayyum)	κίκιον	7,200 dr.	1 chous at a rate of 50 (dr. per kotyla), making 600 (dr.)	P. Tebt. 3 891, 15

** For comparison, cf. Maresch's list of kiki prices in Bronze und Silber, 190.*

† While *tgm* could be used for castor in either form, the pot-determinative used here could indicate the liquid form. Because of this ambiguity, I am listing this example under both castor seeds and castor oil.

‡ As was discussed in Chapter 5, 1 artaba could have a volume of 30 or 40 liters, and 1 metretes was about 34.8 liters. In this case, I am treating the artaba and metretes as metrically equivalent for the sake of simplicity, although that calculation might not be fully accurate. The price in this example seems perhaps more appropriate for castor seeds than oil.

Table 3.6.7 Safflower Seeds

Date	*Location*	*Commodity*	*Unit Price (per artaba of safflower seeds)*	*Original Price*	*Source Text*
259/258	Fayyum?	κνῆκος	1.3333 dr.	1 dr. 2 ob. per artaba of 30 choinikes	P. Rev. p. 4-36, 39/5-6
259/258	Fayyum?	κνῆκος	1.3333 dr.	1 dr. 2 ob. per artaba (crossed out: 3 ob.)	P. Rev. p. 4-36, 53/17
251	Philadelphia (Fayyum)	κνῆκος	.6667 artabas wheat	.25 artaba safflower = .1667 artaba wheat	P. Lond. 7 1994, 149
251	Philadelphia (Fayyum)	κνῆκος	.6667 artabas wheat	.25 artaba safflower = .1667 artaba wheat	P. Lond. 7 1994, 172
251	Philadelphia (Fayyum)	κνῆκος	.5625 artabas wheat + 6 choinikes	4 artabas safflower = 2.25 artabas wheat + 6 choinikes	P. Lond. 7 1994, 193
251	Philadelphia (Fayyum)	κνῆκος	.6154 artabas wheat	6.5 artabas safflower = 4 artabas wheat	P. Lond. 7 1994, 350-351

Table 3.6.8 Safflower Oil

Date	*Location*	*Commodity*	*Unit Price (per metretes of safflower oil)*	*Original Price*	*Source Text*
259/258	Fayyum?	κνήκινος	48 dr. bronze	48 dr. bronze per metretes of 12 choes	P. Rev. p. 4-36, 40/12
259/258	Fayyum?	κνήκινος	17.1667 dr.	17 dr. 1 ob. per metretes	P. Rev. p. 4-36, 53/15
(210-183)	Tebtunis (Fayyum)	κνήκινος	2,500 dr.	2,500 dr. per metretes	P. Tebt. 3 997 descr., 11
(210-183)	Tebtunis (Fayyum)	κνήκινος	2,160 dr.	2,160 dr. per metretes	P. Tebt. 3 997 descr., 8

Table 3.6.9 Colocynth

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
259/258	Fayyum?	κολοκύνθη	.6667 dr./art.	4 ob. per artaba	P. Rev. p. 4-36, 39/6
259/258	Fayyum?	κολοκύνθινος	30 dr./metretes	30 dr. per metretes, 2 ob. per kotyla	P. Rev. p. 4-36, 40/13
243, Mesore 1	Thebes (Upper Egypt)	κολόκυνθα		colocynth = 1/2 1/4 ob.	UPZ 2 158 A, 2/15
243, Mesore 3	Thebes (Upper Egypt)	κολόκυντα		colocynth = 4/26	UPZ 2 158 A, 4/26
243, Mesore 6	Thebes (Upper Egypt)	κολόκυντα		colocynth = 1/4 ob.	UPZ 2 158 A, 9/61
243, Mesore 7	Thebes (Upper Egypt)	κολόκυντα		colocynth = 1/4 ob.	UPZ 2 158 A, 11/71
243, Mesore 9	Thebes (Upper Egypt)	κολόκυντα		colocynth = 1/2 ob.	UPZ 2 158 A, 12/80

Table 3.6.10 Flax Seeds

Date	*Location*	*Commodity*	*Unit Price (per artaba of flaxseed)*	*Original Price*	*Source Text*
Ptolemaic	Medinet Habu (Upper Egypt)	*mḥy*		price of flax (seed?) = 11 deben	Graff. Med. Habu 280
259/8	Fayyum?	ἐκ τοῦ λίνου σπέρμα	.5 dr.	3 ob. per artaba	P. Rev. p. 4-36, 39/7
251	Philadelphia (Fayyum)	λίνον	.42 art. wheat	1035 art.flaxseed = 435 art. wheat	P. Lond. 7 1994, 119
251	Philadelphia (Fayyum)	λίνον	1 art. wheat	1000 art. flaxseed = 1000 art. wheat	P. Lond. 7 1994, 342-343
(210-204) or (193-187)	Egypt	λίνον	8 dr./δέσμη	80 δέσμη = (640 dr.)	BGU 7 1511, 9
(210-204) or (193-187)	Philadelphia (Fayyum)	λίνον σπέρματος	340 dr.	10.5 art. = (3570 dr.)	BGU 7 1523, 2
(199-100)	Tebtunis (Fayyum)	λίνον		400 (dr.?)	P. Tebt. 3 891, 7

Table 3.6.11 Lamp Oil

Date	*Location*	*Commodity*	*Unit Price (per metretes of lamp oil)*	*Original Price*	*Source Text*
259/258	Fayyum?	ἐπελλύχνιον	30 dr.	30 dr. per metretes, 2 ob. per kotyla	P. Rev. p. 4-36, 40/13

Table 3.6.12 White Oil

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
259, Artemisios	Fayyum?	ἐλαίον λευκόν	30 dr./hemikadion	1 hemikadion = 30 dr.	P. Cairo Zen. 1 59012, 1/12

Table 3.6.13 Poppy

Date	*Location*	*Commodity*	*Unit Price (per artaba of poppy)*	*Original Price*	*Source Text*
251	Philadelphia (Fayyum)	μήκων	2 art. wheat	.5 (art.) poppy = 1 (art.) wheat	P. Lond. 7 1994, 84
251	Philadelphia (Fayyum)	μήκων	2.0004 art. wheat	34 choinikes poppy = 68.1667 (choinikes) wheat	P. Lond. 7 1994, 133
251	Philadelphia (Fayyum)	μήκων	2 art. wheat	26.8333 (art.) poppy = 53.6667 (art.) wheat	P. Lond. 7 1994, 201
251	Philadelphia (Fayyum)	μήκων	2 art. wheat	30 (art.) poppy = 60 (art.) wheat	P. Lond. 7 1994, 212
251	Philadelphia (Fayyum)	μήκων	2 art. wheat	3350. 5417 (art.) poppy = 6701.0833 (art.) wheat	P. Lond. 7 1994, 346-347
251	Philadelphia (Fayyum)	μήκων	2 art. wheat	718.5 (art.) poppy = 1437 (art.) wheat	P. Lond. 7 1995, 325
251	Philadelphia (Fayyum)	μήκων	[3] art. wheat	[12.5] (art.) poppy = 37.5 (art.) wheat	P. Lond. 7 1995, 57

Table 3.6.14 Generic Seeds

Date	*Location*	*Commodity*	*Unit Price (per artaba of seeds)*	*Original Price*	*Source Text*
(about 265)	Egypt	σπέρμα[το]ς	2.1818 dr.	33 art. = 72 dr.	P. Hibeh 1 63, 16

Appendix 3.7 Wine, Vinegar, and Beer

Table 3.7.1 Wine Outside the Thebaid

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion, except where noted)*	*Original Price*	*Source Text*
(4th cent.)	Memphis (Lower Egypt)	οἶνος		wine: 5 dr.	SB 14 11963, 2/6
(4th cent.)	Memphis (Lower Egypt)	οἶνος		another wine: 6 dr.	SB 14 11963, 2/7
(4th cent.)	Memphis (Lower Egypt)	οἶνος		wine: 5 dr.	SB 14 11963, 2/8
(3rd cent.)	Fayyum	οἶνος		1 hemichous = 5 ob.	P. Petrie 3 135, 4
(3rd cent.)	Fayyum	οἶνος		wine = 2 dr. 2 ob.	P. Petrie 3 138, 1/5
(3rd cent.)	Fayyum	οἶνος		wine = 3 dr.	P. Petrie 3 138, 2/3
(3rd cent.)	Fayyum	οἶνος		wine, 1.5 choinix = 2 dr. .5 ob.	P. Petrie 3 140a, 7
(3rd cent.)	Fayyum	οἶνος		wine = 2 ob.	P. Petrie 3 142, 4
(3rd cent.)	Egypt	οἶνος		30 dr.	BGU 6 1495, 7
(3rd cent.)	Egypt	οἶνος	8 dr.	1 keramion = 8 dr.	P. Alex. 1, 6 p. 47
(about 270)	Egypt	οἶνος	8 dr.	7 keramia = 56 dr.	P. Hibeh 1 31, Fr. a, 6-8; Fr. b, 15-18
(263-229)	Fayyum?	οἶνος	6.5 dr.(?)	16 (keramia?) = 104 dr.	P. Cairo Zen. 4 59738, 3
(263-229)	Fayyum?	οἶνος	6 dr.(?)	30 (keramia?) = 180 dr.	P. Cairo Zen. 4 59738, 3
(263-229)	Fayyum?	(οἶνος)	4.3333 dr.	2 keramia = 8 dr. 4 ob.	P. Cairo Zen. 4 59739, 12
(263-229)	Fayyum?	οἶνος παλαιός (old wine)	11 dr. bronze	6 keramia = 66 dr. bronze	P. Cairo Zen. 5 59851, Fr. 2, 3
(263-229)	Fayyum?	οἴνου ἀνόσμου (wine without a bouquet)	8.4167 dr.	7 keramia = 58 dr. 3.75 ob.	P. Col. Zen. 2 108, 6
(263-229)	Fayyum?	οἶνος	9 or 12 dr.	1 chous = 1 dr. 3 ob.	P. Lond. 7 2140, 21
(263-229)	Fayyum?	οἶνος	5 and 6 dr.	at 5 and 6 dr./(keramion)	PSI 6 620, 20

Table 3.7.1 Wine Outside the Thebaid (cont.)

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion, except where noted)*	*Original Price*	*Source Text*
(263-229)	Philadelphia (Fayyum)	οἶνος	8 dr.	3 keramia = 24 dr.	SB 16 12811, 10
259, Artemisios	Fayyum?	Οἴνου Χῖ[α (Chian wine)	18 dr.	70 keramia = 1260 dr.; 61 keramia = 1098 dr.	P. Cairo Zen. 1 59012, 1/17, 1/22
259, Artemisios	Fayyum?	Οἴνου Χῖ[α (Chian wine)	9 dr./half-Chion	4 half-Chia = 36 dr.; 2 half-Chia = 18 dr.	P. Cairo Zen. 1 59012, 1/18, 1/ 23
259, Artemisios	Fayyum?	Θάσια (Thasian wine)	20 dr.	3 keramia = 60 dr.; 4 keramia = 80 dr.	P. Cairo Zen. 1 59012, 1/19, 1/24
259, Artemisios	Fayyum?	σηστός (filtered wine)*	12 dr.	1 keramion = 12 dr.	P. Cairo Zen. 1 59012, 1/9
259/8	Fayyum?	(οἶνος)	6 dr.	1 metretes of 8 chous = 6 dr.	P. Rev. p. 4-36, 31/13
(about 256-245)	Fayyum?	Οἶνος	7.2222 dr.	9 keramia = 65 dr.	P. Mich. Zen. 30, 1/5-7
(about 256-245)	Fayyum?	Οἶνος	3.9536 or 5.2715 dr.	75.5 choes = 49 dr. 4.5 ob.	P. Mich. Zen. 30, 3/11
255, Pachons (7-30)	Fayyum?	Οἶνος	12 or 16 dr.	3 kotylai = 3 ob.	P. Cairo Zen. 2 59176 + P. Lond. 7 2167, 110
(255-246)	Fayyum?	Οἶνος	8 dr.(?)	at 8 dr./(?)	P. Lond. 7 2053, 5
(255-246)	Fayyum?	Οἶνος	9 dr.(?)	at 9 dr./(?)	P. Lond. 7 2053, 6
254, Tybi 25	Fayyum?	Οἶνος	8 dr.	9.3333 keramia = 74.6667 dr.	P. Cairo Zen. 3 59499 Ro & Vo l. 85-102, 10
254	Philadelphia? (Fayyum)	οἶνος	7 dr.	2 keramia = 14 dr.	P. Lond. 7 1974 + PSI inv. 3038 Ro ined. (ined.), 37-38
(mid-3rd c.)	Fayyum	οἶνος		wine: 2 dr.	SB 12 10863, 6
(mid-3rd c.)	Egypt	οἶνος		wine = 2.5 ob.	SB 24 16067 Fragments g+I, 3
(mid-3rd c.)	Egypt	οἶνος		wine = 3.75 ob.	SB 24 16067 Fragments g+i, 7
250, Thoth through Tybi	Fayyum	οἶνος	3.5 dr./ker.	a keramion of wine = 3 dr. 3 ob.	PSI 4 368, 1/17
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	6.6 or 8.8 dr.†	12 hemikadia jars = 37 choes = 37 dr. 3 ob.; 10 hemikadia jars = 30 choes = 33 dr.	P. Cairo Zen. 3 59302, 11, 12

Table 3.7.1 Wine Outside the Thebaid (cont.)

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion, except where noted)*	*Original Price*	*Source Text*
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	6 or 8 dr.	5 hemikadia jars = 15 choes = 15 dr.	P. Cairo Zen. 3 59302, 13
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	5.7498 or 7.6664 dr.	4 hemikadia jars = 12 choes = 11.5 dr.	P. Cairo Zen. 3 59302, 14
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	6.4615 or 8.6153 dr.	19 hemikadia jars = 52 choes = 56 dr.	P. Cairo Zen. 3 59302, 15
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	6.1034 or 8.1378 dr.	8 hemikadia jars = 29 choes = 29.5 dr.	P. Cairo Zen. 3 59302, 16
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	2.7273 dr. or 3.6364 dr.	1 hemikadion jar = 5.5 choes = 2.5 dr.	P. Cairo Zen. 3 59302, 17
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	9.6 or 12.8 dr.	1 hemikadion jar = 2.5 choes = 4 dr.	P. Cairo Zen. 3 59302, 18
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	6.9882 or 9.3176 dr.	17 hemikadia jars = 42.5 choes = 49.5 dr.	P. Cairo Zen. 3 59302, 19
250, Pachons 28	Philadelphia? (Fayyum)	(οἶνος)	5.52 or 7.36 dr.	10 hemikadia jars = 25 chous = 23 dr.	P. Cairo Zen. 3 59302, 20
(late 3rd cent.)	Fayyum	(οἶνος)	300 dr.	1 keramion = 300 dr.	P. Harris 2 220, 14, 22, 23, 24, 26
(late 3rd cent.)	Fayyum	(οἶνος)	150 dr.(?)	2 keramia(?) = 300 dr.	P. Harris 2 220, 25
(late 3rd cent.)	Fayyum	(οἶνος)	315 dr.	1 keramion = 315 dr.	P. Harris 2 220, 27
(249-246)	Philadelphia (Fayyum)	οἶνος	5 dr. bronze	1 keramion = 5 dr. bronze	P. Cairo Zen. 3 59327, 44
(247-246)	Fayyum?	οἶνος	10 dr.	85 metretes = 850 dr.	P. Cairo Zen. 3 59341, 13-14
245, Thoth 17	Fayyum	οἶνος		if in need of wine, spend up to 200 dr.	PSI 4 386, 11-12
244, Thoth 13	Fayyum?	οἶνος	6 dr. bronze	at 6 dr. bronze/(?)	P. Cairo Zen. 3 59357, 26
(243-217)	Fayyum		10 dr.	600 metretes = 1 talent	P. Count 13, 3/69
242 or 241, Mecheir 15	Fayyum?	οἶνος	<.1667 dr or <.125 dr.	20 chous. < 1 dr.	P. L. Bat. 20 30, 7-8
241, Phaophi	Fayyum	οἶνος	10 dr./ker.	[wine]: 19 keramia, value [at a rate of] 10 dr. [br]onze/[ker.] - Note that technically "wine" is in the break	PSI 4 396, 11-12

Table 3.7.1 Wine Outside the Thebaid (cont.)

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion, except where noted)*	*Original Price*	*Source Text*
231 or 206, Hyperberetaios	Polemonos Meris (Fayyum)	οἶνος	.6667 dr. bronze or .5 dr. bronze	170 choes at a price per chous of 4 dr. bronze = 680 dr. bronze	CPR 18 5, 3-5
after? 232 or 206, Panemos	Theognis (Fayyum)	οἶνος	.6667 dr. bronze or .5 dr. bronze	750 choes at a price per chous of 4 dr. bronze = [3000] dr. bronze	CPR 18 30, 4-5
226, epagomenal day 5	Fayyum	οἶνος	15 dr./ker.	and 2 keramia of wine, which are worth 30 dr.	P. Sorb. 3 133, 7-8
(late 3rd - early 2nd c.)	Fayyum	οἶνος		Wine = 220 dr.	SB 22 15238, 2/23
(late 3rd - early 2nd c.)	Fayyum	οἶνος	1500 dr./keramion	Wine: from the sale of 16 keramia at 1500 (dr.) = 4 talents	SB 22 15238, vo., 2/39-41
(late 3rd - early 2nd c.)	Fayyum	οἶνος	1400 dr./keramion	wine: another 2 keramia at 1400 (dr.) = 2800 dr.	SB 22 15238, vo., 2/42-45
(late 3rd - early 2nd c.)	Tebtunis (Fayyum)	(οἶνος)	276 dr./Knidion	1 Knidion = 276 dr.	P. Tebt. 3 1079 descr., 12
(late 3rd - early 2nd c.)	Tebtunis (Fayyum)	(οἶνος)	222.0689 dr./Rhodion	29 Rhodia = 1 talent 440 dr.	P. Tebt. 3 1079 descr., 126
(late 3rd - early 2nd c.)	Tebtunis (Fayyum)	(οἶνος)	231.3220 dr./Rhodion	59 Rhodia = 2 talents 1648 dr.	P. Tebt. 3 1079 descr., 128
(late 3rd - early 2nd c.)	Tebtunis (Fayyum)	(οἶνος)	230 dr./Rhodion	1 Rhodion = 230 dr.	P. Tebt. 3 1079 descr., 2
(late 3rd - early 2nd c.)	Tebtunis (Fayyum)	οἶνος	.0606 dr. or .0808 dr.	66 choes(?) = 4 ob.‡	P. Tebt. 3 1079 descr., 23
(late 3rd - early 2nd c.)	Tebtunis (Fayyum)	(οἶνος)	230 dr./Rhodion	1 Rhodion = 230 dr.; 6 Rhodia = 1380 dr.	P. Tebt. 3 1079 descr., 3, 24, 46, 47
(late 3rd - early 2nd c.)	Tebtunis (Fayyum)	(οἶνος)	270 dr./Knidion	1 Knidion = 270 dr.	P. Tebt. 3 1079 descr., 5
218, Phamenoth 27	Kerkesoucha (Fayyum)	οἶνος	14 dr.	126 keramia at 14 dr./metretes of 6 chous	P. Enteux. 34, 4
(before 210)	Ptolemais Hormou? (Fayyum)	οἶνος		wine = 2.5 ob 2 chalkoi	SB 4 7451, 74
(before 210)	Ptolemais Hormou? (Fayyum)	οἶνος		wine from the Delta = 4.5 dr. 2 chalkoi	SB 4 7451, 75
(210-204?) or (193-187?)	Philadelphia (Fayyum)	(οἶνος)	900 dr.	20 keramia = 3 talents; 14 keramia = 2 talents 1600 dr.	BGU 7 1516, 2, 9

Table 3.7.1 Wine Outside the Thebaid (cont.)

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion, except where noted)*	*Original Price*	*Source Text*
(210-204?) or (193-187?)	Philadelphia (Fayyum)	(οἶνος)	500 dr.	2 keramia = 1000 dr.; 1 keramion = 500 dr.	BGU 7 1520, 4, 6, 8, 10
(210-204?) or (193-187?)	Philadelphia? (Fayyum)	(οἶνος)	500 dr.	1 keramion = 500 dr.; 2 keramia at 500 dr./ker.; 3 keramia at 500 dr./ker.	BGU 7 1537, 2, 3, 7, 19, 21, 22
208 or 191, Mecheir 24	Fayyum	οἶνος	700 dr. bronze	45 meteretes as payment for the apomoira, at a rate of 700 dr. bronze (χαλκοῦ πρὸς ἀργύριον) per metretes = 5 talents 1500 dr. bronze (χαλκοῦ πρὸς ἀργύριον)	P. Köln Gr. 5 220, 12-13
(208/7?) or (191/0?)	Tebtunis (Fayyum)	(οἶνος)	300(?) dr.	3.875 (metretes) at a rate of 300(?) (dr.) = 1170 (dr.)	P. Tebt. 3 1062 descr., 2-3
(208-206?)	Memphis? (Lower Egypt)	οἶνος	24 or 32 dr.	12 kotylai at a rate of 2 ob./(kotyla), making 4 dr.	UPZ 1 149, 12
(208-206?)	Memphis? (Lower Egypt)	οἶνος	27 or 36 dr.	16 kotylai = 6 dr.; 11 kotylai at a rate of 2.25 ob./(kotyla), making 4.75 (dr.)	UPZ 1 149, 15, 16
206/5? or 189/8	Philadelphia (Fayyum)	οἶνος	110 dr.	9 keramia = 990 dr.	BGU 7 1501, 6
206/5? or 189/8	Philadelphia (Fayyum)	οἶνος	400 dr.(?)	1 keramion(?) = 400 dr.	BGU 7 1501, 7
206/5? or 189/8	Philadelphia (Fayyum)	οἶνος	500 dr.	2 keramia = 1000 dr.	BGU 7 1506, 3
(about 200)	Fayyum	οἶνος	504 or 672 dr.	1.5 chous = 126 dr.	P. Tebt. 3 885, 18
(about 200)	Fayyum	οἶνος	432 or 576 dr.	4 kotylai = 24 dr.	P. Tebt. 3 885, 32
(2nd c.)	Fayyum	οἶνος		(Y) owes the price of the wine from the vineyard of Ammenemeus: 1 talent, 433 drachmas, 2 obols	ZPE 182 (2012), p. 263-264, 5-8
(early 2nd c.)	Egypt	οἶνος	270 dr.	For wine, a keramion = 270 dr.	SB 24 16004, 5

Table 3.7.1 Wine Outside the Thebaid (cont.)

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion, except where noted)*	*Original Price*	*Source Text*
(early 2nd c.)	Fayyum?	οἶνος	80 dr./chous	apomoira: 348 1/3 choes at a rate of 80 (dr./chous) = 4 talents, 3866 dr. 5 ob.; 251 choes at a rate of 80 (dr./chous) = 3 talents, 2080 (dr.); 86.5 choes = 1 talent, 920 dr.; 33.5 choes, at a rate of 80 (dr./chous) = 2680 (dr.)	P. Hels. 1 3, 1/7, 1/10, 1/12, 2/21
(early 2nd c.)	Fayyum?	οἶνος	60 dr./chous	200 (choes) at a rate of 60 (dr./chous) = 2 talents	P. Hels. 1 3, 2/37
(early 2nd c.)	Tebtunis (Fayyum)	(οἶνος)	432 or 576 dr.	2 kotylai = 12 dr.	P. Tebt. 3 889, 29
(early 2nd c.)	Tebtunis (Fayyum)	οἶνος	864 or 1152 dr.	2 kotylai = 24 dr.	P. Tebt. 3 889, 4
(before 190)	Fayyum	(οἶνος)	400 dr. bronze	231.5 metretes for the apomoira, at a rate of 400 dr. bronze (χαλκοῦ πρὸς ἀργύριον) for each metretes; at a rate of 400 dr. bronze (χαλκοῦ πρὸς ἀργύριον) for each metretes	P. Köln Gr. 5 221 Ro descr. + P. Köln Gr. 5 221 A-H Ro descr., 14-15, 18
(before 190)	Fayyum	οἶνος	400 dr.	at a rate of 400 dr.(/metretes)	P. Köln Gr. 5 221 Ro descr. + P. Köln Gr. 5 221 A-H Ro descr., 40
(before 190)	Fayyum	οἶνος	450 dr.	at a rate of 450 dr./metretes	P. Köln Gr. 5 221 Ro descr. + P. Köln Gr. 5 221 A-H Ro descr., B/10, H/3
(about 190)	Philadelphia (Fayyum)	οἶνος	5.4615 dr./ker.	6.5 keramia for 35.5 dr.	P. Yale 1 40, 20-22

Table 3.7.2 Wine Inside the Thebaid

Date	*Location*	*Commodity*	*Unit Price (per metretes)*	*Original Price*	*Source Text*
(Ptolemaic)	Thebes (Upper Egypt)	*irp*	36,000 or 48,000 dr.(?)	3 (hin?) = 150 deben	O. Leiden Dem. 201, 4
(Ptolemaic)	Thebes (Upper Egypt)	*irp*		8 deben	O. Leiden Dem. 206, x+3
(Ptolemaic)	Thebes (Upper Egypt)	*irp*	1152 or 1536 dr.	5 hin = 8 deben	O. Leiden Dem. 211 vo., 1/5
(Ptolemaic)	Thebes (Upper Egypt)	*irp*	2160 or 2880 dr.	1 hin = 3 deben	O. Leiden Dem. 213 vo., x+15
(Ptolemaic)	Thebes (Upper Egypt)	*irp*	32,400 or 43,200 dr.(?)	1 (hin) = 45 deben	O. Leiden Dem. 94, 2/3, 2/11
(Ptolemaic)	Thebes (Upper Egypt)	*irp*	6893.4857 or 9191.3143 dr. (if 7 hin), or 48,254.3999 or 64,339.2 dr. (if 1 hin)	7 hin (or 1 hin?) = 67 deben 1/5 qite	O. Leiden Dem. 94, 2/5
303, Hathyr 7	Elephantine (Upper Egypt)	*irp*	2 qite/*dp*	Send us 1 *dp*-measure of wine ...If we do not pay you in year 2, Pachons, then we will pay you 2 qite silver = 1 stater = 2 qite again, in year 2, Paoni	MDAI Kairo 15 (1957), p. 51, 7
(3rd cent.)	Upper Egypt	οἶνος	.2917 dr./kotyla	6 kotylai = 1 (dr.) 4.5 ob.	O. Strasb. 1 584, 2
(3rd cent.)	Thebes (Upper Egypt)	*irp*	6 dr.(?)	1 (metretes?) = 3 qite	O. Taxes 2 150, 1
260, Tybi 19	Elephantine (Upper Egypt)		20 dr./keramion	keramion (of wine?) = 20 drachmas of silver	UPZ 2 156, 11
259/8	Thebaid	(οἶνος)	5 dr.	1 metretes of 8 chous = 5 dr.	P. Rev. p. 4-36, 31/14
243, Pharmouthi 21	Thebes (Upper Egypt)	*irp*	6 dr.(?)	1 (metretes?) = 3 qite	O. Taxes 2 157, 3
243, Pharmouthi 21	Thebes (Upper Egypt)	*irp*	8.6667 dr.(?)	1 (metretes?) = 4.3333 qite	O. Taxes 2 157, 7

Table 3.7.3 Wine, Sweet Oil, and Myrrh

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
193 or 180 or 169	Gebelein (Upper Egypt)	οἴνου κερ(άμια) υξ μύρον στεφαλίβανος (δραχμαὶ) π ι.		Wine: 460 keramia; sweet oil; myrrh: 80 + 10 (dr.)	P. Grenf. 1 39, 2/1-3

Table 3.7.4 Sweet Wine

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion)*	*Original Price*	*Source Text*
259, Artemisios	Fayyum?	γλεῦκος	12 dr.*	5 keramia = 60 dr.; 11 hemikadia = 44 dr.; 4 hemikadia = 16 dr.	P. Cairo Zen. 1 59012, 1/6, 1/7, 1/11
250, Payni 11	Fayyum?	γλεῦκος	6 dr. silver per 6-chous Arsinoic metretes	40 metretes of 6-chous at 6 dr. silver/metretes	P. Col. Zen. 1 55, 8

* Bresson suggested 3 hemikadia = 1 keramion based on his assumption that the price was consisted in this text. Cf. Bresson, "Wine, oil, and delicacies at the Pelousion customs," 80.

Table 3.7.5 Vinegar

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion)*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	ὄξος		vinegar = 1 chalkous	P. Petrie 3 137, 1/10
3rd. cent.	Fayyum	ὄξος		vinegar = 1 chalkous	P. Petrie 3 140d, 5
(263-229)	Fayyum?	(ὄξος)	3 dr. silver	17 keramia = 51 dr. + agio of 5 dr. 1.75 ob. 1 chalkous	P. Cairo Zen. 5 59851, Fr. 2, 9
(mid-3rd c.)	Fayyum	ὄξος		vinegar: 1 chalkous	SB 12 10863, 2
(mid-3rd c.)	Fayyum	ὄξος		vinegar: .5 ob.	SB 12 10863, 15
(260-200)	Fayyum	ὄξος	3 dr.	1 ker. = 3 dr.	P. Lille Gr. 1 58, 4
259, Artemisios	Fayyum?	ὄξος	[3] dr.	[2 keramia] = 6 dr.	P. Cairo Zen. 1 59012, 1/10
(about 259)	Fayyum?	ὄξος	2 dr.	1 keramion = 2 dr.	P. Mich. Zen. 2, 9

Table 3.7.5 Vinegar (cont.)

Date	*Location*	*Commodity*	*Unit Price (per metretes = per keramion)*	*Original Price*	*Source Text*
244, Thoth 13	Fayyum?	ὄξος		2 dr. 3 ob.	P. Cairo Zen. 3 59357, 28
(late 3rd – early 2nd c.)	Tebtunis (Fayyum)	ὄξος		100.5 (keramia?) at a rate of(?) 1 talent 40 dr.	P. Tebt. 3 1079 descr., 34-35
(about 200)	Fayyum	ὄξος	720 or 960 dr.(?)	10 (dr./kotyla?)	P. Tebt. 3 885, 37
(early 2nd c.)	Tebtunis (Fayyum)	ὄξος		vinegar: 2 (dr.?)	P. Tebt. 3 1086 descr., 14

Table 3.7.6 Beer

Date	*Location*	*Commodity*	*Unit Price (per keramion of beer)*	*Original Price*	*Source Text*
255, Pachons (7-30)	Fayyum?	ζῦθος	.6667 dr.	1 keramion = 4 ob.	P. Cairo Zen. 2 59176 + P. Lond. 7 2167, 40

Appendix 3.8 Cakes, Bread, and Other Prepared Meals

Table 3.8.1 Wheat Cakes

Date	*Location*	*Commodity*	*Unit Price (per artaba of wheat-cake)*	*Original Price*	*Source Text*
251	Philadelphia (Fayyum)	βωλόπυρος	.5965 art. wheat	57 art. wheat-cake = 34 art. wheat	P. Lond. 7 1994, 340-341

Table 3.8.2 Barley Cakes

Date	*Location*	*Commodity*	*Unit Price (per artaba of barley-cake)*	*Original Price*	*Source Text*
251	Philadelphia (Fayyum)	βωλοκρίθου	.5974 art. wheat	77 art. barley cake = 46 art. wheat	P. Lond. 7 1995, 62

Table 3.8.3 Laganon Cakes

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(299-200), Epeiph 21	Egypt	λάγανον		20 dr.*	BGU 6 1495, 10
(299-200), Epeiph 21	Egypt	λάγανον		20 dr.*	BGU 6 1495, 39

* No specific quantity is mentioned. The singular is used, so it is possible that this is the price of one cake, but that price seems quite high.

Table 3.8.4 Cakes

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	ἄρτος		1 chalkous	P. Petrie 3 135, 3
3rd. cent.	Fayyum	ἄρτος		cakes for you = .5 ob.	P. Petrie 3 137, 1/2
3rd. cent.	Fayyum	ἄρτος		cakes for me = 1.25 ob.	P. Petrie 3 137, 1/3
3rd. cent.	Fayyum	ἄρτος		cakes = .5 ob.	P. Petrie 3 137, 1/6
3rd. cent.	Fayyum	ἄρτος		cakes for me = .5 ob.	P. Petrie 3 137, 1/17

Table 3.8.4 Cakes (cont.)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	ἄρτος		cakes for me = 1 ob.	P. Petrie 3 137, 1/19
3rd. cent.	Fayyum	ἄρτος		cakes for you: .5 ob.	P. Petrie 3 137, 1/20
3rd. cent.	Fayyum	ἄρτος		cakes = .75 ob.	P. Petrie 3 137, 2/3
3rd. cent.	Fayyum	ἄρτος		cakes for you: .5 ob.	P. Petrie 3 137, 2/5
3rd. cent.	Fayyum	ἄρτος		cakes = 1.75 ob.	P. Petrie 3 137, 2/8
3rd. cent.	Fayyum	ἄρτος		cakes = 1 ob.	P. Petrie 3 137, 2/9
3rd. cent.	Fayyum	ἄρτος		cakes for me = .5 ob.	P. Petrie 3 137, 2/13
3rd. cent.	Fayyum	ἄρτος		cakes = 1.75 ob.	P. Petrie 3 138, 1/3
3rd. cent.	Fayyum	ἄρτος		cakes = 2 ob.	P. Petrie 3 138, 2/1
3rd. cent.	Fayyum	ἄρτος		cakes = 4.5 ob.	P. Petrie 3 138, 2/7
3rd. cent.	Fayyum	ἄρτος		cake = .5 ob.	P. Petrie 3 139a, 2/2
3rd. cent.	Fayyum	ἄρτος		cake = .5 ob.	P. Petrie 3 139b, 2/11
3rd. cent.	Fayyum	ἄρτος		cakes = 1 ob.	P. Petrie 3 140d, 2
3rd. cent.	Fayyum	ἄρτος		cakes = 2 ob.	P. Petrie 3 140d, 4
3rd. cent.	Fayyum	ἄρτος		cakes = 1 ob.	P. Petrie 3 140d, 6
(3rd c.)	Tebtunis (Fayyum)	ἄρτος		cakes: 5 ob.	P. Tebt. 3 1078 descr. Vo., 29
(mid-3rd c.)	Fayyum	ἄρτοι		cakes: 2 ob.	SB 12 10863, 4
(mid-3rd c.)	Fayyum	ἄρτοι		cakes: 2 ob.	SB 12 10863, 15
(mid-3rd c.)	Fayyum	ἄρτοι		cakes: 2.5 ob.	SB 12 10863, 18
(263-229)	Fayyum?	ἄρτος		cake = 1 chalkous	P. Col. Zen. 2 94, 12
243, Epeiph 30	Thebes (Upper Egypt)	ἄρτος		cakes = ½ ¼ ob.	UPZ 2 158 A, 1/7

Table 3.8.4 Cakes (cont.)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
243, Mesore 1	Thebes (Upper Egypt)	ἄρτος		cakes = 1 1/4 ob.	UPZ 2 158 A, 2/12
243, Mesore 2	Thebes (Upper Egypt)	ἄρτος		cakes = 2 1/2 1/4 ob.	UPZ 2 158 A, 3/18
243, Mesore 3	Thebes (Upper Egypt)	ἄρτος		cakes = 1 ob.	UPZ 2 158 A, 4/23
243, Mesore 4	Thebes (Upper Egypt)	ἄρτος		cakes = 1 1/2 ob.	UPZ 2 158 A, 5/35
243, Mesore 5	Thebes (Upper Egypt)	ἄρτος		cakes = 1/2 1/4 ob.	UPZ 2 158 A, 7/45
243, Mesore 6	Thebes (Upper Egypt)	ἄρτος		cakes = 1 1/2 ob.	UPZ 2 158 A, 9/58
243, Mesore 7	Thebes (Upper Egypt)	ἄρτος		cakes = 1 1/2 ob.	UPZ 2 158 A, 10/68
243, Mesore 8	Thebes (Upper Egypt)	ἄρτος		cakes = 1 1/2 ob.	UPZ 2 158 A, 11/73
243, Mesore 9	Thebes (Upper Egypt)	ἄρτος		cakes = 1 1/2 ob.	UPZ 2 158 A, 12/82
243, Mesore 10	Thebes (Upper Egypt)	ἄρτος		cakes = 2 ob.	UPZ 2 158 A, 13/87
243, Mesore 11	Thebes (Upper Egypt)	ἄρτος		cakes = 1 1/2 ob.	UPZ 2 158 A, 14/97
243, Mesore 12	Thebes (Upper Egypt)	ἄρτος		cakes = 1 1/2 ob.	UPZ 2 158 A, 17/112
243, Mesore 13	Thebes (Upper Egypt)	ἄρτος		cakes = 1 1/2 ob.	UPZ 2 158 A, 18/120
243, Mesore 14	Thebes (Upper Egypt)	ἄρτος		cakes = 1 ob.	UPZ 2 158 A, 19/130
243, Mesore 15	Thebes (Upper Egypt)	ἄρτος		cakes = 1 1/2 ob.	UPZ 2 158 A, 20/137
243, Mesore 16	Thebes (Upper Egypt)	ἄρτος		cakes = 1 1/2 ob.	UPZ 2 158 A, 21/144
243, Mesore 18	Thebes (Upper Egypt)	ἄρτος		cakes = 1 1/2 ob.	UPZ 2 158 A, Vo 1/163
(before 210)	Ptolemais Hormou? (Fayyum)	ἄρτος		cakes = 2 chalkoi	SB 4 7451, 9
(early 2nd c.)	Tebtunis (Fayyum)	ἄρτος		cakes: 10 (dr.?)	P. Tebt. 3 1086 descr., 5

Table 3.8.4 Cakes (cont.)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	ἄρτος		cake: 1 chalkous	P. Petrie 3 135, 3

Table 3.8.5 Pure Cakes

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(208-206?)	Memphis? (Lower Egypt)	καθαροὺς ἄρτους	.0370 dr./cake	18 cakes = 4 ob.	UPZ 1 149, 17

Table 3.8.6 Pressed Cakes

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(3rd cent.	Egypt	ναστὸς	20 dr./ choinix	3 choinikes = 60 dr.	BGU 6 1495, 38

Table 3.8.7 Breakfast Cakes

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
257, Choiak 3	Herakleopolis (Upper Egypt)	ἄριστον		for breakfast: 1.25 ob.	P. Sorb. 1 16, 15

Table 3.8.8 Generic Prepared Meals

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Egypt	ὄψον		50 dr.	BGU 6 1495, 6
3rd. cent.	Upper Egypt	ὄψον	.0556 dr./meal	6 meals = 2 ob.	O. Strasb. 1 603, 2
3rd. cent.	Fayyum	ὄψον		meal = .5 ob.	P. Petrie 3 142, 2
(mid-3rd c.)	Fayyum	ὄψον	2.25 ob.	meal: 2.25 ob.	SB 12 10863, 3
257, Choiak 3	Herakleopolis (Upper Egypt)	ὄψον		for a meal: 1 ob.	P. Sorb. 1 16, 14
243, Epeiph 30	Thebes (Upper Egypt)	ὄψον		meal = 1 1/2 ob.	UPZ 2 158 A, 1/8

Table 3.8.8 Generic Prepared Meals (cont.)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
243, Mesore 2	Thebes (Upper Egypt)	ὄψον		meal = 2 ob.	UPZ 2 158 A, 3/19
243, Mesore 4	Thebes (Upper Egypt)	ὄψον		meal = 4 ob.	UPZ 2 158 A, 5/32
243, Mesore 5	Thebes (Upper Egypt)	ὄψον		meal = 2 ob.	UPZ 2 158 A, 7/46
243, Mesore 6	Thebes (Upper Egypt)	ὄψον		meal = 2 ob.	UPZ 2 158 A, 8/56
243, Mesore 8	Thebes (Upper Egypt)	ὄψον		meal = 1 1/4 ob.	UPZ 2 158 A, 11/74
243, Mesore 10	Thebes (Upper Egypt)	ὄψον		meal = 1/2 ob.	UPZ 2 158 A, 13/88
243, Mesore 11	Thebes (Upper Egypt)	ὄψον		meal = 1 ob.	UPZ 2 158 A, 15/104
243, Mesore 12	Thebes (Upper Egypt)	ὄψον		meal = 1 1/2 1/4 ob.	UPZ 2 158 A, 17/113
243, Mesore 13	Thebes (Upper Egypt)	ὄψον		meal = 1 1/2 1/4 ob.	UPZ 2 158 A, 18/119
243, Mesore 14	Thebes (Upper Egypt)	ὄψον		meal = 3 ob.	UPZ 2 158 A, 19/131
243, Mesore 15	Thebes (Upper Egypt)	ὄψον		meal = 2 1/2 ob.	UPZ 2 158 A, 20/138
243, Mesore 16	Thebes (Upper Egypt)	ὄψον		meal = 1 1/2 ob.	UPZ 2 158 A, 21/146
243, Mesore 18	Thebes (Upper Egypt)	ὄψον		meal = 1 1/2 ob.	UPZ 2 158 A, Vo 1/165

Appendix 3.9 Meat and Edible Animal Products

Table 3.9.1 Honey

Date	*Location*	*Commodity*	*Unit Price (per metretes of honey)*	*Original Price*	*Source Text*
(3rd c.)	Fayyum	μέλι		honey = 1 ob.	P. Petrie 3 139a, 2/1
(3rd c.)	Tebtunis (Fayyum)	μέλι		honey: an obol	P. Tebt. 3 1078 descr. vo., 25
(3rd c.)	Tebtunis (Fayyum)	μέλι		honey: .5 ob.	P. Tebt. 3 1078 descr. vo., 33
(263-229)	Fayyum?	μέλι	10 dr.	1 metretes = 10 dr.	P. Cairo Zen. 3 59512, 2/7
(263-229)	Fayyum?	μέλι	96 or 128 dr.	100 choes = 160 dr.	P. Cairo Zen. 3 59516, 19-21
(263-229)	Philadelphia? (Fayyum)	μέλι	16.2326 dr.	21.5 metretes, 3 chous = 349 dr.	P. Cairo Zen. 4 59790, 22
259, Artemisios	Fayyum?	μέλι Θεαγγελικοῦ	36 dr.	7 hemikadia = 84 dr.	P. Cairo Zen. 1 59012, 2/28
259, Artemisios	Fayyum?	μέλι Ῥοδιακοῦ*	12 dr.(?)	1 (keramion?)	P. Cairo Zen. 1 59012, 2/29
259, Artemisios	Fayyum?	μέλι Ἀττικοῦ†	20 dr./stamnos	1 stamnos = 20 dr.	P. Cairo Zen. 1 59012, 2/30
259, Artemisios	Fayyum?	μέλι Λυκιακοῦ‡	36 dr.	1 hemikadion = 12 dr.	P. Cairo Zen. 1 59012, 2/31
259, Artemisios	Fayyum?	μέλι Κορακησιωτικοῦ	33 dr.	4 hemikadia = 44 dr.	P. Cairo Zen. 1 59012, 2/33
259, Artemisios	Fayyum?	μέλι Χαλυβωνίου		2 […] = 5 ob.	P. Cairo Zen. 1 59012, 2/34
259, Artemisios	Fayyum?	μέλι	36 dr.	1 hemikadion = 12 dr.	P. Cairo Zen. 1 59012, 2/47
(about 259)	Fayyum?	μέλι	perhaps 21 or 28 dr.?	1 hemikadion at 3 dr. 3 ob. (per chous?)	P. Mich. Zen. 2, 9
253, Pachons	Fayyum?	μέλι	37 dr./metretes	37 dr. per metretes of honey	PSI 5 512, 10

Date	*Location*	*Commodity*	*Unit Price (per metretes of honey)*	*Original Price*	*Source Text*
12					
253, Pauni 2	Fayyum?	μέλι	24 dr.	4 metretes = 96 dr. silver	P. Lond. 7 1977, 4-5

* Likely imported honey from Rhodes.

† Likely imported honey from Attica.

‡ Likely imported honey from Lycia.

Table 3.9.2 Eggs

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	ὠιά		eggs = .5 ob.	P. Petrie 3 135, 5
(mid-3rd c.)	Egypt	ᾠόν		eggs = .75 ob.	SB 24 16067 Fragments g+i, 7
231, Thoth 19 or 206, Thoth 19	Fayyum	ὠιά		eggs = .5 ob.	P. Petrie 3 136, 3/20

Table 3.9.3 Cheese

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
259, Artemisios	Fayyum?	τυρός Χῖος	5 dr./stamnion	1 stamnion = 5 dr.	P. Cairo Zen. 1 59012, 3/58
257, Daisios 21	Alexandria? (Lower Egypt)	τυρός		.25 ob.	P. Cairo Zen. 1 59083, 4
248, Pachons 4	Onniton Koite? (Fayyum)	τυρός	10 dr./talent	10 dr./talent (proposed selling price)	P. Lond. 7 2006, 16
248, Pachons 4	Onniton Koite? (Fayyum)	τυρός	6 dr./talent	6 dr./talent (actual feasible market price)	P. Lond. 7 2006, 17

Table 3.9.4 Tallow

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
253, Tybi	Fayyum?	στέαρ		tallow = 2 ob.	P. Col. Zen. 1 43, 5

Table 3.9.5 Generic Meat*

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(3rd cent.)	Egypt	κρέας	20 dr./mina	meat at a rate of 20 dr./mina	P. Alex. 1, 6 p. 47
(mid-3rd c.)	Egypt	κρέας		meat = .75 ob.	SB 24 16067 Fragments g+i, 4
243, Mesore 10	Thebes (Upper Egypt)	κρέας		meat = 1 1/2 ob.	UPZ 2 158 A, 14/95
243, Mesore 12	Thebes (Upper Egypt)	κρέας		meat = 1 1/2 ob.	UPZ 2 158 A, 17/114
243, Mesore 16	Thebes (Upper Egypt)	κρέας		meat = 1 1/2 ob.	UPZ 2 158 A, 21/145
243, Mesore 18	Thebes (Upper Egypt)	κρέας		meat = 1 1/2 ob.	UPZ 2 158 A, Vo 1/162

* Three prices for pork exist, all form P. Cairo Zen. 1 59012. However, they are all quantified using different volume units, so the prices cannot be compared.

Table 3.9.6 Pork

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
259, Artemisios	Fayyum?	κρεῶν σ[υα]γρέων	2 dr./salousia	2 salousia at the rate of 2 (dr./salousia)	P. Cairo Zen. 1 59012, 2/44
259, Artemisios	Fayyum?	κρεῶν συαγρέων	5 dr./keramion	1 keramion = 5 dr.	P. Cairo Zen. 1 59012, 3/52
259, Artemisios	Fayyum?	κρεῶν συαγρέων	2.5 dr./banatos	1 banatos-pot = 2 dr. 3 ob.	P. Cairo Zen. 1 59012, 3/53

Table 3.9.7 Goat Meat

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
259, Artemisios	Fayyum?	αἴγεος	2 dr./banotion	2 banotia-pots = 4 dr.	P. Cairo Zen. 1 59012, 3/55

Table 3.9.8 Venison

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
259, Artemisios	Fayyum?	ἐλαφέων	3 dr./ker.	2 keramia at a rate of 3 (dr./keramion) = 6 dr.	P. Cairo Zen. 1 59012, 3/54

Table 3.9.9 Fish

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(Ptolemaic)	Thebes (Upper Egypt)	*mrꜣ̭t.t(?)**	1 dr.	1 *mrꜣ̭t.t(?)* = ½ qite	O. Leiden Dem. 417, 2-3
3rd. cent.	Fayyum	ὀψάριον		(1) fish = 1.5 ob.	P. Petrie 3 138, 1/11
(mid-3rd c.)	Egypt	ἰχθυηρός		fish = .5 ob.	SB 24 16067 Fragments g+i, 5
259, Artemisios	Fayyum?	ὡραῖος (fish of the season)		4 dr.	P. Cairo Zen. 1 59012, 2/39
259, Artemisios	Fayyum?	βικίον (tunny—fish?)	20 dr./ker.(?)	at a rate of 20 (dr./keramion?)	P. Cairo Zen. 1 59012, 2/41
259, Artemisios	Fayyum?	σφηνέων (mullet)	12 dr./(volume in lacuna)	at a rate of 12 (dr./volume?)	P. Cairo Zen. 1 59012, 2/43
257, Daisios 21	Alexandria? (Lower Egypt)	γλαυκίσκος, κάππαρος, ἀμία	average .3611 dr./fish	6 fish = 2 dr. 1 ob.	P. Cairo Zen. 1 59083, 2
257, Daisios 21	Alexandria? (Lower Egypt)	ἑψητός	.4167 dr./fish	1 fish = 2.5 ob.	P. Cairo Zen. 1 59083, 3
251, Choiak 7	Fayyum?	θρίσσα (thrissa-fish)	.4 dr./fish	100 fish = 40 dr.	P. Cairo Zen. 2 59261, 6
251, Thoth 3	Fayyum?	θρίσσα (thrissa-fish)	.4 dr./fish	200 fish = 80 dr.	P. Cairo Zen. 2 59261, 9
251, Choiak 7	Fayyum?	θρίσσα (thrissa-fish)	.4 dr./fish	50 fish = 20 dr.	P. Cairo Zen. 2 59261, 12
251, Choiak 7	Fayyum?	θρίσσα (thrissa-fish)	.4 dr./fish	100 fish = 40 dr.	P. Cairo Zen. 2 59261, 15

Table 3.9.9 Fish (cont.)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	θρίσσα	.2857 dr./fish (regardless of quality/size)	Embark for Alexander 10,000 thrissa-fish at 70 (fish) for 20 dr., of which 2/3 are first-class and 1/3 second(-class)	P. Tebt. 3 701, 39-40
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	ἀλάβητας	.2857 dr./fish	and 7,000 alabete-fish, at 70 for 20 dr.	P. Tebt. 3 701, 41
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	κεστρεύς	.8333 dr./fish	We have sold the mullet-fish in the magazine, equal numbers of male and non-male, at a rate of 5 ob.	P. Tebt. 3 701, 43-45
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	κεστρεύς	.6667 dr./fish	for the males, at a rate of 4 ob.	P. Tebt. 3 701, 45
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	θρίσσα	.2857 dr./fish	also 3,000 pairs of thrissa-fish at 70 for 20 dr.	P. Tebt. 3 701, 47
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	θρίσσα	.2857 dr./fish	send out to Panas son of Taos thrissa-fish, first- and second-class, worth 600 dr., [at a rate of 70] for 20 dr., with 2/3 first-class and 1/3 second-class	P. Tebt. 3 701, 48-49
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	κεστρεύς	.8333 dr./fish	mullet-fish, in equal numbers of non-[male and male], at a rate of 5 ob.	P. Tebt. 3 701, 65-66
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	κεστρεύς	.6667 dr./fish	with the male fish at a rate of 4 ob.	P. Tebt. 3 701, 67

Table 3.9.9 Fish (cont.)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	θρίσσα	.1 dr./fish	fishermen should pay back for nets out of their thrissa-fish, at a rate of 200 for 20 dr.	P. Tebt. 3 701, 90
(235 or 210), Mecheir-Epeiph	Tebtunis (Fayyum)	θρίσσα	.2857 dr./fish	price of thrissa-fish: 200 at 70 [for 20 dr.]	P. Tebt. 3 701, 230

* The meaning of *mr*ʾ*t.t(?)* is uncertain, although it might be a fish. This is the only example of the word attested in the CDD. The CDD suggests that it might be related to *mlt*ʾ, a type of fish. CDD "M" 10.1 (July 2010), 155.

Table 3.9.10 Animal Guts

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	χορδή		guts = 1 dr. .5 ob.	P. Petrie 3 142, 22

Table 3.9.11 Generic Salted Meat

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(3rd. cent.)	Egypt	τάριχος		80 dr.	BGU 6 1495, 11
(3rd. cent.)	Egypt	τάριχος		30 dr.	BGU 6 1495, 13
(3rd. cent.)	Egypt	τάριχος		15? dr.	BGU 6 1495, 35
(3rd. cent.)	Egypt	τάριχος		60 dr.	BGU 6 1495, 41
(mid-3rd c.)	Egypt	τάριχος		Salted meat = 2 ob.	SB 24 16067 Fragments g+i, 2
(mid-3rd c.)	Egypt	τάριχος		salted meat = .25 ob.	SB 24 16067 Fragment e, 2
(mid-3rd c.)	Egypt	τάριχος		salted meat = .25 ob.	SB 24 16067 Fragment f, 3
259, Artemisios	Fayyum?	τάριχος		1 (dr.?)	P. Cairo Zen. 1 59012, 2/38

Table 3.9.11 Generic Salted Meat (cont.)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
243, Mesore 1	Thebes (Upper Egypt)	τάριχος		salted meat = 1 ob.	UPZ 2 158 A, 2/13
243, Mesore 4	Thebes (Upper Egypt)	τάριχος		salted meat = 1 ob.	UPZ 2 158 A, 5/33
243, Mesore 5	Thebes (Upper Egypt)	τάριχος		salted meat = 1/4 ob.	UPZ 2 158 A, 7/44
243, Mesore 6	Thebes (Upper Egypt)	τάριχος		salted meat = 1 ob.	UPZ 2 158 A, 8/54
243, Mesore 7	Thebes (Upper Egypt)	τάριχος		salted meat = [1/2] 1/4 ob.	UPZ 2 158 A, 10/69
243, Mesore 8	Thebes (Upper Egypt)	τάριχος		salted meat = 1/2 ob.	UPZ 2 158 A, 11/76
243, Mesore 9	Thebes (Upper Egypt)	τάριχος		salted meat = 1/2 ob.	UPZ 2 158 A, 13/85
243, Mesore 10	Thebes (Upper Egypt)	τάριχος		salted meat = 1/2 ob.	UPZ 2 158 A, 14/94
243, Mesore 12	Thebes (Upper Egypt)	τάριχος		salted meat = 1/2 1/4 ob.	UPZ 2 158 A, 17/116
243, Mesore 13	Thebes (Upper Egypt)	τάριχος		salted meat = 1 ob.	UPZ 2 158 A, 18/122
243, Mesore 15	Thebes (Upper Egypt)	τάριχος		salted meat = 1/2 1/4 ob.	UPZ 2 158 A, 20/139
243, Mesore 16	Thebes (Upper Egypt)	τάριχος		salted meat = 1/2 ob.	UPZ 2 158 A, 22/150
243, Mesore 18	Thebes (Upper Egypt)	τάριχος		salted meat = 1/2 ob.	UPZ 2 158 A, Vo 2/166

Table 3.9.12 Dry-Salted Fish

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
259, Artemisios	Fayyum?	κύβιον	16 dr./(quantity in lacuna)	salted fish ... at a rate of 16 dr. …	P. Cairo Zen. 1 59012, 2/42

Appendix 3.10 Animals

Table 3.10.1 Calves

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
(255-248), Phaophi 21	Fayyum?	μόσχος		200 dr.	1 calf = 200 dr.	P. Cairo Zen. 4 59595, 7
241, Choiak 20	Oxyrynchites (Upper Egypt)	μόσχος	white	270 dr. bronze	2 calves = 540 dr. bronze	P. Hamb. 2 173, 2
240-239?	Fayyum?	μόσχος		65.4545 dr. silver	11 calves (large and small added together) = 720 dr. silver	P. Cairo Zen. 3 59370, 7-8
240-239?	Fayyum?	(μόσχος)	ἐλάττους (larger)	38.6667 dr.	3 calves, assessed at 116 dr. but sold for 80 dr.	P. Cairo Zen. 3 59370, 5-6
240-239?	Fayyum?	(μόσχος)	ἐλάττους (smaller)	26.6667 dr.	3 calves, assessed at 116 dr. but sold for 80 dr.	P. Cairo Zen. 3 59370, 5-6
233, Gorpaios 21	Fayyum	μόσχος		1.5 ob./calf/day	For 5 calves, by day for each: 1.5 ob., per day = 1 dr. 1.5 ob., per month = 37.5 dr.	SB 14 11965, 6-7

Table 3.10.2 Goats

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
247, Artemesios	Philadelphia (Fayyum)	αἴξ		100 dr. silver	penalty of 100 dr. silver per goat	P. Cairo Zen. 3 59340, 10
235, Pharmouthi 8	Talae (Upper Egypt)	αἴξ	δασεῖς (thick-haired, i.e., unshorn?), 1 male & 1 female	2 dr.	2 goats = 4 dr.	P. Hibeh 1 37, 15-17

Table 3.10.3 Kids

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
247, Artemesios	Philadelphia (Fayyum)	ἔριφος	6 months old	10 dr.	penalty price of 10 dr./kid	P. Cairo Zen. 3 59340, 7

Table 3.10.4 Sheep

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
(263-229)	Fayyum?	πρόβατον		7 dr.	7 dr. per sheep	P. Cairo Zen. 4 59597, 3
(263-229)	Syron Kome? (Fayyum)	πρόβτον		.6667 dr.	100 sheep at a rate of 4 ob. = 66 dr.	P. Cairo Zen. 4 59773, 2-3
(about 250)	Oxyrynchites (Upper Egypt)	πρόβατον		1 dr.(?)	concerning the sheep: 1 dr.*	P. Hibeh 1 111, 40
250, Pharmouthi 21	Fayyum?	πρόβατον	δοῦναι ἔρια (to provide wool)		the sheep to provide wool = 30 dr.**	P. Cairo Zen. 3 59298, 4
250	Fayyum?	πρόβατα		2.5 dr./sheep/year	He has 71 sheep, of which in year 35, Phamenoth. (Rent?) for each one annually: 2 dr. 3 ob.= 300 dr.	PSI 6 583, 2
250, Pharmouthi 21	Fayyum?	πρόβατον	δοῦναι ἔρια (to provide wool)		the sheep to provide wool = 30 dr.	P. Cairo Zen. 3 59298, 4

Table 3.10.4 Sheep (contd.)

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
245, Dios 25	Oxyrynchites (Upper Egypt)	πρόβατον	ἔρσ[εν]ες η ἄρνες ιγ ὑποδίφθερα ἡμίκουρ[α ιζ] ὧν λευκόφαιον ψιλὸν ἕν [Αἰ]γύπτια ἡμίκουρα γ ψιλὰ νόθα ι, ἡμίκουρον ἕν Αἰγύπτια ψιλὰ β (8 are lambs, 13 rams, [17] wearing leather coats and half-shorn, of which one is whitish grey and shorn, 3 Egyptian and half-shorn, 10 shorn and cross-bred, one half-shorn, 2 Egyptian and shorn)	5.2632 dr.	Penalty for violence is owed of 200 dr. + agio of 20 dr.; in lieu of money, 38 sheep are confiscated. So it is possible that 38 sheep = 200 dr.	P. Hibeh 1 32, 7-17
242, Payni 12	Fayyum?	πρόβατον	ὑποδιφθέρων (skin-clad - i.e., shorn?)	2.8744 dr.	71 sheep sold at auction for 204 dr. 1/2 ob.	P. Lond. 7 2016, 10, mentioned again on ll. 16-18
229, Thoth 2	Talae (Upper Egypt)	πρόβατον	θῆλυ δασὺ Ἀράβιον (female, unshorn, Arabian)	8 dr.	1 lost sheep is valued at 8 dr.	P. Hibeh 1 36, 11-12

* It is not clear if this value represents a purchase price or some other fee or fine.

Table 3.10.5 Donkeys

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
(263-229)	Fayyum?	ὑποζύγιον		5.6667 dr.	3 donkeys = 17 dr.	P. Cairo Zen. 4 59597, 8
(263-229)	Kanopos	ὄνος	τὸν μέγαν (the big one)	7 staters (=28 dr.)	He sold the donkey, the big one for 7 staters	PSI 5 543, 2/56-57
(263-229)	Kanopos	ὄνος	τὸν μικρὸν (the little one)	4 dr.	the little one for 4 dr.	PSI 5 543, 2/58

Table 3.10.5 Donkeys (cont.)

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
before 257, Xandikos 3	Athribis? (Lower Egypt)	ὑποζύγιον			donkeys = 1000 dr.	P. Lond. 7 1944, 2
before 257, Xandikos 3	Athribis? (Lower Egypt)	ὑποζύγιον			donkeys = 1000 dr.	P. Lond. 7 1944 vo., 11
before 257, Xandikos 3	Athribis? (Lower Egypt)	ὑποζύγιον			donkeys = 1000 dr.	P. Lond. 7 1943, a9-b2
257, Thoth 24	Philadelphia	ὄνος		2 ob./donkey	donkeys: 25 at a rate of 2 ob. = 8 dr. 2 ob.	PSI 4 332, 2/21
257, Thoth 25	Philadelphia	ὄνος		2 ob./donkey	donkeys: 29 at a rate of 2 ob. = 9 dr. 4 ob.	PSI 4 332, 2/22
254, Hathyr 12	Philadelphia (Fayyum)	ὄνος	female, white	80 dr.	80 dr. valuation for lost donkey (assessed by owner)	P. Mich. Zen. 34, 15-17
(250-211), Pharmouthi through Epeiph	Fayyum	ὄνος		28 dr.	in Berenikis Thesmophorou, the price of a donkey = 28 dr.	P. Köln Gr. 8 346 vo., 2/20-21
(250-210?)	Philadelphia?	*ϣ.t*	female	200 dr.	1 donkey = 10 deben*	Enchoria 28 (2002-2003), p. 59, x+10 - x+11
(about 250)	Oxyrynchites (Upper Egypt)	ὄνος		6 dr.	1 donkey = 6 dr.	P. Hibeh 1 111, 38
(244-243)	Oxyrynchites (Upper Egypt)	ὄνος		20 dr.	1 donkey = 20 dr.	P. Hibeh 1 73, 6
(243-229)	Oxyrynchites (Upper Egypt)	ὄνος		20 dr.	1 donkey = 20 dr. (penalty price)	P. Hibeh 1 34, 3
(after 241)	Fayyum?	(ὑποζύγιον)	ἔρσεν ἐργατικὸν λευκὸν (male, hard-working, white)	50 dr.	1 donkey = 50 dr.	P. Cairo Zen. 4 59659, 15-16

Table 3.10.5 Donkeys (cont.)

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
(after 241)	Fayyum?	ὑποζύγιον	ἄρρεν βαδιστικὸν λευκὸν (male, good at walking - can be ridden, white)	140 dr.	1 donkey = 140 dr.	P. Cairo Zen. 4 59659, 10
226, epagomenal day 5	Fayyum	ὄνος (τὴν ὄνον καὶ τὸν πῶλον αὐ[τῆς])	female, with her foal		a female donkey and her foal, which are worth 60 dr.	P. Sorb. 3 133, 6-7
221, Tybi 12	Magdola (Medinet Nehas)	ὄνος		40 dr.	1 donkey worth 40 dr.	P. Enteux. 41, 2
215/4, Dios	Tholthis (Upper Egypt)	ὄνος	3 female: 1 dark, 2 white	133.3333 dr.	3 female donkeys = 400 dr.	SB 3 6283a, 10-11
215/4, Dios	Tholthis (Upper Egypt)	ὄνος	3 female: 1 dark, 2 white	133.3333 dr.	3 female donkeys = 400 dr. (copy of same transaction)	SB 3 6283a, 36-38
215/4, Dios	Tholthis (Upper Egypt)	ὄνος	3 female: 1 dark, 2 white	133.3333 dr.	3 female donkeys = 400 dr. (copy of same transaction)	SB 3 6283b (copy of SB 3 6283a), 14-15

* Manning writes that this might be the purchase price of the donkey, but since the value is so low, it might also be a fine or loan. Joseph G. Manning, "A Ptolemaic agreement concerning a donkey with an unusual warranty clause. The strange case of P. dem. Princ. 1 (inv. 7524)," *Enchoria* 28 (2002/2003): 59.

Table 3.10.6 Rented Donkeys

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
(263-229)	Fayyum?	ὄνος μισθώσιμος		2 ob./donkey/day	14 rented donkeys at 2 ob. = 4 dr. 4 ob.	P. Lond. 7 2175, 2
(263-229)	Fayyum?	ὄνος μισθώσιμος		2 ob./donkey/day	14 rented donkeys at 2 ob. = 4 dr. 4 ob.	P. Lond. 7 2175, 3
(263-229)	Fayyum?	ὄνος μισθώσιμος		2 ob./donkey/day	14 rented donkeys at 2 ob. = 4 dr. 4 ob.	P. Lond. 7 2175, 4

Table 3.10.6 Rented Donkeys (contd.)

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
(263-229)	Fayyum?	ὄνος μισθώσιμος		2 ob./donkey/day	13 rented donkeys at 2 ob. = 4 dr. 2 ob.	P. Lond. 7 2175, 5
(263-229)	Fayyum?	ὄνος μισθώσιμος		2 ob./donkey/day	13 rented donkeys at 2 ob. = 4 dr. 2 ob.	P. Lond. 7 2175, 6

Table 3.10.7 Horses

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
(after 212)	Tholthis? (Upper Egypt)	ἵππος	female	100 dr.	1 female horse = 100 dr.	P. Frankf. 3, 7

Table 3.10.8 Camels

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
(about 259)	Palestine? or Alexandria?	κάμηλος		24 dr.(?)	ἄλλας καμήλων (δραχμὰς) κδ*	P. Cairo Zen. 1 59010, 2/23

* The quantity of camels implied is unclear.

Table 3.10.9 Pigs

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
(3rd cent.)	Egypt	δέλφαξ		500 dr.	1 pig = 500 dr.	BGU 6 1495, 3
(3rd cent.)	Egypt	χοῖροι (young pigs)			20 dr.	BGU 6 1495, 37

Table 3.10.9 Pigs (cont.)

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
(263-229)	Alexandria? (Lower Egypt)	ἱερεῖον	ὡς βέλτιστον (as good a pig as possible for the Arsinoeia)	up to 20 dr.	maximum willing to spend is 20 dr. for the best pig possible	P. Cairo Zen. 3 59501, 6
(about 259)	Fayyum?	χοῖρος		2.5 dr.	2 pigs = 5 dr.	P. Mich. Zen. 1, 2/16
(about 259)	Fayyum?	χοῖρος		3 dr.	2 pigs = 6 dr.	P. Mich. Zen. 1, 2/18
255, Hathyr 22	Fayyum?	ἱερεῖον		4.0833 dr.	59 pigs at a rate of 4 dr. 1/2 ob.	P. Cairo Zen. 2 59161, 6
254/53	Fayyum?	ἱερεῖον		4 dr.(?)	20 pigs (at a rate of?) 4 dr.	P. Cairo Zen. 4 59769, 5
250, Pharmouthi 21	Fayyum?	ἱερεῖον	for the festival of Arsinoe	12 dr.	1 pig = 12 dr.	P. Cairo Zen. 3 59298, 6

Table 3.10.10 Dogs

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
250, Thoth through Tybi	Fayyum	κύνες		.5 ob./dog/day	6 dogs at a rate of .5 ob. per day = 2 dr. 3 ob.	PSI 4 368, 1/12-13

Table 3.10.11 Birds

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	ὄρνις			birds = 3 dr. 3 ob.	P. Petrie 3 142, 17
(about 259)	Fayyum?	ὄρνις		1 dr.	3 birds = 3 dr.	P. Mich. Zen. 1, 2/14
(about 200)	Fayyum	ὄρνις		60 dr.	2 birds = 120 dr.	P. Tebt. 3 885, 48

Table 3.10.12 Geese

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
(199-100)	Fayyum	χήν			1300 dr.*	P. Tebt. 3 891, 17

* The quantity of geese is not mentioned.

Table 3.10.13 Pigeons

Date	*Location*	*Commodity*	*Descriptors*	*Unit Price*	*Original Price*	*Source Text*
(299-200)	Egypt	περιστεριδεύς (young pigeon)			40 dr.*	BGU 6 1495, 36
(299-200)	Egypt	περιστεριδεύς (young pigeon)			40 dr.†	BGU 6 1495, 42

* The quantity of pigeons intended here is unclear.

† The quantity of pigeons intended here is unclear.

Appendix 3.11 Wool and Cloth

Table 3.11.1 Wool

Date	*Location*	*Commodity*	*Unit Price (per mina)*	*Original Price*	*Source Text*
(263-229)	Fayyum?	γνάφαλλον	.8 dr.	flocks of wool of 35 minas = 28 dr.	P. Cairo Zen. 4 59776, 2-3
259, Artemisios	Fayyum?	ἔρια καθαρὰ	2.5 dr.	[22.5? minas] of pure wool, 1 bronze half-obol?, at 2 dr. [3 ob. (per mina) = 56 dr. 1] 1/2 ob.	P. Cairo Zen. 1 59012, 3/62-64
(after 257)	Alexandria? (Lower Egypt)	ἔρια	2.2667 dr. silver	30 minas wool = 68 dr. silver	P. Cairo Zen. 3 59398, 2
256, Daisios 11	Philadelphia? (Fayyum)	ἔρια		wool = 2 dr.	P. Cairo Zen. 2 59145, 10
252, Pharmouthi 2	Fayyum?	ἔρια	1.3333 dr.	15 minas wool = 20 dr.	P. Cairo Zen. 5 59825, 6
252, Pharmouthi 2	Fayyum?	ἔρια	1.3333 dr.	10 minas wool at a rate of 1 dr. 2 ob. = 13 dr. 2 ob.	P. Cairo Zen. 5 59825, 33
248/7	Fayyum?	ἔριον	2 dr.	15 minas wool = 30 dr.	P. Mich. Zen. 61, 27
248/7	Fayyum?	(ἔριον)	2 dr.	15 minas wool = 30 dr.	P. Mich. Zen. 61, 29
197, Mesore 17	Fayyum	ἔρεα καινὰ ("new wool")	100 [+ x] dr.	new wool = 100 [+ x] dr.	P. Petrie 3 36 d, 20
197, Mesore 17	Fayyum	[ἔρεα] ἰργασμένων ("worked wool")	60 dr./mina	5 minas of worked [wool?] worth 300 dr.	P. Petrie 3 36 d, 21

Table 3.11.2 Generic Cloth

Date	*Location*	*Commodity*	*Unit Price (per mina)*	*Original Price*	*Source Text*
289, Pharmouthi 27	Thebes	*ḥbs*	(quantity unclear)	6 qite for the clothing of a boy	Journal of Egyptian Archaeology (JEA) 85 (1999), p. 189-190, 4

Table 3.11.3 Himation Cloth

Date	*Location*	*Commodity*	*Unit Price (per himation)*	*Original Price*	*Source Text*
(3rd. cent.)	Tebetny?	ἱμάτιόν	6 dr.	worn himation worth 6 dr.	P. Lille Gr. 1 6, 9
(mid-3rd c.)	Krokodilopolis (Fayyum)	ἱμάτιον		himation: 24 (dr.)	P. Tebt. 3 1077 descr., 5
(263-229)	Fayyum?	ἱματίον	1.5 dr.	1 himation = 1 dr. 3 ob.	P. Cairo Zen. 3 59507, 11
(263-229)	Fayyum?	ἱματίον	14 dr.	1 himation = 14 dr.	P. Cairo Zen. 4 59701, 5
(263-229)	Fayyum?	ἱματίον	54 dr.	1 himation = 54 dr.	P. Cairo Zen. 4 59776, 1
(263-229)	Fayyum?	ἱματον	<2 dr./mina	himation-cloth from the Thebaid, 3.5 minas: spend up to 28 dr.	P. Col. Zen. 2 107, 5
257, Choiak 3	Herakleopolis (Upper Egypt)	ἱμάτιον	1.1667 dr.	himation: 1 dr. 1 ob.	P. Sorb. 1 16, 16
(after 257)	Alexandria? (Lower Egypt)	ἱματίον	.6667 dr.	9 himatia for children at a rate of 4 ob. = 6 dr.	P. Cairo Zen. 3 59398, 7
before 256, Daisios 11	Philadelphia? (Fayyum)	ἱμάτιον	6 dr.	2 lost himatia worth 12 dr.	P. Cairo Zen. 2 59145, 9
254, Thoth 21	Tanis (Lower Egypt)	ἱμάτιον	40 dr.	we bought a himation = 40 dr.	PSI 4 348, 6
250, Choiak 1	Fayyum?	ἱμάτιον	60 dr.?	of the himation and others = …, they say the value is 60 dr.	PSI 6 572, 3
(250-211), Pharmouthi through Epeiph	Fayyum	ἱμάτιον	6 dr.	in Arsinoe, for the deposit of a pawned himation (himation as security): 6 dr.	P. Köln Gr. 8 346 vo., 2/22-23
249, Dios 4	Fayyum?	ἱματίον	25 dr.	1 himation = 25 dr.	P. Cairo Zen. 3 59319, 4
249, Dios 4	Fayyum?	ἱματίον	25 dr.	1 himation = 25 dr.	P. Cairo Zen. 3 59319, 9

Table 3.11.3 Himation Cloth (cont.)

Date	*Location*	*Commodity*	*Unit Price (per himation)*	*Original Price*	*Source Text*
after 249	Fayyum?	ἱμάτιον	24 dr.	1 himation = 24 dr. silver	P. Cairo Zen. 3 59326 + P. Lond. 7 2002 + P. Cairo Zen. 3 59326 bis, 23
(244, Mecheir 26) or (219, Mecheir 26)	Moeris (Fayyum)	ἱμάτιον	30 dr.	new men's himation worth 30 dr.	SB 18 13160, 11-12
(about 228), Hathyr	Choibnotmis (Upper Egypt)	ἱμα(τίον)	7 dr.	21 himatia = 147 dr.	P. Hibeh 1 68, 8
226, epagomenal day 5	Fayyum	ἱμάτιον	30 dr.	and a himation, which is worth 30 dr.	P. Sorb. 3 133, 9
(late 3rd c.)	Meidum (Lower Egypt)	ἱμάτιον		one woman's himation, worth 600 dr.	SB 6 9068, 15
(late 3rd c.)	Meidum (Lower Egypt)	ἱμάτιον		one woman's himation, worth 400 dr.	SB 6 9068, 18
221, Tybi 12	Oxyryncha	ἱμάτιόν	30 dr.	1 himation worth 30 dr.	P. Enteux. 83, 7 & 10
(late 3rd - early 2nd c.)	Fayyum	ἱμάτιον	25,010 dr.	Himation = 4 talents, 1010 dr.	SB 22 15238, vo., 1/36
(late 3rd - early 2nd c.)	Fayyum	ἱμάτιον	25,000 dr.	hima(tion?) = 4 talents 1000 dr.	SB 22 15238, vo., 2/48
(193-187?) or (210-204?)	Philadelphia (Fayyum)	ἱματίον	20 dr.	1 himation = 20 dr.	BGU 7 1558, 7
(2nd cent.)	Fayyum	ἱμάτιον	>125 dr.	partial payment towards a himation = 125 dr.	P. Tebt. 3 891, 21
(2nd cent.)	Fayyum	ἱμάτιον	>1000 dr.	partial payment towards a himation = 1000 dr.	P. Tebt. 3 891, 31
197, Mesore 17	Fayyum	ἱμάτιόν	800 dr.	1 Egyptian himation worth 800 dr.	P. Petrie 3 36 d, 19

Table 3.11.4 Chitons

Date	*Location*	*Commodity*	*Unit Price (per chiton)*	*Original Price*	*Source Text*
(3rd. cent.)	Tebetny?	χιτών	6 dr.	chiton worth 6 dr.	P. Lille Gr. 1 6, 9
(3rd. cent.)	Egypt	χιτών	2.5 dr.	chiton towards 2.5 dr.	P. L. Bat. 33 13, 2/7
(3rd. cent.)	Egypt	χιτών	8 dr.	women's linen chiton, towards 8 dr.	P. L. Bat. 33 13, 2/39-40
(263-229)	Fayyum?	χιτών	13.5 dr.	1 chiton = 13.5 dr.	P. Cairo Zen. 4 59778, 3
(263-229)	Fayyum?	χιτών	10 dr.	3 chitons = 30 dr.	P. Cairo Zen. 4 59778, 4
249, Dios 4	Fayyum?	χι(τὼν) γυ(ναικεῖος)	40 dr.?	women's chitons = 40 dr.	P. Cairo Zen. 3 59319, 3
249, Dios 4	Fayyum?	χι(τὼν) γυ(ναικεῖος)	60 dr.?	women's chitons = 60 dr. (crossed out: 40 dr.)	P. Cairo Zen. 3 59319, 8
after 244, Phamenoth 3	Fayyum?	χιτών ἐπὶ ζωωτῶι	1270 dr./chiton	1 chiton adorned with figures = 1270 dr.	P. L. Bat. 20 62, 2
(after 241)	Fayyum?	χιτών	5 dr.	1 chiton = 5 dr.	P. Cairo Zen. 4 59659, 19
238/7	Krokodilopolis? (Fayyum)	χιτών	40 dr.	woman's woolen chiton: 40 dr.	P. Petrie(2) 1 13, 18
238/7	Krokodilopolis? (Fayyum)	χιτών	12 dr.	men's chiton: 12 dr.	P. Petrie(2) 1 13, 18-19
238/7	Krokodilopolis? (Fayyum)	χιτών	10.3333 dr.	new chiton: 10 dr 2 ob.	P. Petrie(2) 1 13, 19
(211 - mid-2nd c.)	Egypt	χιτών	50 dr.	the chiton = 50 dr.	SB 22 15236 Fragment 2, vo./77
(early 2nd c.)	Egypt	χιτών	210 dr.	For a chiton = 210 dr.	SB 24 16004, 4
197, Mesore 17	Fayyum	χιτών	15 dr.	2 chitons worth 30 dr.	P. Petrie 3 36 d, 21
(2nd cent.)	Fayyum	χιτών τῆς μικρᾶς	600 dr.	1 chiton for a little girl = 600 dr.	P. Tebt. 3 891, 19

Table 3.11.4 Chitons (cont.)

Date	*Location*	*Commodity*	*Unit Price (per chiton)*	*Original Price*	*Source Text*
(2nd or 1st cent.)	Thebes (Upper Egypt)	*gtn*	1160 dr.	1 chiton = 58 deben	O. Leiden Dem. 276, 1/1
(187-88)	Pathyris	*gtn*	4000 dr.	1 chiton = 200 deben	Enchoria 21 (1994), p. 48 no. 48, 4

Table 3.11.5 Himation and Chiton

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	ἱματίου καὶ χιτῶνος		himation and chiton = 1.25 ob.	P. Petrie 3 140d, 1

Table 3.12.6 Himation and Sindonos Cloth

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(early 2nd c.)	Herakleopolis? (Upper Egypt)	ἱμ(ατίου) καὶ σινδόνος		5100 dr. which he pays to Teos son of Pgeris ... as the price of a himation and a sindonos-cloth	P. Tebt. 3 890 , 2/21-23

Table 3.12.7 Himation and Syrian Cloth

Date	*Location*	*Commodity*	*Unit Price (*	*Original Price*	*Source Text*
(late 3rd. c.)	Egypt	συρίαι καὶ ἱματίωι		for a Syrian cloth and the himation mentioned above: 20 dr.	P. L. Bat. 33 14, 19-21

Table 3.12.8 *inw*-Cloth

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
287, Mesore	Thebes	*inw*	4 qite	1 inw = 4 silver qite	Revue d'Égyptologie (RdE) 35 (1984), p. 4-6, 3
(247-221)	Edfu (Upper Egypt)	*inw*	12 dr.	1 *inw*-cloth = 6 qite	P. Hauswaldt Manning 4, 2
226, Epeiph	Djeme, Thebes west (Upper Egypt)	*inw*	1.6 deben	1 inw-cloth: 1 deben 6 qite	P. Recueil 7, 5
(225/4)	Armant (Upper Egypt)	*inw*	40 dr.	1 *inw*-cloth = 2 deben	P. BM Andrews 46, 3
219, Mesore	Edfu (Upper Egypt)	*inw*	12 dr.	1 *inw*-cloth = 6 qite bronze	P. Hauswaldt Manning 6, 3
(2nd-1st cent.)	Thebes (Upper Egypt)	*inw*	2000 dr.	1 *inw*-cloth = 100 deben	O. Leiden Dem. 276, 1/6
(2nd-1st cent.)	Thebes (Upper Egypt)	*inw*	6000 dr.	1 *inw*-cloth = 300 deben	O. Leiden Dem. 277, x+6
(2nd-1st cent.)	Pathyris (Upper Egypt)	*inw*	370 deben	1 inw-cloth: 370 deben	Enchoria 21 (1994), p. 45-46 no. 46, 11
(2nd-1st cent.)	Pathyris (Upper Egypt)	*inw*	300 deben	1 inw-cloth: 300 deben	Enchoria 21 (1994), p. 47-48 no. 47, 3
(2nd-1st cent.)	Pathyris (Upper Egypt)	*inw*	10 deben	another inw-cloth: 10 deben (great example of variety in price)	Enchoria 21 (1994), p. 47-48 no. 47, 4
(2nd-1st cent.)	Pathyris (Upper Egypt)	*inw*	400 deben	1 inw-cloth: 400 deben	Enchoria 21 (1994), p. 54 no. 52, 1
(2nd c. BCE)	Gebelein? (Upper Egypt)	*inw*	1100 deben	1 inw-cloth = 1100 deben	Bulletin of the Center of Papyrological Studies (BACPS) 26 (2009), p. 158-159 no. 4, 1
198, Thoth		*inw*	600 dr.	1 *inw*-cloth = 30 deben	P. Eheverträge 28, 5
(198-118)	Aswan? (Upper Egypt)	*inw*	1000 dr.	1 *inw*-cloth = 50 deben	P. Äg. Handschr. 63 descr., x+2

Table 3.12.8 *ỉnw*-Cloth (cont.)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(189-100)	Deir el-Medina (Upper Egypt)	*ỉnw*	250 deben	1 *ỉnw*-cloth = 250 deben	P. Tor. Botti 39, 11
(188/7)	Pathyris (Upper Egypt)	*ỉnw*	8000 dr.	1 *ỉnw*-cloth = 400 deben	Enchoria 21 (1994), p. 48 no. 48, 3
186, Choiak 27	Deir el-Ballas (Upper Egypt)	*ỉnw*	6 silver qite	1 inw-cloth = 6 qite silver (hd sp-sn)	Journal of the American Research Center in Egypt (JARCE) 2 (1963), p. 114, 6

Table 3.12.9 Webs

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	τρα( ) με( )		tra( ) and me( ) = 1.5 dr. 12 chalkoi?	P. Petrie 3 138, 1/7
3rd. cent.	Fayyum	τρα( ) με( )		tra( ) and me( ) = 1 dr. 5.5 ob.	P. Petrie 3 138, 1/8
3rd. cent.	Fayyum	με( ) . .		me( ) = 4 ob.	P. Petrie 3 138, 2/4
3rd. cent.	Fayyum	με( )		me( ) = 3 (dr.?)	P. Petrie 3 138, 2/6
(about 228), Hathyr	Choibnotmis (Upper Egypt)	μη( )	8.3013 dr./μη( )	104 μη( ) = 863 dr. 2 ob.	P. Hibeh 1 68, 7
228, Hathyr 22	El-Hibeh (Upper Egypt)	μη( ) + πρ( ) = ἰσ(τοὶ)	11.6667 dr./web	21 μη( ) + 7 πρ( ) = 28 webs, worth 326 dr. 4 ob.	P. Hibeh 1 67, 12-13
228, Hathyr 22	El-Hibeh (Upper Egypt)	μη( ) + πρ( ) = ἰσ(τοὶ)	11.6667 dr./web	3 μη( ) + 1 πρ( ) = 4 webs, worth 46 dr. 4 ob.	P. Hibeh 1 67, 20-21

Table 3.12.10 Pastoral Cloth

Date	*Location*	*Commodity*	*Unit Price (per cloth)*	*Original Price*	*Source Text*
228, Hathyr 22	El-Hibeh (Upper Egypt)	βου(κολικός)	9.3333 dr.	7 pastoral cloths = 65 dr. 2 ob.	P. Hibeh 1 67, 13
228, Hathyr 22	El-Hibeh (Upper Egypt)	βου(κολικός)	9.3333 dr.	1 pastoral cloth = 9 dr. 2 ob.	P. Hibeh 1 67, 21
(about 228), Hathyr	Choibnotmis (Upper Egypt)	βου(κολικός)	9.3333 dr.	21 pastoral cloths = 196 dr.	P. Hibeh 1 68, 7
(about 228), Hathyr	Choibnotmis (Upper Egypt)	βου(κολικός)	9.3333 dr.	1 pastoral cloth = 9 dr. 2 ob.	P. Hibeh 1 68, 19

Table 3.12.11 Cerecloth

Date	*Location*	*Commodity*	*Unit Price (per cloth)*	*Original Price*	*Source Text*
228, Hathyr 22	El-Hibeh (Upper Egypt)	σορώιον	8 dr.	7 cloths = 56 dr.	P. Hibeh 1 67, 14
228, Hathyr 22	El-Hibeh (Upper Egypt)	σορώιον	8 dr.	1 cloth = 8 dr.	P. Hibeh 1 67, 21
(about 228), Hathyr	Choibnotmis (Upper Egypt)	σορώιον	8 dr.	42 cloths = 336 dr.	P. Hibeh 1 68, 8
(about 228), Hathyr	Choibnotmis (Upper Egypt)	σορώιον	8 dr.	2 cloths = 16 dr.	P. Hibeh 1 68, 19

Table 3.13.12 Othonia

Date	*Location*	*Commodity*	*Unit Price (per cloth)*	*Original Price*	*Source Text*
(mid-3rd c.)	Egypt	ὀθόνιον		othonia = 5 talents 20 (dr.?)	SB 24 15971, 4-5
(263-229)	Philadelphia? (Fayyum)	ὀθόνιον		one othonion-cloth: bronze, 3 dr.	PSI 6 599, 9
(late 3rd c.)	Tebtunis (Fayyum)	ὀθόνιον	12 dr.	2 othonia = 24 dr.	P. Tebt. 3 794, 12

Table 3.13.12 Othonia (cont.)

Date	*Location*	*Commodity*	*Unit Price (per cloth)*	*Original Price*	*Source Text*
(225-200)	Meidum (Lower Egypt)	ὀθόνιον		one woman's othonion - 100 dr.	SB 6 9068, 21
(early 2nd c.)	Herakleopolis? (Upper Egypt)	ὀθόνιον		price of othonia-cloths = 4650 dr.	P. Tebt. 3 890 , 2/32
185, Phaophi 11	Tebtunis (Fayyum)	ὀθόνιον	300 dr.	2 torn othonia, worth 600 dr.	P. Tebt. 3 796, 9
228, Hathyr 22	El-Hibeh (Upper Egypt)	σορώιον	8 dr.	7 cloths = 56 dr.	P. Hibeh 1 67, 14

Table 3.13.13 New Cloth

Date	*Location*	*Commodity*	*Unit Price (per cloth)*	*Original Price*	*Source Text*
(211 - mid-2nd c.)	Egypt	ἄγναφος		(pawn payment) on a new piece of cloth = 200 dr.	SB 22 15236 Fragment 2, 2/28
(211 - mid-2nd c.)	Egypt	ἄγναφος		the ἄγναφος-cloth = 200 dr.	SB 22 15236 Fragment 2, vo./75

Table 3.13.14 Fine Cloth

Date	*Location*	*Commodity*	*Unit Price (per cloth)*	*Original Price*	*Source Text*
223, Epeiph 3	Mouchis (Fayyum)	σινδών	10 dr.	fine cloth worth 10 dr.	Aegyptus 92 (2012), p. 3-12, 4-5
(211 - mid-2nd c.)	Egypt	σινδών	50 dr.	(pawn payment) on a fine cloth = 50 dr.	SB 22 15236 Fragment 2, 2/33

Table 3.13.15 Syrian Cloth

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(about 259)	Palestine? or Alexandria?	συρία		Syrian cloths = 6 dr. 3 ob.	P. Cairo Zen. 1 59010, 2/25
245, Mecheir 12	Oxyrynchites (Upper Egypt)	συρία		Syrian cloths = 6 dr.	P. Hibeh 1 51, 5-6
(244, Mecheir 26) or (219, Mecheir 26)	Moeris (Fayyum)	συρία	34 dr.	woman's Syrian cloth worth 34 dr.	SB 18 13160, 11

Table 3.13.16 Mantles

Date	*Location*	*Commodity*	*Unit Price (per mantle*	*Original Price*	*Source Text*
(263-229)	Fayyum?	χλαμύς	37 dr.	1 mantle = 37 dr.	P. Cairo Zen. 4 59778, 1
(263-229)	Fayyum?	χλαμύς	21 dr.	1 mantle = 21 dr.	P. Cairo Zen. 4 59778, 2
(late 3rd - early 2nd c.)	Fayyum	χλαμύς	4500 dr.	Mantle = 4500 dr.	SB 22 15238, vo., 1/27

Table 3.13.17 Cloaks

Date	*Location*	*Commodity*	*Unit Price (per cloak)*	*Original Price*	*Source Text*
249, Dios 4	Fayyum?	καυνάκης	18.75 dr.	2 cloaks, with wool of 30 minas(?) = 37 dr. 3 ob.	P. Cairo Zen. 3 59319, 2
249, Dios 4	Fayyum?	καυνάκης	18.75 dr.	2 cloaks, with wool of 30 minas(?) = 37 dr. 3 ob.	P. Cairo Zen. 3 59319, 7

Table 3.13.18 Socks and Leggings

Date	*Location*	*Commodity*	*Unit Price (per pair of socks)*	*Original Price*	*Source Text*
(263-229)	Fayyum?	ποδεί(ων) ζεῦ(γος)	1.1667 dr.	2 pairs of socks = 2 dr. 2 ob.	P. Cairo Zen. 4 59778, 5
(263-229)	Arsinoites? or Lower Egypt? or Herakleopolites?	ποδεί(ων) ζεῦ(γος)	4 minas of ?	1 pair of socks = 4 minas (of wool? or of iron?)	P. Cairo Zen. 4 59782a, 69
249, Dios 4	Fayyum?	ποδεί(ων) ζεῦ(γος)	4 dr.	1 pair of socks = 4 dr.	P. Cairo Zen. 3 59319, 3
249, Dios 4	Fayyum?	ποδεί(ων) ζεῦ(γος)	4 dr.	1 pair of socks = 4 dr.	P. Cairo Zen. 3 59319, 8-9

Table 3.13.19 Theristra

Date	*Location*	*Commodity*	*Unit Price (per garment)*	*Original Price*	*Source Text*
216, Artemisios	Oxyrynchites (Upper Egypt)	θἐριστρα καινὰ		new theristra = 2 dr.*	BGU 6 1283, 14

* No quantity is specified.

Table 3.13.20 Skepanismos Cloth

Date	*Location*	*Commodity*	*Unit Price (per garment)*	*Original Price*	*Source Text*
(mid-3rd c.)	Krokodilopolis (Fayyum)	σκεπανισμοῦ		skepanismos-cloth: 16 (dr.)	P. Tebt. 3 1077 descr., 6

Table 3.13.21 Threadbare Cloaks

Date	*Location*	*Commodity*	*Unit Price (per cloak)*	*Original Price*	*Source Text*
(after 241)	Fayyum?	τριβώνιον	3 dr.	1 threadbare cloak stolen, worth 3 dr.	P. Cairo Zen. 4 59659, 20
(211 - mid-2nd c.)	Egypt	τρίβων		(pawn payment) on a threadbare cloak = 140 dr.	SB 22 15236 Fragment 2, 2/43

Table 3.13.22 Ragged Garments

Date	*Location*	*Commodity*	*Unit Price (per garment)*	*Original Price*	*Source Text*
(263-229)	Fayyum?	ῥάκος	4 dr.	1 ragged garment = 4 dr.	P. Mich. Zen. 90, 6

Appendix 3.12 Other Commodities

Table 3.12.1 Sheepskins

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Egypt	ὤια	.08 dr./sheepskin	25 sheepskins = 2 dr.	BGU 6 1495, 44
3rd. cent.	Fayyum	ὤα		sheepskin = 1 ob.	P. Petrie 3 142, 3
210, Phamenoth	Tebtunis (Fayyum)	ὤα	.5 ob.	20 sheepskins at a rate of .5 ob. [...]	P. Tebt. 3 884 Fr. 1, 1/14
210, Phamenoth	Tebtunis (Fayyum)	ὤα		sheepskin, looking = 4 ob.	P. Tebt. 3 884 Fr. 1, 1/19
(about 200)	Fayyum	ὤα	40 (dr.)	1? sheepskin = 40 (dr.)	P. Tebt. 3 885, 51

Table 3.12.2 Fleeces

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
218, Phamenoth 27	Magdola (Medinet Nehas)	πόκος		118 fleeces at 4 dr. 5 ob. 2 chalkoi per fleece	P. Enteux. 2, 3

Table 3.12.3 Sponges

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
259, Artemisios	Fayyum?	σπόγγος τραχύς (hard sponges)	8 dr./phormos	1 phormos-basket = 8 dr.	P. Cairo Zen. 1 59012, 3/56
259, Artemisios	Fayyum?	σπόγγος μαλακός (soft sponges)	12 dr./phormos?	1 phormos? = 12 dr.	P. Cairo Zen. 1 59012, 3/57

Table 3.12.4 Water

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Upper Egypt	ὕδωρ		water = 2 ob.	O. Strasb. 1 584, 3
3rd. cent.	Fayyum	ὕδωρ		4 ob.	P. Petrie 3 137, 2/12
3rd. cent.	Fayyum	ὕδωρ		water = .25 ob.	P. Petrie 3 142, 26
243, Mesore 18	Thebes (Upper Egypt)	ὕδωρ		water = 1 ob.	UPZ 2 158 A, 25/157
210, Phamenoth	Tebtunis (Fayyum)	ὕδωρ		water = .75 ob.	P. Tebt. 3 884 Fr. 1, 1/9

Table 3.12.5 Wax

Date	*Location*	*Commodity*	*Unit Price (per mina of wax)*	*Original Price*	*Source Text*
(3rd c.)	Tebtunis (Fayyum)	κήρωμα	5 ob.	wax tablet: 5 ob.	P. Tebt. 3 1078 descr. vo., 27
(263-229)	Fayyum?	κηρός	.6667 dr.	15 minas wax = 10 dr.	P. Cairo Zen. 5 59847, 26
(263-229)	Fayyum?	κηρός	1.7917 dr.	wax for bronze-casting: 1 dr. 4.75 ob. per mina	P. Cairo Zen. 4 59662, 5
(263-229)	Fayyum?	κηρός	1.6667 dr.	6 minas wax at a rate of 1 dr. 4 ob. = [10 dr.]	P. Cairo Zen. 4 59767, 6-7
(263-229)	Philadelphia? (Fayyum)	κηρός	.4333 dr. (26 dr./talent)	11 talents wax at a rate of 26 (dr.) = 286 dr.	P. Cairo Zen. 4 59790, 21
255/4, Pachons-Payni	Fayyum?	κηρός	.5417 dr.	25.75 minas wax at a rate of 3.25 ob. = 13 dr. 5 ob.	P. Cairo Zen. 4 59764, 11
253, Pharmouthi 19	Mendes? (Lower Egypt)	κηρός	.7333 dr. (44 dr./talent, inc. tax)	usual price of 1 talent wax, including the toll at Memphis = 44 dr.	P. Cairo Zen. 5 59823, 2

Table 3.12.5 Wax (cont.)

Date	*Location*	*Commodity*	*Unit Price (per mina of wax)*	*Original Price*	*Source Text*
253, Pharmouthi 19	Mendes? (Lower Egypt)	κηρός	.6667 dr. (40 dr./talent)	Zenon has been told that the price with Promethion is 40 dr.(/talent)	P. Cairo Zen. 5 59823, 3
253, Pharmouthi 19	Mendes? (Lower Egypt)	κηρός	.8 dr. (48 dr./talent)	but Promethion says his costs are 48 dr.(/talent)	P. Cairo Zen. 5 59823, 4
248/7	Fayyum?	κηρός	.8 dr.	20 minas wax = 16 dr.	P. Mich. Zen. 61, 26
(late 3rd c. BCE)	Elephantine (Upper Egypt)	κηροῦ		wax ... 2 dr.	Greek medical papyri (GMP) 2 11, 1

Table 3.12.6 Papyrus Rolls

Date	*Location*	*Commodity*	*Unit Price (per roll)*	*Original Price*	*Source Text*
(about 259)	Palestine? or Alexandria?	χάρτης	.6667 dr.	60 papyrus rolls = 40 dr.	P. Cairo Zen. 1 590102/20
(258-256)	Fayyum?	(χάρτης)	.5833 dr.	10 papyrus rolls = 5 dr. 5 ob.	P. Cairo Zen. 4 59687, 9
257 or 258	Fayyum?	χάρτης	.5833 dr.	60 papyrus rolls = 35 dr.	P. Col. Zen. 1 4, 2/?
(258-256)	Fayyum?	χάρτης	.5833 dr.	60 papyrus rolls = 35 dr.	P. Cairo Zen. 4 59687, 6
(258-256)	Fayyum?	χάρτης	.5833 dr.	10 papyrus rolls = 5 dr. 5 ob.	P. Cairo Zen. 4 59687, 7
(258-256)	Fayyum?	χάρτης	.5833 dr.	10 papyrus rolls = 5 dr. 5 ob.	P. Cairo Zen. 4 59687, 8
256, Choiak 28	Fayyum	χάρτης		400 dr. in silver have been paid to Iatrokles for the papyri which are being manufactured in Tanis for Apollonios	PSI 4 333, 13-15
250, Choiak 1	Fayyum?	χάρτης	1.1667 dr./roll	5 papyri = 5 dr. 5 ob.	PSI 6 572, 3

Table 3.12.7 Roses

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(263-229)	Philadelphia (Fayyum)	ῥόδον		.75 ob.	P. Cairo Zen. 4 59735, 5
252	Philadelphia (Fayyum)	ῥόδον		60 dr.*	P. Cairo Zen. 2 59269, 7
252	Philadelphia (Fayyum)	λυχνίς (rose campion, used in garlands)		13 dr.	P. Cairo Zen. 2 59269, 39

* No quantity is specified, but this does represent all the roses from one garden from one year.

Table 3.12.7 Violet

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(270-258?)	Fayyum	ἴον		violet = 2 ob.	SB 8 9860b, 4
255/4, Pachons-Payni	Fayyum?	ἴον	2.5 dr./mina	1.5 (minas) violet at 2 dr. 3 ob. (per mina) = 4.5 ob.	P. Cairo Zen. 4 59764, 14

Table 3.12.8 Crowns

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Fayyum	στέφανοι		crowns = 1 ob.	P. Petrie 3 142, 28
(3rd c.)	Tebtunis (Fayyum)	στέφανοι		crowns: an obol	P. Tebt. 3 1078 descr. vo., 26
(mid-3rd c.)	Fayyum	στέφανοι		crowns: 4 ob.	SB 12 10863, 1-2
(mid-3rd c.)	Fayyum	στέφανοι		crowns: 1 ob.	SB 12 10863, 4
(mid-3rd c.)	Egypt	στεφάνια		crowns = .25 ob.	SB 24 16067 Fragment e, 3
246/5	Fayyum	στέφανος	3.5 dr.	a crown: 3 dr. 3 ob.	PSI 4 388, 5
231, Thoth 19 or 206, Thoth 19	Fayyum	στέφανος		crown = 3 ob.	P. Petrie 3 136, 3/23
(about 200)	Fayyum	στέφανοι		crowns = 1 (dr.)	P. Tebt. 3 885, 17

Table 3.12.9 Ivy

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
257, Choiak 2	Herakleopolis (Upper Egypt)	κισσός		for ivy: .75 ob.	P. Sorb. 1 16, 13

Table 3.12.10 Rue

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
210, Phamenoth	Tebtunis (Fayyum)	πήγανον		rue = .5 ob.	P. Tebt. 3 884 Fr. 1, 1/8

Table 3.12.11 Reeds and Rushes

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
230 or 205, Thoth	Thebes (Upper Egypt)	θρύα		.5 ob + 2 chalkoi	O. Bodl. 1 307, 12
253, Tybi	Fayyum?	θρύα		3 ob.	P. Col. Zen. 1 43, 5
253, Payni	Fayyum?	θρύα		2 dr. 5 ob.*	P. Col. Zen. 1 43, 10
246, Tybi 30	Philadelphia? (Fayyum)	θρύα		1.5 ob.	P. Col. Zen. 2 80, 19
(223-218)	Fayyum	θρύον	3 dr./reed	4 reeds which were worth 12 dr.	P. Sorb. 3 106, 6-7

* No quantity is specified, but it should be roughly the amount of reeds necessary to caulk a small boat.

Table 3.12.12 Wood

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Upper Egypt	ξύλον		firewood = 1.25 ob.	O. Strasb. 1 584, 4
3rd. cent.	Fayyum	ξύλα		wood = 1 chalkous	P. Petrie 3 137, 1/13
3rd. cent.	Fayyum	ξύλα		wood = 4 ob.	P. Petrie 3 139a, 2/4
3rd. cent.	Fayyum	ξύλα		wood = .5 ob.	P. Petrie 3 140a, 3

Table 3.12.12 Wood (cont.)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
3rd. cent.	Upper Egypt	ξύλον		firewood = 1.25 ob.	O. Strasb. 1 584, 4
3rd. cent.	Fayyum	ξύλα		wood = 1 chalkous	P. Petrie 3 137, 1/13
3rd. cent.	Fayyum	ξύλα		wood = 4 ob.	P. Petrie 3 139a, 2/4
3rd. cent.	Fayyum	ξύλα		wood = .5 ob.	P. Petrie 3 140a, 3
3rd. cent.	Fayyum	ξύλα		woos = .25 ob.	P. Petrie 3 140a, 5
3rd. cent.	Fayyum	ξύλα		wood = .25 ob.	P. Petrie 3 140d, 3
3rd. cent.	Fayyum	ξύλα		wood = .25 ob.	P. Petrie 3 142, 5
3rd cent., Phaophi 5	Thebes (Upper Egypt)	ξύλον		wood = 2 1/2 1/4 ob.	UPZ 2 158 B, 1/10
(mid-3rd c.)	Fayyum	ξύλα		wood: .5 ob.	SB 12 10863, 1
(mid-3rd c.)	Fayyum	ξύλα		wood: .75 ob.	SB 12 10863, 5
(mid-3rd c.)	Fayyum	ξύλα		wood: .5 ob.	SB 12 10863, 15
(257, Phaophi 2)	Fayyum	ξύλον	.3636 dr.	timber pieces: 33 6-cubit measures, at a rate of 4 dr. per [11] timber pieces = 33 timber pieces (for) 12 dr.	SB 26 16504, 5-7
(257, Phaophi 2)	Fayyum	ξύλον	.3333 dr.	another 6 (timber pieces), 6-cubit measures = 2 dr.	SB 26 16504, 8
(257, Phaophi 2)	Fayyum	ξύλον	.5 dr.	16 timber pieces, 8-cubit measures, at a rate of 3 ob. = 8 dr.	SB 26 16504, 9-10
(257, Phaophi 2)	Fayyum	ξύλον	.25 dr.	9 timber pieces, at a rate of 1.5 ob. = 2 dr. 1.5 ob.	SB 26 16504, 11-12
(257, Phaophi 2)	Fayyum	ξύλον	.6667 dr.	2 timber pieces, at a rate of 4 ob. = 1 dr. 2 ob.	SB 26 16504, 13-14
(257, Phaophi 2)	Fayyum	ξύλον	.5 dr. per 8-cubit measure	4 timber pieces at a rate of 8 cubits for 3 ob. = 8 dr.	SB 26 16504, 15-16

Table 3.12.12 Wood (cont.)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
243, Epeiph 30	Thebes (Upper Egypt)	ξύλον		wood = 1/2 1/4 ob.	UPZ 2 158 A, 2/9
243, Mesore 1	Thebes (Upper Egypt)	ξύλον		wood = 1/2 ob.	UPZ 2 158 A, 2/14
243, Mesore 2	Thebes (Upper Egypt)	ξύλον		wood = 1/2 ob.	UPZ 2 158 A, 3/20
243, Mesore 3	Thebes (Upper Egypt)	ξύλον		wood = 1/2 1/4 ob.	UPZ 2 158 A, 4/25
243, Mesore 4	Thebes (Upper Egypt)	ξύλον		wood = 1/2 ob.	UPZ 2 158 A, 5/37
243, Mesore 5	Thebes (Upper Egypt)	ξύλον		wood = 1/2 ob.	UPZ 2 158 A, 7/47
243, Mesore 6	Thebes (Upper Egypt)	ξύλον		wood = 1/2 ob.	UPZ 2 158 A, 8/55
243, Mesore 8	Thebes (Upper Egypt)	ξύλον		wood = 1/4 ob.	UPZ 2 158 A, 12/77
243, Mesore 9	Thebes (Upper Egypt)	ξύλον		wood = 1/2 ob.	UPZ 2 158 A, 12/81
243, Mesore 11	Thebes (Upper Egypt)	ξύλον		wood = 1/2 ob.	UPZ 2 158 A, 15/101
243, Mesore 12	Thebes (Upper Egypt)	ξύλον		wood = 1/4 ob.	UPZ 2 158 A, 17/117
243, Mesore 13	Thebes (Upper Egypt)	ξύλον		wood = 1/4 ob.	UPZ 2 158 A, 18/123
243, Mesore 14	Thebes (Upper Egypt)	ξύλον		wood = 1/4 ob.	UPZ 2 158 A, 19/132

Table 3.12.12 Wood (cont.)

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
243, Mesore 15	Thebes (Upper Egypt)	ξύλον		wood = 1/2 ob.	UPZ 2 158 A, 21/141
243, Mesore 16	Thebes (Upper Egypt)	ξύλον		wood = 1/2 ob.	UPZ 2 158 A, 22/148
243, Mesore 18	Thebes (Upper Egypt)	ξύλον		wood = 1/2 ob.	UPZ 2 158 A, Vo 2/168

Table 3.12.13 Tamarisk Wood

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(240 or 215), Epeiph 5	Fayyum	ξύλα μυρίκινα	3 dr. and 2 dr.	30 wood, with 20 at a rate of 3 dr. = 60 dr., and 10 at a rate of 2 dr. = 20 dr., = total 80 dr.	SB 16 12823, 9-14

Table 3.12.14 Willow

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(332-30)	Thebes (Upper Egypt)	*trꜣ(.t) ꜥꜣ.t*	6 deben/mḏꜣ.t = 72 deben/artaba?	0.5 *mḏꜣ.t* = 3 deben	O. Leiden Dem. 204, 2

Table 3.12.15 Wood Ashes

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(270-258?)	Fayyum	σποδός		wood-ashes = 4 dr.	SB 8 9860b, 4

Table 3.12.16 Fir Resin

Date	*Location*	*Commodity*	*Unit Price (per metretes)*	*Original Price*	*Source Text*
(Ptolemaic)	Thebes (Upper Egypt)	*sfy*	8.3333 dr.	3 hin = 90 deben	O. Leiden Dem. 96, 1/5

Table 3.12.17 Vine Prop

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
247, Phaophi 23	Fayyum?	χάραξ		1.5 ob.	P. Col. Zen. 2 76, 6-7
247, Phaophi 23	Fayyum?	χάραξ	.00006667 dr.	65,000 vine-props at 4 ob. per 10,000 = 4 dr. 2 ob.	P. Col. Zen. 2 76, 6-7

Table 3.12.18 Earth

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
259, Artemisios	Fayyum?	γῆς Σαμίας (Samian earth)	10 dr./stamnos	2 stamnoi at a rate of 10 (dr./stamnos), making 20 (dr.)	P. Cairo Zen. 1 59012, 2/45

Table 3.12.19 Lye

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
243, Mesore 16	Thebes (Upper Egypt)	κονία		lye = 2 dr. 3 ob.	UPZ 2 158 A, 22/154

Table 3.12.20 Stones

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(263-229)	Fayyum?	λίθος	66.8333 dr.?*	125? stones (at a rate of) 68 dr. 5 ob. = 284 dr.	P. Cairo Zen. 4 59760, 2-3
(263-229)	Fayyum?	πέτρα	.01 dr.	400 stones per 4 dr.	P. Lond. 7 2054, 13
255/4	Fayyum?	λίθος	.1667 dr.	1162 stones at a rate of 1 ob. = 193 dr. 4 ob.	P. Cairo Zen. 4 59757, 3

* The math in this case does not work out properly, and this price seems far too high.

Table 3.12.21 Gravel

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(263-229)	Fayyum?	χάλιξ	.25 dr./naubion	1.5 ob. per naubion	P. Lond. 7 2054, 5-6

Table 3.12.22 Asphalt

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(263-229)	Fayyum?	ἄσφαλτος	1 dr./mina	2 minas asphalt = 2 dr.	P. Cairo Zen. 5 59847, 27-28

Table 3.12.23 Raw Pitch

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(late 3rd c. BCE)	Elephantine (Upper Egypt)	πίσσης		raw pitch, .25 [dr.]	Greek medical papyri (GMP) 2 11, 2

Table 3.12.24 Bricks

Date	*Location*	*Commodity*	*Unit Price (per brick)*	*Original Price*	*Source Text*
302, Thoth	Djeme, Thebes west (Upper Egypt)	*tby qpy*	.00005 deben/brick	2000 vaulting brikcs, at a rate of 1000 for .5 silver qite = 1 silver qite	P. Phila. Dem. 30, 1/2
302, Thoth	Djeme, Thebes west (Upper Egypt)	*tby n qt*	.00005 deben/brick	6000 bricks for building, at a rate of 4000 bricks for 2 silver qite = 3 silver qite	P. Phila. Dem. 30, 1/3
3rd. cent.	Fayyum	πλίνθος	.0015 dr./brick	at a rate of 15 dr. for 10,000 bricks, buy 30,000 bricks for 45 dr. (corrected from "for 20,000 bricks, 30 dr. in bronze")	P. Petrie 3 46 (1), 24
3rd. cent.	Fayyum	πλίνθος	.0080 dr./brick	5000 bricks = 40 dr.	P. Petrie 3 46 (4), 7
(263-229)	Fayyum?	πλίνθος	.0015 dr.	5500 bricks = 8 dr. 1.5 ob.	P. Cairo Zen. 3 59480, 6-7
(263-229)	Fayyum?	πλίνθος	.0004 dr.	3000 bricks at 2.5 ob. per 1000 = 1 dr. 1.25 ob.	P. Zen. Dem. 15 descr. + PSI 5 546, 8-9
(260-240)	Fayyum	πλίνθος	.0080 dr./brick	2000 bricks at the rate (of 80 dr.) for 10,000 bricks = 16 dr.	P. Petrie 3 46 (3), 3-4
(260-240)	Fayyum	πλίνθος	.0080 dr./brick	9960 bricks at a rate (of 80 dr.) for 10,000 bricks = 79 (dr.) 4 ob.	P. Petrie 3 46 (3), 13
254, Payni 1	Philadelphia? (Fayyum)	(πλίνθος)	.0015 dr.	20,000 bricks = 30 dr.	P. Col. Zen. 1 36, outer/2
254, Payni 1	Philadelphia? (Fayyum)	(πλίνθος)	.0015 dr.	10,000 bricks = 15 dr.	P. Col. Zen. 1 36, outer/3
254, Payni 1	Philadelphia? (Fayyum)	(πλίνθος)	.0015 dr.	10,000 bricks = 15 dr.	P. Col. Zen. 1 36, outer/4
254, Payni 1	Philadelphia? (Fayyum)	(πλίνθος)	.0015 dr.	10,000 bricks = 15 dr.	P. Col. Zen. 1 36, outer/5
254, Payni 1	Philadelphia? (Fayyum)	(πλίνθος)	.0015 dr.	10,000 bricks = 15 dr.	P. Col. Zen. 1 36, outer/6

Table 3.12.24 Bricks (cont.)

Date	*Location*	*Commodity*	*Unit Price (per brick)*	*Original Price*	*Source Text*
254, Payni 1	Philadelphia? (Fayyum)	(πλίνθος)	.0015 dr.	10,000 bricks = 15 dr.	P. Col. Zen. 1 36, inner/12
254, Payni 1	Philadelphia? (Fayyum)	(πλίνθος)	.0015 dr.	10,000 bricks = 15 dr.	P. Col. Zen. 1 36, inner/13
254, Payni 1	Philadelphia? (Fayyum)	(πλίνθος)	.0015 dr.	10,000 bricks = 15 dr.	P. Col. Zen. 1 36, inner/14
254, Payni 1	Philadelphia? (Fayyum)	(πλίνθος)	.0015 dr.	10,000 bricks = 15 dr.	P. Col. Zen. 1 36, inner/15
254, Payni 1	Philadelphia? (Fayyum)	πλίνθος	.0015 dr.	20,000 bricks = 30 dr.	P. Col. Zen. 1 36, inner/11
252, Pharmouthi 2	Fayyum?	πλίνθος	.0015 dr.	10,000 bricks = 15 dr.	P. Cairo Zen. 5 59825, 14

Table 3.12.25 Nails

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(263-229)	Fayyum?	ἦλος		baskets of nails = 4 ob.	P. Col. Zen. 2 94, 7
253, Tybi	Fayyum?	ἦλος		nails = 3.5 ob.	P. Col. Zen. 1 43, 7

Table 3.12.26 Gold

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(early 2nd c.)	Herakleopolis? (Upper Egypt)	χρυσίου	6000 dr./talent	uncoined gold, 3 (τεταρτῶν) at a rate of 1500 dr./tetarte	P. Tebt. 3 890 , 4/89
(early 2nd c.)	Herakleopolis? (Upper Egypt)	χρυσίου	3600 dr./talent	uncoined gold, 1.5 tetartes, at a rate of 900 (dr./tetarte) = 2250 dr.	P. Tebt. 3 890 , 12/208

Table 3.12.27 Silver

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(early 2nd c.)	Herakleopolis? (Upper Egypt)	ἀργυρίου	200 dr./talent	uncoined silver, 32 at a rate of 1600 for 8 talents = 3200	P. Tebt. 3 890 , 4/84-86

Table 3.12.28 Copper Flakes

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(late 3rd c.)	Elephantine (Upper Egypt)	λεπιδ[ίου χ]ạ̣λκοῦ		copper flakes, 2 dr.	Greek medical papyri (GMP) 2 11, 4

Table 3.12.29 Yellow Ochre

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
about 255/4	Fayyum?	ὤχρα	8 dr.?	1 mina yellow ochre at 8 dr. = 4 dr.*	P. Cairo Zen. 4 59764, 13

* The math in this case does not work out properly.

Table 3.12.30 Red Ochre

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(263-229)	Fayyum?	μίλτος	.1667 (dr./mina)	.5 (mina?) red ochre = (2 ob.?)	P. Cairo Zen. 5 59847, 28-29
255/4, Pachons-Payni	Fayyum?	μίλτος	60.1667 dr./mina(??)	.5 (mina?) 3 ob. red ochre = 30 dr. 1/2 ob.(?)	P. Cairo Zen. 4 59764, 15

Table 3.12.31 Red Dye

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
257, Tybi 7	Fayyum?	ἐρυθρύδα[ν]ọ̣[ν]	25 dr./talent	3 talents red dye = 75 dr.	P. L. Bat. 20 22, 6-7
257, Tybi 7	Fayyum?	ἐρυθρύδα[ν]ọ̣[ν]	30 dr./talent	3 talents red dye = 90 dr.	P. L. Bat. 20 22, 7

Table 3.12.32 Lapis Lazuli

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
255/4, Pachons-Payni	Fayyum?	κύανος	.8333 dr./mina	2.625 minas lapis lazuli at a rate of 5 ob. = 2 dr. 1.25 ob.	P. Cairo Zen. 4 59764, 12

Table 3.12.33 White Lead

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
about 255/4	Fayyum?	ψιμύθιον	1.0833 dr./mina	5.375 minas white lead at a rate of 1 dr. .5 ob. = 5 dr. 5 ob.	P. Cairo Zen. 4 59764, 10

Table 3.12.34 Potter's Clay

Date	*Location*	*Commodity*	*Unit Price*	*Original Price*	*Source Text*
(about 200)	Fayyum	κέραμος	10 (dr.)	potter's clay (no quantity specified) = 10 (dr.)	P. Tebt. 3 885, 55

Appendix 3.13 Marriage-Related Annuities, Payments, and Penalties

Table 3.13.1 *ʿq-ḥbs* Contracts

Text Name	*Year*	*Money (deben)*	*Emmer (sacks)*	*Nḥḥ (hin)*	*Castor Oil (hin)*	*Unspecified Grain*
P. Hawara OI 2	331	1.2	36			
P. Eheverträge 10 + P. Ryl. Dem. 10	315	1.2			24	1/16 6-heqat daily
P. Hawara OI 3	311	1.2	36			
P. Eheverträge 13 + P. Phil. Dem. 14	264	0.6		12		1/16 4-heqat daily
P. Hawara OI 6	259	1.2	36			
P. Eheverträge 14 + Revue égyptologique 5 (1888), p. 90 & pl. 24 [2433] descr.	252	1.2		36		1/16 6-heqat daily
P. Hawara OI 8	243	1.8	36			
P. Hawara 1	239	1.2	36			
P. Hawara 2	235	2.4	72			
P. Eheverträge 17	230	2.4	72	24	24	
P. Eheverträge 19	225	1.2	36	12	12	
P. Eheverträge 20 + P. Phil. Dem. 25	223	1.2		12	12	1/16 6-heqat daily
P. Eheverträge 21	221	1.2	36	12	12	
P. Eheverträge 25 + P. Berl. Spieg. p. 7 no. 3075	210	2.4	36	12	12	
P. Köln Ägypt. 1 7	205	1.2	24			
P. Eheverträge 27 + P. Berl. Spieg. p. 17-18 no. 3145	201	2.4	36	12	12	
P. Eheverträge p. 148-150 no. 4 D + P. Eheverträge p. 150-152 no. 4 Z	199	2.4	72			
P. Eheverträge 31 + Acta Orientalia 23 (1958), p. 126 no. A	195	20	72			

Table 3.13.1 *ʿq-ḥbs* Contracts (cont.)

Text Name	*Year*	*Money (deben)*	*Emmer (sacks)*	*Nḥḥ (hin)*	*Castor Oil (hin)*	*Unspecified Grain*
P. Eheverträge 29	191	1.2		12		1/16 3-heqat daily
P. Eheverträge 30 + Acta Orientalia 23 (1958), p. 123-124 no. B	186		48			

Table 3.13.2 Annuity Contracts Related to Marriage

Text	*Date*	*Location*	*šp n sḫm.t (deben)*	*Divorce Penalty (deben)*	*sʿnḫ (deben)*	*ḥḏ n ỉr ḫm.t (deben)*	*φερνή (bronze drachmas)*	*Total Monetary Divorce Payment, Including Other Woman (deben)*	*ỉnw-Cloth (deben)*
P. Hawara OI 2	331	Hawara			10			10	
P. Eheverträge 10 + P. Ryl. Dem. 10	315	Djeme (Thebes west)	2	10				12	
P. Hawara OI 3	311/0	Hawara			10			10	
Revue d'Égyptologie (RdE) 35 (1984), p. 4-6	287	Thebes						5	0.4
P. Eheverträge 13 + P. Phil. Dem. 14	264	Djeme (Thebes west)	1	5				6	
P. Hawara OI 6	259	Hawara			10			10	
P. Eheverträge 14 + Revue égyptologique 5 (1888), p. 90 & pl. 24 [2433] descr.	252	Dios Polis (Thebes east)	1	20				21	
P. Hauswaldt Manning 4	(247-221)	Apollonopolites (Edfu)	1	1				2	0.6
P. Hawara OI 8	243	Hawara			21			21	

Table 3.13.2 Annuity Contracts Related to Marriage (cont.)

Text	*Date*	*Location*	*šp n sḥm.t (deben)*	*Divorce Penalty (deben)*	*sᶜnḫ (deben)*	*ḥḏ n ỉr ḥm.t (deben)*	*φερνή (bronze drachmas)*	*Total Monetary Divorce Payment, Including Other Woman (deben)*	*ỉnw-Cloth (deben)*
CPR 18 28	(after 232 or after 206)	Polemonos Meris					1000 dr. of bronze = 50 deben	50	
CPR 18 8	231 or 206	Samareia					600 dr. of bronze = 30 deben	30	
CPR 18 9	231 or 206	Samareia					500 dr. of bronze = 25 deben	25	
P. Eheverträge 17	230	Akhmim		10 deben, plus 400 emmer (ṯ ḥn 40)*				20	
P. Dem. Memphis 1	226	Memphis			21			21	
P. Recueil 7	226	Djeme (Thebes west)	1	2				3	1.6
P. Eheverträge 19	225	Djeme (Thebes west)	2	10				12	
P. BM Andrews 46	225/4	Armant							2
P. Eheverträge 20 + P. Phil. Dem. 25	223	Dios Polis (Thebes east)	1	5				6	
P. Eheverträge 21	*221*	*Akhmim*		*5 deben, plus 200 emmer (ṯ ḥn 40)†*				*10*	

Table 3.13.2 Annuity Contracts Related to Marriage (cont.)

Text	*Date*	*Location*	*šp n sḥm.t (deben)*	*Divorce Penalty (deben)*	*sᶜnḫ (deben)*	*ḥḏ n ỉr ḥm.t (deben)*	*φερνή (bronze drachmas)*	*Total Monetary Divorce Payment, Including Other Woman (deben)*	*ỉnw-Cloth (deben)*
P. Eheverträge 22 + MDAI Kairo 16 (1958), p. 2 & 4	220	Djeme (Thebes west)	1	5				6	
P. Hauswaldt Manning 6	219	Apollonopolites (Edfu)	2	2				4	0.6
P. Hauswaldt Manning 15	217/6	Apollonopolites (Edfu)	1	2				3	
P. Eheverträge 25 + P. Berl. Spieg. p. 7 no. 3075	210	Thebes		10				10	
P. Hauswaldt Manning 14	208	Apollonopolites (Edfu)	1	1				2	
P. Eheverträge 27 + P. Berl. Spieg. p. 17-18 no. 3145	201	Dios Polis (Thebes east)	2	10				12	
Enchoria 21 (1994), p. 45-46 no. 46	(199-30)	Pathyris							370
Enchoria 21 (1994), p. 47-48 no. 47	(199-30)	Pathyris							One for 300, one for 10
Enchoria 21 (1994), p. 54 no. 52	(199-30)	Pathyris							400

Table 3.13.2 Annuity Contracts Related to Marriage (cont.)

Text	*Date*	*Location*	*šp n sḫm.t (deben)*	*Divorce Penalty (deben)*	*sᶜnḫ (deben)*	*ḥḏ n ỉr ḫm.t (deben)*	*φερνή (bronze drachmas)*	*Total Monetary Divorce Payment, Including Other Woman (deben)*	*ỉnw-Cloth (deben)*
Bulletin of the Center of Papyrological Studies (BACPS) 26 (2009), p. 158-159 no. 4	(2nd cent.)	Gebelein?							1100
O. Leiden Dem. 276	(199-1)	Thebes							100
P. Äg. Handschr. 63 descr.	(about 198-118)	Aswan?							50
P. Eheverträge 28	198	Aswan	3	5				8	30
P. Eheverträge 31 + Acta Orientalia 23 (1958), p. 126 no. A	195/4	Fayyum				100 deben (ḫmt 24 r qt.t 2)		100	
P. Eheverträge 29	191	Thebes	1‡	5				6	
P. Tor. Botti 39	(189-100)	Deir el-Medina						100	250
Enchoria 21 (1994), p. 48 no. 48	(187-88)	Gebelein							400
Journal of the American Research Center in Egypt (JARCE) 2 (1963), p. 114	186	Deir el-Ballas			5				0.6
P. Eheverträge 30 + Acta Orientalia 23 (1958), p. 123-124 no. B	186	Philadelphia				90 deben (ḫmt 24 r qt.t 2)		90	
P. Eheverträge 30 + Acta Orientalia 23 (1958), p. 123-124 no. B	*186*	*Philadelphia*				*90 deben (ḫmt 24 r qt.t 2)*		*90*	

* Penalty is doubled if the man leaves to marry a new woman.
† Penalty is doubled if the man leaves to marry a new woman.

‡ This text does not include the actual term *šp n sḥm.t*, but this value immediately follows the statement that the man has made the woman his wife, so the positioning of the payment seems reasonable. Its value also seems comparable to the amount given in other texts.

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