

THE UNIVERSITY OF CHICAGO

THE IMPACT OF NAFTA ON PRICES AND COMPETITION: EVIDENCE FROM
MEXICAN MANUFACTURING PLANTS

A DISSERTATION SUBMITTED TO
THE FACULTY OF THE DIVISION OF THE SOCIAL SCIENCES
IN CANDIDACY FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

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CHICAGO, ILLINOIS

JUNE 2018

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To my wife, Lucila, for your unconditional support throughout this endeavor. This Ph.D. is as much yours as it is mine. To my parents, Mónica and Luis, for providing me with the tools I needed to complete this program and for your never-ending encouragement.

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ACKNOWLEDGMENTS

Empirical analyses for this thesis were conducted at the Microdata Laboratory Center of the Mexican Institute of Statistics and Geography (INEGI) in Mexico City. Conclusions and opinions expressed in this study are the sole responsibility of the author and are not part of the official statistics of the National Statistical and Geographic Information System nor INEGI. All results have been reviewed to ensure that no confidential information was disclosed. I thank my committee members Jonathan Dingel, Chad Syverson, and Felix Tintelnot for their invaluable input and support. I am grateful to Liliana Martínez, Carmen Marquez, Andrea Ortiz, and Natalia Volkow from INEGI Mexico City, and Gabriel Romero from INEGI Aguascalientes, for their help with the data. I also thank Rodrigo Adao and Ken Kikkawa for comments and discussions, and participants of the International Trade Working Group, the Applied Macro Working group, and the Macro Lunch at the University of Chicago. I am grateful for my friends Alp Tuncay, Arvid Viaene, Brenda Samaniego, Chien-Yu Lai, David Argente, Felipe Labbé, Jorge Rodríguez, José Tudón, Ken Kikkawa, Nick Tsivanidis, Nicolás Castro, Nuno Souza, Qi Li, Santiago Caicedo, Simone Lenzu, Victor Gay, Yu Ushioda and Yuan Mei at the University of Chicago. They provided me with support in every step of the program and their excellent comments significantly improved this work. Finally, I would also like to thank all my teachers at the University of Chicago for not only making me a better economist but for showing me the importance of asking questions no matter how big or small.

ABSTRACT

This thesis uses detailed plant-product-destination-level information from Mexican manufacturing plants to assess the impact of the North American Free Trade Agreement (NAFTA) on prices and competition in Mexico. Using a structural model of production, I decompose product prices into markups and marginal costs and analyze how NAFTA's tariff reductions affected these components. I find that declines in output tariffs, intermediate input tariffs and U.S. tariffs on Mexican products, led to significant reductions in the marginal cost of both domestic and exported products. These reductions, however, were not entirely passed through to consumers as producers increased their markups in response to declines in costs. For domestic products, I find evidence of pro-competitive gains from NAFTA, with declines in output tariffs lowering prices and markups. For exported products, I find that producers responded to cuts in U.S. tariffs on Mexican products by increasing prices and markups, as they took advantage of improved market access. My results demonstrate that while both Mexican consumers and producers benefitted from NAFTA, producers benefitted significantly more.

CHAPTER 1

INTRODUCTION

The signing of the North American Free Trade Agreement (NAFTA) by Canada, Mexico, and the United States was one of Mexico's most significant economic policy achievements during the second half of the 20th century. The agreement reshaped the Mexican economy by shifting it from a closed economy to an export-oriented one. One of the expected outcomes of the treaty was that increased foreign competition that resulted from a reduction in trade barriers would compel Mexican manufacturers to lower their markups and improve efficiency. Policymakers argued that Mexican consumers would benefit from an increase in competition. However, this outcome has so far escaped rigorous empirical scrutiny. Nevertheless, such evaluation is fundamental to understanding and appraising the full effects of NAFTA in particular, and of free trade agreements in general.

Identifying the competitive impact of free trade agreements on prices constitutes a difficult empirical challenge for a number of reasons. First, price data at a disaggregated product level for a broad set of industries is not publicly available. Second, even if one had sufficiently disaggregated price data, looking at prices alone is not enough to infer whether changes in prices are driven by changes in markups or marginal costs. Looking at this decomposition is important because it allows us to identify how the gains from the agreement were distributed between producers and consumers. Given that markups and marginal costs are not observable, a structural model must be used to estimate them. Finally, changes in trade policy tend to be endogenous making identification more difficult.

This work provides the first empirical assessment of the impact of a free trade agreement on prices and markups. To do this, I use a confidential dataset from Mexican manufacturing plants that includes disaggregated product-level data for the period 1994-2008, for a sample of plants that account for 85% of value added in manufacturing. The data contains

quantity and price (unit value) information for both domestic and exported products. I then use a model of production to decompose product prices into their markup and marginal cost components. I follow the empirical framework developed by de Loecker et al. (2016) to derive estimates of markups and marginal costs at the plant-product-destination level. The framework exploits first-order conditions of a plant's cost minimization problem to obtain estimates of markups, without the need to make assumptions about market structure or consumer preferences. Using these estimates, I analyze the effect of tariff declines on prices through their impact on their underlying markups and marginal costs.

Tariff declines from NAFTA can potentially affect markups and marginal costs of Mexican manufacturing plants via three different channels. First, a reduction in Mexican output tariffs, which are the tariffs applied by the Mexican authorities to goods coming from abroad, reduces the price of competing imported products. This increased competitive pressure can force Mexican producers to lower their markups and also compel them to become more productive (competition channel). Second, a decline in tariffs on intermediate inputs directly lowers the marginal cost for plants that use imported intermediate inputs (cost channel). Finally, a lowering of U.S. tariffs on Mexican products might lead producers to upgrade their technology and increase their productivity to export to the U.S. market, and allow incumbent Mexican exporters to raise their factory-gate prices and markups without increasing the after-tariff price paid by U.S. consumers (market access channel). I explore these three channels by looking at the impact of Mexican output tariffs, tariffs on intermediate inputs, and U.S. tariffs, on plant-product-destination-level prices, markups, and marginal costs. Their impact is identified by exploiting variation of these quantities within a plant-product-destination over time, controlling for changes in Macroeconomic conditions at the sectoral level. By focusing on the disaggregated product level, identification requires the plausible assumption that tariff cuts are exogenous at the level of individual plants and products. The circumstances surrounding negotiations of NAFTA suggest that

tariff declines were indeed exogenous. This exogeneity allows me to identify the causal impact of tariff declines from NAFTA on prices, markups and marginal costs operating through these three channels.

I find that NAFTA had significant effects on prices, markups and marginal costs through the competition channel. My estimates suggest that declines in output tariffs led to a reduction in the price and marginal cost of domestic products as plants became more efficient due to an increase in foreign competition. Prices declined by less than the decrease in costs leading to a slight increase in markups. The impact of output tariffs on markups of domestic products is capturing two distinct effects. First is the direct pro-competitive effect: cuts to output tariffs push producers to lower their markups because of increased competition. The second is the indirect effect coming from changes in marginal costs: because of incomplete pass-through of cost to prices, producers respond to reductions in costs by raising markups. The observed increase in markups suggests that the indirect effect dominates. By controlling for changes in marginal cost, I isolate the direct pro-competitive effects of output tariffs on markups and find that they are significant. For exported products, I find that declines in output tariffs led to reductions in marginal costs, which because of almost zero pass-through, led to a rise in markups.

My results on the impact of NAFTA operating through the cost channel are mixed. For exported products, I find that declines in tariffs on intermediate inputs led to sizable reductions in marginal costs. These marginal cost reductions were not passed through entirely to prices, leading to a substantial increase in the markup of exported products. For domestic products, however, I find that cuts in tariffs on intermediate inputs have no significant effect on marginal costs. This contrast reflects the fact that the majority of Mexican producers do not use imported intermediates, and the share of plants that do use them is higher among exporters.

Finally, I find significant evidence of the impact of NAFTA from the market access channel. Declines in U.S. tariffs on Mexican products led to a substantial reduction in the marginal costs of domestic and exported products as Mexican producers increased their productivity to export to the U.S. market. The reduction in marginal costs led producers to increase their markups because of incomplete pass-through. For exported products, I find that markups increased by more than the decline in marginal costs because the reduction in U.S. tariffs led producers to increase their prices on exported products. Lastly, I find that controlling for marginal costs, exporters responded to declines in U.S. tariffs applied to Mexican products by raising their markups. This is the first work to document this behavior during a trade liberalization episode.

My estimates imply that the observed average tariff declines during the 1994-2008 period led to a reduction in prices and marginal costs of domestic products of 3.4% and 8.2% respectively and an increase in their markups by 4.8%. For exported products, the reductions in tariffs led to a small rise in prices of 1.9%, a reduction in marginal costs of 27.9% and an increase in markups of 29.9%. These results suggest that while both Mexican consumers and producers benefitted from NAFTA, producers benefitted significantly more as they were able to increase their markups in response to declines in marginal costs.

1.1 Related Literature

This thesis builds on the existing industrial organization literature on markup estimation. In particular, it follows the methods developed by de Loecker and Warzynski (2012) and de Loecker et al. (2016) who use plant-and product-level information to arrive at an estimate of markups. Their methods rely on the estimation of production functions and identify markups from the wedge between the output elasticity of a variable input and its expendi-

ture share out of total revenue.¹ This work provides the first application of these methods to the estimate of product-destination-specific markups.²

My thesis is also associated with the theoretical literature that analyzes the competitive effects of a trade reform. Within this literature, my work is closest to the paper by de Blas and Russ (2015). Their paper studies a trade model with variable markups in which the endogenous distribution of markups responds to changes in trade costs.³ By lowering trade costs, trade liberalization indirectly reduces the residual demand for domestic goods, leading to a decline in domestic markups (pro-competitive effects) and an increase in welfare. However, in a regional free trade agreement, the increase in welfare is offset by a rise in foreign markups, what de Blas and Russ (2015) call the anti-competitive effects of trade liberalization, lowering overall gains from trade. My thesis contributes to this literature by providing the first empirical evidence for both pro-competitive and anti-competitive effects of trade liberalization.

My work is also related to the empirical literature analyzing the competitive effects of a trade liberalization. A recent contribution to this literature is de Loecker et al. (2016) who estimate product-level markups and analyze the Indian trade liberalization episode of

1. Production functions are estimated using proxy methods that are now standard in the literature. See Olley and Pakes (1996), Levinsohn and Petrin (2003), de Loecker (2011), de Loecker and Warzynski (2012), and Akerberg et al. (2015) for production function estimation at the plant level. de Loecker et al. (2016) and Garcia-Marin and Voigtländer (2016) are examples of production function estimation at the product level.

2. An alternative approach for markup estimation, exemplified by Berry et al. (1995), Goldberg (1995), and Goldberg and Hellerstein (2013), assumes a specification for preferences and market structure to derive estimates of markups. The detailed product-market-level data required as well as the particular assumption on market structure makes it impossible to use this approach for a broad set of industries like I do in this work.

3. Quantitative trade models, like that from Eaton and Kortum (2002) with perfect competition, and the monopolistic competition model of Melitz (2003), are unable to capture the competitive effects of trade liberalization since they assume constant markups. Even in models with variable markups, few predict changes to competition from liberalization. Bernard et al. (2003) and Arkolakis et al. (2017), for example, allow for variable markups and find that the distribution of markups is invariant to changes in trade costs.

the 1990's.⁴ They find that product-level markups in India increased during this period as marginal-cost declines, mainly driven by cuts in tariffs on intermediate inputs, were not entirely passed through to consumers in the form of lower prices. While my findings for domestic products are consistent with the results of de Loecker et al. (2016), the channels driving the results are different. In my work, declines in marginal costs of domestic products are driven by cuts in output tariffs and increased market access. An important difference between their paper and mine is that I distinguish between domestic and exported products. This distinction is important given that I study a free trade agreement and not a unilateral trade liberalization. In a free trade agreement, trade barriers decline on both sides of the border affecting both domestic and exported products. The effect, however, is not expected to be the same for domestic and exported products as a decline in trade barriers puts competitive pressure on local products while making exported products more competitive.

Finally, my thesis is related to the literature that examines effects of trade liberalization on productivity. This literature emphasizes two main channels through which trade liberalization raises productivity. The first channel is through increased foreign competition, as increased competitive pressure compels producers to reduce their X-inefficiencies.⁵ The second channel is through cheaper imported intermediate inputs which not only lower the cost of production but allow for substantial technological improvements by expanding the set of available inputs.⁶ Within this literature, my work is closest the papers of

4. Earlier contributions to this literature are the studies by Levinsohn (1993) on Turkey, Harrison (1994) on the Ivory Coast, and Krishna and Mitra (1998) on India.

5. Examples of papers that emphasize this channel include Trefler (2004) and Lileeva and Trefler (2010) for the Canada-U.S. Free Trade Agreement, and Pavcnik (2002), who studies trade liberalization in Chile.

6. The analysis of Amiti and Konings (2007) for Indonesia and Khandelwal and Topalova (2011) for India emphasize this second channel.

López-Córdova (2003) and Iacovone (2012) who analyze the impact of tariff declines during NAFTA on plant-level measures of revenue productivity from Mexican manufacturing plants. They find that reductions in Mexican output tariffs, tariffs on intermediate inputs, and U.S. tariffs applied to Mexican products, all lead to a significant increase in productivity. Their measure of revenue productivity, however, might result in biased estimates as it might be capturing changes in prices. If, for example, more efficient producers charge lower prices, this would be reflected as lower revenue productivity.⁷ My thesis, in contrast, analyzes the impact of tariff declines on marginal costs which are not contaminated by output prices.

1.2 Outline of the Thesis

The rest of the thesis is structured as follows. Chapter 2 gives a brief background on NAFTA. Chapter 3 describes the data set used in the estimation and performs a preliminary analysis on the impact of tariffs on prices. Chapter 4 presents the empirical framework used in the estimation of markups and marginal costs. Chapter 5 shows the results of the estimation and provides evidence on the validity of the estimates. Chapter 6 analyzes the impact of tariff reductions on prices, markups and marginal costs. Finally, Chapter 7 concludes. Additional results and further methodological details are included in Appendix 1 and Appendix 2.

7. See Garcia-Marin and Voigtländer (2016) for a detailed discussion on this point.

CHAPTER 2

BACKGROUND ON NAFTA

In this chapter, I discuss the history of NAFTA and the circumstances surrounding the negotiation as they are essential to understanding the identification strategy.

2.1 A Brief History of NAFTA

When Carlos Salinas assumed the Mexican presidency in December of 1988, the Mexican experiment with trade liberalization had already begun. Mexico joined the General Agreement on Tariffs and Trade (GATT) in 1986 agreeing on a 50% ceiling on its tariffs. A subsequent liberalization in 1987 reduced and homogenized tariffs to either zero, five, ten, or twenty percent, eliminated quotas and reduced the number of products covered by official import prices. Although these advances represented a significant break from Mexico's previous protectionist policies, significant barriers to trade remained. In 1993, for example, only 10% of manufacturing products had tariffs at or below 15%.¹

However, when Salinas began his presidency, further liberalization was not his priority. After nearly a decade of recession, high inflation, and a significant debt burden, Mexico had just started on a path to recovery. Salinas and his team of technocrats wanted to implement structural reforms to modernize the Mexican economy. A key element of these structural reforms was an increase in investment in multiple sectors. Unfortunately, the previous decade left the Federal Government without the funds needed to undertake the required investments. Also, prior debt binges and forced restructuring had locked out Mexico from international debt markets. The solution, the government decided, was to attract foreign direct investment. In January of 1990, the need for foreign direct investment led the

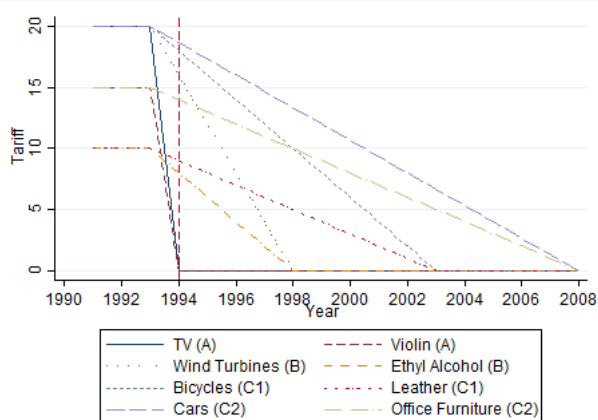
1. See Ten-Kate (1992) and López-Córdova (2003).

president and members of his cabinet to an unsuccessful roadshow across Europe. The fear of arbitrary expropriation by the Mexican authorities, as well as the integration of former communist countries to the European market, reduced the relative attractiveness of Mexico as an investment destination. Running out of options, the Mexican team tried one last gambit. During the final leg of the trip at the World Economic Forum in Davos Switzerland, President Salinas approached the U.S. Trade Representative, Carla Hills, with the idea of creating a single market between Mexico and the United States. The hope was that a single market would attract the foreign direct investment that further unilateral liberalization could not. Three years and eleven months later, after a period of intense negotiations, the North American Free Trade Agreement between Canada, Mexico, and the United States went into effect.

This account explains outcomes of NAFTA negotiations and the little influence that Mexican negotiators had in shaping them. Particularly, the urgency to reach an agreement by a Mexican government starved for funds led Mexican negotiators to concede to nearly every pressure from the dominant U.S. negotiators, and to a lesser extent, the Canadian negotiators. An account by Cameron and Tomlin (2002) of negotiations in Dallas in 1992 illustrates this point. They document that during those talks, Chief Mexican Negotiator Herminio Blanco wrote a memorandum to the Mexican negotiation team with a message along the lines of “show your cards, get to the bottom, there is no tomorrow.” The ensuing enthusiasm with which Mexican negotiators made concessions surprised Canadian and U.S. negotiators. This evidence, coupled with the fact that many provisions included in NAFTA came from the previous Canada-U.S. Free Trade Agreement (CUFTA), suggests that I can treat provisions from NAFTA as plausibly exogenous of the interests of Mexican industries, and more importantly for my purposes, from those of individual Mexican plants and product lines.

NAFTA was a comprehensive agreement that covered a range of issues, including market access, intellectual property, and investment protection provisions. I focus on the impact of one aspect of the agreement—the decline in tariffs. Under NAFTA, the Governments of Canada, Mexico and the U.S. agreed to eliminate tariffs on most of their products by the year 2008. Tariffs were scheduled to decline annually at a constant rate until they were completely phased out. However, there was substantial heterogeneity on the actual phase-out date with some products having the phase-out year of 1994, the year that NAFTA came into effect, others 1998, 2003 and others 2008. The following graph shows the Mexican tariff schedule for a sample of products.

Figure 2.1. Mexican Tariff Schedule Under NAFTA, Selected Products



The figure plots Mexico’s tariff decline schedule for a selected sample of products in different groups. Products in group A had to have their tariff phased out by the year 1994, those in group B by 1998, those in group C1 by 2003 and finally products in group C2 had to be phased out in 2008.

Source: NAFTA Agreement, Annex 302.2 Section B.

As we can see from Figure 2.1, heterogeneity in phase-out dates as well as on the initial level of tariffs before NAFTA led to substantial variation in yearly tariff cuts across products. I am going to exploit this heterogeneity in tariff cuts across products in the estimation of the impact of tariffs on prices, markups and marginal costs.

CHAPTER 3

DATA

This chapter describes the primary data sources used in the empirical analysis. I also analyze the impact of tariff declines from NAFTA on prices for the period 1994 to 2008.

3.1 Manufacturing Survey Data

I use manufacturing plant and product data from two surveys conducted and maintained by the Mexican Institute of Statistics and Geography (INEGI)-the Monthly Industrial Survey (EIM) and the Annual Industrial Survey (EIA), available for the 1994-2008 period. Both surveys cover initially the same set of plants based on the 1993 Economic Census. The EIA, however, was updated in 2003 to include new plants that were either opened after 1994 or were identified by INEGI after that year. Since my analysis requires information of variables from both EIA and EIM, I include only plants present in both the EIM and EIA in the estimation. These surveys classify plants according to a unique 6-digit class (similar to the 6-digit North American Industrial Classification System [NAICS] industry code) based on the *1994 Mexican Classification of Activities and Products (CMAP94)*, a precursor of NAICS. The surveys cover 206 six-digit classes in the manufacturing sector. The number of plants included was chosen to ensure that they covered at least 85% of value added in each class and that it contained all plants with more than 100 employees. The final sample of plants comprises around 85% of value added in manufacturing in Mexico. For a more detailed description of the sampling methodology and data, refer to Appendix A.1. These surveys, however, have some limitations. Although coverage concerning value added is excellent, the sample is skewed toward larger plants. Also, while the surveys track plant exit systematically, they do not record plant entry.

The EIM survey reports monthly data on employment and the wage bill at the plant level, and quantities and sales value of disaggregated products separated between products destined for the domestic and export market. The distinction of products between domestic and export markets is a unique feature of EIM. The data does not include the destinations of exports. However, Mexico's exports are highly concentrated, with more than 85% of exports going to the U.S. during the period examined. Since the majority of these products were going to the U.S., I assume that all exported products were destined for that country. Products are disaggregated at the 8-digit level and can be viewed as individual product lines. Table 3.1 below provides an example of the level of product disaggregation.¹

1. See Table A.1 and Table A.2 in the Appendix for further examples.

Table 3.1: Example of Products

CMAP94 CODE	Product Code	Description
31		Food and Beverages Sector
3112		Manufacturing of Dairy Products Subsector
311201		Processing and Packaging of Milk Industry
	311201001	Condensed Milk
	311201002	Dehydrated Milk
	311201003	Pasteurized Milk
	311201004	Pasteurized and Homogenized Milk
	311201005	Rehydrated Milk
	311201006	Ultra-Pasteurized Milk
		⋮
34		Paper Industries Sector
3410		Manufacturing of Cellulose and Paper Subsector
341021		Paper Manufacturing Industry
	341021001	Airmail Paper
	341021002	Bond Paper
	341021003	Copy Paper
	341021004	Paper for Textbooks
	341021005	Newsprint
	341021011	Corrugated paper for boxes
	341021012	Liner paper
		⋮

Note: CMAP94 corresponds to the Mexican Classification of Activities and Products. The first column shows the CMAP94 code for sector, subsector or industry. The second column includes the CMAP94 product code, and finally, the third column shows the description.

As the table shows, products are very disaggregated relative to other manufacturing surveys that include product or product line information. The availability of sales and quantity data by product allows construction of unit values as a measure of prices. I aggregate monthly values into annual data to match them with information from the EIA.

The EIA survey records plant-level yearly information on plant inputs, total production, and other detailed data on their operations. Most of the manufacturing plant data used in estimation, except for quantities and sales at the product level, came from this survey. I use material expenditures, total employment, capital, import and export status, research and development expenditures, and plant's state from this survey.² I deflate all monetary variables by their appropriate price deflator. For more information on the construction of the variables and other sources of external data used during estimation, see Appendix A.1.

I match the EIM and EIA surveys using a unique plant identifier provided by INEGI and construct a panel of approximately 180 thousand product-plant-year observations for 1994 through 2008. Tables 3.2 and 3.3 below, show the average statistics for the number of products and plants by sector.

2. I construct the capital series with the perpetual inventory method using investment by type and the initial book value of a capital stock. See Appendix A.1 for more details.

Table 3.2: Average Number of Plant-Product pair per Sector

Sector	# of Products			Avg. # of Products Per Plant		
	Total	Domestic	Exported	Total	Domestic	Exported [†]
	(1)	(2)	(3)	(4)	(5)	(6)
Food and Beverages	2,963	2,622	340	3.66	3.23	1.55
Textile Manufacturing	548	417	131	2.36	1.78	1.13
Apparel Manufacturing	1,240	1,091	149	3.00	2.64	1.13
Wood and Furniture	610	547	63	4.13	3.70	1.57
Paper Industries	850	752	98	2.62	2.33	1.16
Chemical Industries	2,908	2,348	561	4.11	3.31	1.66
Non-Metallic Minerals	839	708	130	2.86	2.40	1.67
Metallic Manufacturing	1,105	809	296	3.17	2.30	1.66
Machinery & Equipment	890	666	225	2.76	2.06	1.17

Notes: Columns 1–3 show the average number of plant–product pairs per sector for all years in the sample. Columns 4–6 show the average number of products per plant for all years in the sample.

[†]Average number of exported products for exporter plants.

Table 3.3: Summary Statistics on Plants

Sector	# of Plants				Average (Thousands of Dollars)			
	Total	Exporter	Single	Employees [†]	Sales	VA/Employees	Materials	Capital
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Food and Beverages	814	224	151	378.9	35,823.9	164.7	16,230.4	7,363.1
Textile Manufacturing	235	118	85	248.9	13,339.1	56.3	5,568.6	4,116.2
Apparel Manufacturing	410	135	143	148.9	4,864.8	25.5	2,217.0	771.4
Wood and Furniture	150	42	43	133.6	4,681.2	15.2	2,457.6	1,136.5
Paper Industries	318	81	165	210.5	16,761.4	45.5	6,907.1	5,543.5
Chemical Industries	707	339	167	244.0	24,221.0	48.6	10,123.2	6,940.8
Non-Metallic Minerals	292	79	125	212.1	19,815.1	67.6	2,938.7	9,455.3
Metallic Manufacturing	354	183	123	242.7	32,703.9	36.6	18,443.7	8,752.3
Machinery & Equipment	325	192	96	467.0	78,896.3	26.3	44,954.4	15,835.7

Notes: Includes sector-level averages of plant-level variables across all years in the sample. Units in columns 5–8 are in 1994 US dollars, converted from Mexican pesos using the average 1994 exchange rate. †Number of employees.

Table 3.2 shows the average number of plant-product-destination observations by sector, as well as the average number of products by a plant in the sample. As Table 3.2 shows, plants on average produce around three different products. The table also shows that exporter plants tend to export one or two products. Table 3.3 presents the number of plants in the sample as well as summary statistics of the main variables from the EIA that I use in the estimation by sector. The table shows that the majority of plants in the sample are multi-product and non-exporter plants. The number of single-product plants per sector in the sample is relatively large, however, which is going to be important for the empirical strategy.

3.2 Tariff Data

Tariff data for Mexico and the United States comes from the *World Bank's World Integrated Trade Solution*. Tariffs are available at the 6-digit HS-level. Since there is no concordance available between HS-6 classification and the Mexican *CMAP94* classification, I constructed the concordance manually. The process involved matching approximately 5,000 products in the *CMAP94* classification to one or sometimes multiple HS codes using the *CMAP94* product description provided by INEGI. When multiple HS-6 codes corresponded to a single *CMAP94* product, I used the average tariff across corresponding HS-6 codes. The concordance is included in Appendix B.1. Utilizing this concordance, I constructed a measure of output tariffs, that is the tariffs applied by the Mexican authorities to goods coming from the U.S., for each product in the *CMAP94* classification using the effectively applied tariffs from the World Bank. I also constructed a measure of U.S. tariffs applied to goods coming from Mexico using the concordance.

To derive a measure that captures the impact of cheaper access to imported intermediates that resulted from tariff declines under NAFTA, I construct class-level intermediate input tariffs using the Mexican input-output tables available from INEGI for 2003 at the 4-digit NAICS classification and match them to a *CMAP94* class classification using concordances provided by INEGI.³ To do this, I calculate the average output tariff within a class and then use direct and indirect requirement coefficients from the I-O table and this tariff to compute a weighted-average tariff. Formally, the intermediate input tariffs of plants from class j at time t is going to be given by:

$$\tau_{jt}^{input} = \sum_k \Phi_{kj} \cdot \tau_{kt}^{output}$$

3. This is the only I-O table available in Mexico with a high degree of disaggregation since I-O tables before 2003 are available only at a highly aggregated level.

where Φ_{kj} is class j 's share of intermediate inputs coming from class k , and τ_{kt}^{output} is the average output tariff in class k . See Subsection A.1.2 in the Appendix for more details on the construction of the tariffs measures.

Thus, output and U.S. tariffs vary at the product level, and intermediate input tariffs vary at the class level. The following table gives summary statistics on the tariff measures for the year 1993, the year before NAFTA started, and 2008, the last year in the sample.

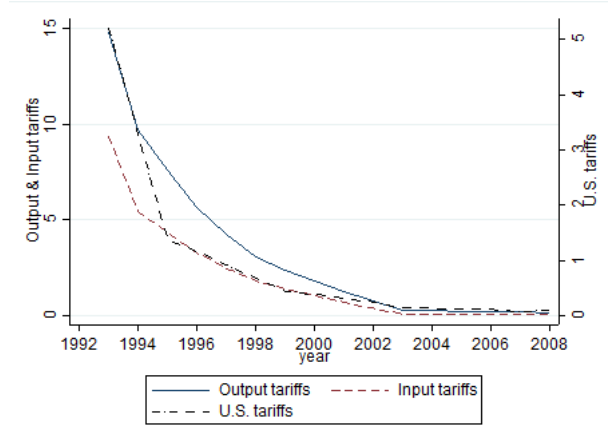
Table 3.4: Summary Statistics on Tariffs

	1993			2008			Difference	
	Mean	Median	S.D.	Mean	Median	S.D.	Mean	Median
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Output Tariffs	14.8	15.0	4.3	0.2	0.0	1.0	-14.6	-15.0
Intermediate Input Tariffs	9.4	9.2	2.3	0.1	0.0	0.0	-9.3	-9.2
U.S. Tariffs	5.2	4.3	4.5	0.1	0.0	0.5	-5.1	-4.3

Notes: The table shows the mean, median and standard deviation of the tariffs during 1993 and 2008 in percentage points. Columns 7 and 8 report the difference in means and medians, respectively, between 2008 and 1993.

As we can see from Table 3.4, output tariffs declined 14.6 percentage points on average during this period. The measure of intermediate input tariffs decreased by 9.3 percentage points. Finally, U.S. tariffs on Mexican products fell by only 5.1 percentage points as their level before NAFTA was lower than the initial level of Mexican tariffs. Figure 3.1 below shows the average of my three measures of tariffs for the period of 1993-2008.

Figure 3.1. Average Tariffs (1993-2008)



The figure plots the average of my measures output tariffs, intermediate input tariffs, and U.S. tariffs for the years 1993–2008. Output and intermediate input tariffs on the left scale. U.S. tariffs on the right scale.

3.3 The Impact of Tariff Declines on Prices

Before analyzing the decomposition of prices into markup and marginal costs, I examine the impact that declines in my tariff measures had on prices. I estimate the following specification separately for domestic and exported products:

$$\log P_{ijt} = \alpha + \beta_1 \tau_{it}^{output} + \beta_2 \tau_{jt}^{input} + \beta_3 \tau_{it}^{US} + \xi_{ij} + \psi_{st} + \varepsilon_{ijt}, \quad (3.1)$$

where P_{ijt} are prices of product i from plant j at time t , τ_{it}^{output} are Mexican output tariffs applied to product i , τ_{jt}^{input} are the intermediate input tariff of plant j , τ_{it}^{US} are the tariffs applied by the United States on goods i from Mexico, and ξ_{ij} and ψ_{st} are plant–product and sector-year fixed effects, respectively. Since the primary policy variable, output tariffs, varies at the product level, I cluster standard errors at the product level. As tariffs enter in levels in equation 3.1 and prices in logarithms, the coefficients β 's are semi-elasticities. That is, they measure the percent change in prices when tariffs increase by one percent-

age point. I include U.S. tariffs on Mexican products in the specification for two reasons. First, since most exported products go to the United States, changes in U.S. tariffs should affect their prices. Second, declines in U.S. tariffs might influence the behavior of Mexican plants, affecting both exported and domestic products. Iacovone and Javorcik (2012), for example, find that an increase in market access driven by a decline in U.S. tariffs stimulates investment by Mexican manufacturing plants as they prepare to introduce new products into the export market.

The coefficients on the tariffs are identified by exploiting variation in the dependent variable and tariffs within a plant-product-destination over time, controlling for changes in macroeconomic conditions at the sectoral level.

More on Identification: Exogeneity of Tariff Cuts:

The main concern with this specification is that tariff changes might be correlated with omitted factors that also affect Mexican sectoral outcomes. However, by focusing on the disaggregated product level, identification requires the more plausible assumption that tariff cuts are exogenous at the level of individual plant-product pairs. In this particular exercise, the main concern for identification would be if tariff schedules under NAFTA were set to protect specific products or industries. If this protectionism was a factor in determining tariff schedules, the previous specification would suffer from endogeneity problems as tariffs would be correlated with an omitted factor that also determines prices: protectionism. If this were the case, I would be overestimating, for example, the impact of output tariffs on prices.⁴

There is substantial evidence, both empirical and anecdotal, that endogeneity arising from protectionism is not likely to be the case. If tariffs were set with protectionism in

4. See Appendix A.2 for a formal argument.

mind, we would expect that products with high initial tariffs would face higher tariffs after NAFTA than the average product, and a slower tariff decline schedule. The data shows, however, that products with high initial tariffs faced the largest tariff declines from NAFTA (See Figure A.2 in the Appendix). Moreover, Kowalczyk and Davis (1998) present empirical evidence that indicates that phase-out periods for Mexican tariffs appear to be uncorrelated with their levels before NAFTA. From the anecdotal side, as discussed in Section 2.1, the circumstances surrounding negotiations of NAFTA suggest that Mexican negotiators had very little bargaining power in setting tariffs. Both sets of evidence suggest that I can treat tariff reductions under NAFTA as plausibly exogenous from the viewpoint of individual Mexican plant-product pairs during the analysis. I will, therefore, maintain the assumption that tariff cuts from NAFTA are exogenous for the rest of the thesis.

Another potential identification problem is that the three measures of tariffs are likely to be correlated so there might not be enough variation in the data to identify the coefficients in equation three separately. Table A.6 in the Appendix shows that the three tariff measures are indeed correlated, but the correlation is not perfect suggesting that there is enough variation leftover to identify the coefficients separately.

Results:

The Table below presents the results of the estimation of equation 3.1.

Table 3.5: Impact of Tariffs on Prices

	Domestic	Exported
	(1)	(2)
τ_{it}^{output}	0.13 ^a	0.04
	(.04)	(.08)
τ_{jt}^{input}	0.14	-0.00
	(.54)	(.14)
τ_{it}^{US}	0.05	-0.50 ^c
	(.14)	(0.30)
Total Impact (%)	-3.43 ^a	1.98
	(1.43)	(2.50)
Within R^2	0.073	0.035
N	145,887	28,738

Notes: The dependent variable is the log of prices. Column 1 uses the sample of domestic products and Column 2 the sample of exported products. The regressions exclude outliers in the top and bottom 1% of the markup distribution within each sector. Regressions include plant-product and sector-year fixed effects. Standard errors are clustered at the product level. I calculate the total impact of tariff declines by taking the average percentage point decrease in tariffs for the 1993-2008 period, -14.6, -9.3 and -5.1 for output, input and U.S. tariffs respectively, and multiplying them by their associated coefficients. Significance: a (1%), b (5%), and c (10%), respectively.

From Table 3.5, the coefficient on output tariffs of domestic products is positive and statistically significant. This result accords with the argument that increased foreign competition places competitive pressures on domestic producers, pushing them to reduce prices. The magnitude of the coefficient means that a one percentage point decline in tariffs leads to a 0.13% decline in prices. Coefficients for input and U.S. tariffs on domestic products are not statistically significant. Using the estimated coefficients and the observed average tariff

declines from 1993, before the beginning on NAFTA, to 2008, I find that tariff declines led to a statistically significant reduction in the prices of domestic products of 3.43%.

For exported products, the effect of declines in output tariffs or intermediate input tariffs on prices is not statistically significant. I find a statistically and economically significant impact of U.S. tariffs on the prices of exported products with estimates suggesting that a one percentage point decline in U.S. tariffs leads to a 0.50% increase in prices. Therefore, it appears that exporters are responding to the reductions in U.S. tariffs by raising prices, partially offsetting the decrease in tariffs. Prices, however, increase by less than the decline in U.S. tariffs suggesting that the after-tariff price paid by U.S. consumers is still declining. Finally, the observed decrease in tariffs seems to raise the price of exported products slightly, but this increase is not statistically significant.

To get a deeper understanding of the forces that drive the results in Table 3.5, I analyze the impact of tariffs on prices through their effect on marginal costs and markups. In the following chapter, I show the empirical framework used to decompose observed product-level prices into their unobserved markup and marginal cost components.

CHAPTER 4

EMPIRICAL FRAMEWORK

In this chapter, I set up and discuss the empirical framework used to recover markups and marginal costs at the product level for domestic and exported products. I use the framework developed by de Loecker et al. (2016) that relies on the estimation of quantity production functions and exploits a plant's first-order conditions to arrive at estimates of markups and marginal costs at the plant-product level.¹

Estimating production functions at the product level offers many advantages over standard plant-level estimation, but it also poses some important empirical challenges since it forces recognition of the multi-product nature of a plant. In particular, it forces me to deal with the fact that I do not observe input allocations at the product level in the data. I can surmount this challenge under some assumptions as will be demonstrated below. Essential to resolving this issue is the suggestion from de Loecker et al. (2016) that a researcher can estimate production functions using a sample of single-product plants, and then recover the unobserved input allocations for multi-product plants from restrictions imposed by the structural model. I follow methods from de Loecker et al. (2016) closely, with slight modification to the product definition to account for the unique features of the data.

As mentioned in Section 3.1, the data includes quantities and sales revenues separately for domestic and exported products. One issue is how to treat these products during estimation. I assume that domestic and exported varieties of the same disaggregated product category are distinct products, even if the same plant produced them. I treat, for example, bicycles destined for the domestic market as a different product than bicycles intended for the export market. I treat domestic and exported varieties as different products for two reasons. First, the quality of the products destined for the domestic market might be dif-

1. For a more general exposition of the framework see Appendix A.2 and de Loecker et al. (2016).

ferent than the quality of exported products within the same plant. If quality is positively correlated with consumer income, for example, we would expect that products exported to the U.S. to be of higher quality than those sold on the domestic market.² Second, since domestic and exported products are going to two different markets, they might respond very differently to changes in tariffs even if they are exactly the same physical product. This treatment is consistent with the model and evidence presented by Verhoogen (2008), in which a single plant manufactures products of varying qualities for different markets. Therefore, in what follows I treat each product-market pair as a distinct product. I describe the main elements of the framework below.

4.1 Recovering Markups and Marginal Costs

To obtain estimates of markups and marginal costs at the product level, I use a structural model of production. Consider the production function of product-market i from plant j in sector s at time t :

$$Q_{ijt} = F_i(M_{ijt}, L_{ijt}, K_{ijt}; \beta_s) \Omega_{jt}, \quad (4.1)$$

where Q_{ijt} is physical output, M_{ijt} is material inputs, L_{ijt} denotes labor inputs, K_{ijt} is capital inputs, β_s is the parameter vector of the production function that I assume is sector specific, and Ω_{jt} is Hicks-neutral productivity at the plant level. Ideally, I would have the parameters of the production functions to be product-destination or even product-specific. However, due to data limitations, I must restrict these parameters to be the same for all products within a sector.

2. See, for example, Linder (1961), Hallak (2006) and Hallak and Sivadasan (2013).

To estimate equation 4.1, I must make some additional assumptions. I assume that production function $F_i(\cdot; \beta_s)$ is product-market specific and twice differentiable with respect to materials, M_{ijt} . This assumption implies that a multi-product plant that produces SUVs and sedans, for example, uses the same production technology in the production of SUVs as a single-product plant that manufactures only SUVs. Their productivities are allowed to differ, however. I assume that all of the inputs used by a plant are allocated to the production of products and that the share of input expenditures by product is the same across all inputs. This last assumption means, for example, that if a product uses 20% of plant-level material expenditures, it must also use 20% of labor and 20% of capital. Finally, I assume that plants minimize short-run costs, taking quantities and input prices of materials, labor, and capital as given.

I follow the approach from Hall (1986) and subsequently refined by de Loecker and Warzynski (2012) and de Loecker et al. (2016), and use a plant's first-order conditions from its cost minimization problem to recover the model's implied markups. Consider the Lagrangian of the cost minimization problem of a product-market i from plant j at time t :

$$\begin{aligned} \mathcal{L}(M_{ijt}, L_{ijt}, K_{ijt}, \lambda_{ijt}) &= W_{ijt}^M M_{ijt} + W_{ijt}^L L_{ijt} + W_{ijt}^K K_{ijt} \\ &+ \lambda_{ijt} [\bar{Q}_{ijt} - Q_{ijt}(M_{ijt}, L_{ijt}, K_{ijt}, \Omega_{jt})] \end{aligned}$$

where $Q_{ijt}(M_{ijt}, L_{ijt}, K_{ijt}, \Omega_{jt}) = F_i(M_{ijt}, L_{ijt}, K_{ijt}; \beta_s) \Omega_{jt}$, λ_{ijt} is the Lagrange multiplier from the cost minimization problem, \bar{Q}_{ijt} is a given level of output, and W_{ijt}^M , W_{ijt}^L and W_{ijt}^K are the input prices of materials, labor, and capital respectively. Taking the first-order condition of the Lagrangian with respect to materials we have:

$$\frac{\partial \mathcal{L}_{ijt}}{\partial M_{ijt}} : W_{ijt}^M - \lambda_{ijt} \frac{\partial Q_{ijt}}{\partial M_{ijt}} = 0, \quad (4.2)$$

where λ_{ijt} in equation 4.2 is the marginal cost of production.³ Using this fact, I can rewrite first-order condition to get an expression for the markup of product-market i from plant j , μ_{ijt} , as:

$$\mu_{ijt} = \theta_{ijt}^M \times (\Psi_{ijt}^M)^{-1}, \quad (4.3)$$

where $\theta_{ijt}^M = \frac{\partial Q_{ijt}}{\partial M_{ijt}} \frac{M_{ijt}}{Q_{ijt}}$ is the output elasticity of material inputs, $\Psi_{ijt}^M = \frac{W_{ijt}^M M_{ijt}}{P_{ijt} Q_{ijt}}$ the expenditure share of materials in product i 's revenues, and P_{ijt} its sales price.⁴

The derivation of equation 4.3 highlights the need to have at least one input that is freely adjustable since it comes from the static, first-order condition of a plant's cost minimization problem. I use materials as the flexible input. Although in principle I could use labor as the flexible input, as de Loecker and Warzynski (2012), in a Mexican context, using labor might be problematic. Juarez and de la Cabada (2016) find significant labor market rigidities in Mexico from 1996 to 2011, that indicate adjustment costs and make labor a dynamic input, thus violating the validity of the first-order condition.

Equation 4.3 reveals the requirements to construct markups at the product level. I need an estimate of output elasticity, product revenue and input expenditures per product. Unfortunately, information on input expenditures by product within a plant is unavailable in the Mexican data. For example, the data includes total expenditures on labor, capital, and materials for a producer of bicycles and tricycles, but not what portions were allocated to the

3. The Lagrange multiplier tells us how much the objective function changes if we relax the constraint by one unit. In the cost minimization case, it tells us how much costs increase if we increase production by one unit, which is precisely the definition of marginal costs.

4. Under perfect competition, output elasticity equals the expenditure share, and the markup is therefore equal to one.

production of bicycles and tricycles separately.⁵ Moreover, under general production functions, such as the translog production function I use during estimation, output elasticities will depend on these unobserved input expenditures. One exception is the Cobb-Douglas production function. Under the assumptions described above, output elasticities of Cobb-Douglas production functions are constant across products in a sector. The downside is that all variation in product markups comes from differences in input expenditure shares. Because of this, I chose the more flexible translog specification.

For these reasons, I take additional steps to recover input expenditures by product for multi-product plants. I follow the procedure developed by de Loecker et al. (2016), that involves estimating the parameters of $F_i(\cdot; \beta_s)$ using single-product plants and employing these estimates and the equations implied by the structural model to recover these unobserved input expenditures. I develop this procedure in more detail below. Once I estimate the markup, I can obtain estimates of a product's marginal cost, MC_{ijt} , from:

$$MC_{ijt} = \frac{P_{ijt}}{\mu_{ijt}}.$$

Thus, once I estimate the markups, I have all of the elements needed to decompose the observed prices into unobserved markups and marginal costs.

4.2 Estimation of the Production Function

Allowing for log-additive measurement error in output, and taking logs of equation 4.1, I have:

$$q_{ijt} = f_i(\mathbf{x}_{ijt}; \beta_s) + \omega_{jt} + \varepsilon_{ijt}, \quad (4.4)$$

5. No manufacturing plant dataset reports information on input expenditures at the product level for all inputs.

where $\mathbf{x}_{ijt} = (m_{ijt}, l_{ijt}, k_{ijt})$ are the log of inputs, q_{ijt} the log of output, ω_{jt} the log of productivity, and ε_{ijt} the measurement error. Following the literature, I estimate a translog production function on materials, labor, and capital. The translog production function of product-market i of plant j in sector s is:

$$\begin{aligned}
f_i(m_{ijt}, l_{ijt}, k_{ijt}; \beta_s) = & \beta_{sm}m_{ijt} + \beta_{smm}m_{ijt}^2 + \beta_{sl}l_{ijt} + \beta_{sll}l_{ijt}^2 + \beta_{sk}k_{ijt} + \beta_{skk}k_{ijt}^2 \\
& + \beta_{sml}m_{ijt}l_{ijt} + \beta_{smk}m_{ijt}k_{ijt} + \beta_{slk}l_{ijt}k_{ijt} + \beta_{smlk}m_{ijt}l_{ijt}k_{ijt},
\end{aligned} \tag{4.5}$$

where m_{ijt} , l_{ijt} , and k_{ijt} represent the logarithm of materials, labor, and capital, respectively, for plant j used in the production of product-market i at time t . Since I will estimate translog production functions, elasticities will vary not only at the sector level but also at the product–market level within a plant. Therefore, a plant that manufactures the same product category for export and domestic markets has different output elasticities for each market. By not restricting elasticities to be the same across plants and products within a sector, as is the case with a Cobb-Douglas production function, the translog specification does not limit variation in markups to come exclusively from heterogeneity in input expenditure shares from sales revenue. To estimate equation 4.4, however, I must resolve some issues.

The presence of unobserved productivity, ω_{jt} , in equation 4.4 leads to simultaneity bias. This bias arises because plants observe their productivity draws before making their choice of inputs. Not taking into account this bias in the estimation yields inconsistent estimates of the parameters. If I had data on physical inputs at the product level, I could solve these problems following the proxy methods used by Olley and Pakes (1996) and Levinsohn and Petrin (2003). Unfortunately, I do not have input allocation across products in a plant.

I have an additional obstacle since I do not have data on physical units of inputs, but on input expenditures deflated by industry-level input price indexes. Not observing input prices at the plant or product level when estimating quantity production functions might lead to significant biases in the estimation.⁶ To understand how this biases estimation, consider an example. Suppose two Mexican producers of bicycles manufacture their products using materials as their only input. Assume that the first producer makes its bicycles using cheap domestic materials, and the second uses more expensive imported materials. Given their cost structures, suppose the first produces twice as many bicycles, spending half of what the second spends, but the second producer has larger revenues due to its higher-quality product. Naïve application of OLS of the number of bicycles sold on material expenditures deflated by a common industry-specific price index would yield a negative output elasticity of materials. Failure to correct for input price differences, therefore, can also lead to biased estimates.

I introduce some additional notation to understand the econometric problems better. Let ρ_{ijt} denote the logarithm of the share of input expenditures of product-market i of plant j assumed to be the same across inputs. Since all the inputs are assumed to be allocated to the production of products, ρ_{ijt} 's of plant j have to satisfy:

$$\sum_{i \in J_j} \exp(\rho_{ijt}) = 1$$

where J_j is the set of products produced by plant j . Although in principle I would like to have real input allocations at the product level, $\mathbf{x}_{ijt} = (m_{ijt}, l_{ijt}, k_{ijt})$, in practice I have plant-level input expenditures that are deflated by industry-level input price indices, $\hat{\mathbf{x}}_{jt} = (\hat{m}_{jt}, \hat{l}_{jt}, \hat{k}_{jt})$. Let \mathbf{w}_{ijt} denote the vector of unobserved deviations of the logarithm of

6. See the argument by de Loecker and Goldberg (2014).

product i 's input prices from the log of the industry-specific input price indexes. I can write the vector of inputs \mathbf{x}_{ijt} of product i from plant j as:

$$\mathbf{x}_{ijt} = \rho_{ijt} + \hat{\mathbf{x}}_{jt} - \mathbf{w}_{ijt}$$

Substituting this expression in equation 4.4, I have:

$$q_{ijt} = f_i(\hat{\mathbf{x}}_{jt}; \beta_s) + \Gamma(\rho_{ijt}, \hat{\mathbf{x}}_{jt}; \beta_s) + \Lambda(\mathbf{w}_{ijt}, \rho_{ijt}, \hat{\mathbf{x}}_{jt}; \beta_s) + \omega_{jt} + \varepsilon_{ijt}, \quad (4.6)$$

where $\Gamma(\cdot)$ comes from the fact that I do not have product-level input allocations, and $\Lambda(\cdot)$ from the fact that I do not have plant-product-level input prices. From equation 4.6, it is clear that even if I control for unobserved productivity, ω_{jt} , estimates of β_s would still be biased since both $\Gamma(\cdot)$ and $\Lambda(\cdot)$ depend on the vector of input expenditures, $\hat{\mathbf{x}}_{jt}$. Estimation of the production function, therefore, requires dealing with several issues: (1) the unobserved input expenditures by product, (2) unobserved product-level input prices, and (3) unobserved plant-level productivity. I address each of these below.

Unobserved Input Expenditures by Product

The assumptions above imply that multi-product plants use the same technology as single-product plants that manufacture the same product. For example, a plant that produces bicycles and tricycles has the same technology when producing bicycles than a plant that only produces bicycles. This observation suggests that I can use single-product plants to estimate the parameters of the production functions. For single-product plants, the input expenditure share is one and therefore $\rho_{ijt} = 0$, and term $\Gamma(\cdot)$ in equation 4.6 is zero. This strategy, however, leads to a new type of sample selection bias since I would be conditioning on plants that produce only a single product. To correct for this bias, I use an

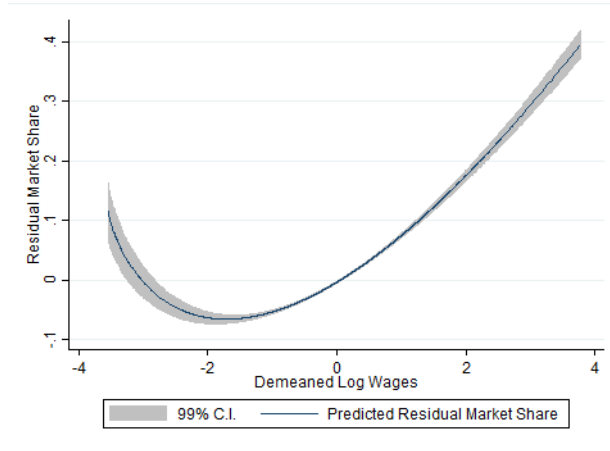
unbalanced panel of plants that produce a single product at any point in time. Thus my estimating sample includes plants that produce a single product in a given year but may become multi-product in subsequent years. In practice, a plant must be single-product for at least two consecutive years to be included in the sample. Also, I use selection correction in the spirit of Heckman (1979) to control for the probability of becoming a multi-product plant. I will explain the details of the selection correction below. In what follows, I use only single-product plants during the estimation of the parameters of the production function.

Unobserved Product-Level Input Prices

Following de Loecker et al. (2016), I proxy for unobserved plant-product-level input prices using a function of output prices, market share, and product dummies. It is useful to break the mechanism into two components to understand why such a proxy works. The first component comes from the insight developed by Khandelwal (2010), that suggests that if two products in the same category have the same price, then, the product having a larger market share should be higher quality. This observation indicates that I can proxy for product quality using a function of output prices, market share, and product dummies. The second component is that higher-quality products require higher-quality inputs, that are more expensive. Kugler and Verhoogen (2012) provide a theoretical framework for this assertion, showing empirical evidence that supports it using data from Colombian manufacturing plants. Although the Mexican survey data do not offer input prices for intermediate inputs, I can test whether this result approximately holds using data on wages. Figure A.1 in Appendix A.1 shows a positive correlation between average hourly wages at the plant level and output prices. Thus, more expensive products in my sample use more costly labor inputs.

Combining these two components implies that a product that has a higher market share conditional on its price should be of higher quality, and therefore must be produced using more expensive inputs. I test this relationship in Figure 4.1, in which I examine the correlation between the residuals from a regression of market shares on output prices and product dummies (my measure of quality), and average wages.

Figure 4.1. Quality and Average Wages



The figure plots the the best-fitted polynomial of residuals from a regression of product market shares on prices and product dummies (y-axis) and the log of average wages demeaned by product–market fixed effects (x-axis) for the full 1994–2008 sample. Average wages were constructed by dividing total wage bill by total number employees. The shaded area indicates a 99% confidence interval.

As the figure illustrates, there is a mainly positive relationship between the residuals (the proxy for quality) and average plant-level wages. This relationship is the foundation of the input price control function that I use:

$$w_{ijt} = w_t(p_{ijt}, ms_{ijt}, D_i, G_j, EXP_{jt}; \delta_s),$$

where p_{ijt} is the logarithm of the price of product i , ms_{ijt} the market share of product i , D_i a product dummy, G_j a plant’s state, EXP_{jt} a plant’s export status at time t , and δ_s is a

sector-specific parameter vector that I estimate. The specification of the input price control function allows for different products manufactured by the same plant to have different input prices, and for the same product produced by different plants to have different input prices. The framework, however, does not allow separate control functions for each input. In principle, I could include an input-specific control function during estimation of the parameters of the production function, but I would be unable to identify δ_s . Unfortunately, δ_s is necessary to recover the input expenditures per product for multi-product plants.⁷

I use only single-product plants during estimation, and therefore I simplify the notation and index all variables at the plant level in what follows. Reference to plant j below will thus refer to a product.

Unobserved Plant-Level Productivity

To control for unobserved productivity, I follow the proxy methods developed by Olley and Pakes (1996) and Levinsohn and Petrin (2003) and use a control function based on a static input demand equation for materials. I assume that demand for materials takes the form:

$$\hat{m}_{jt} = m_t(\omega_{jt}, \hat{k}_{jt}, \hat{l}_{jt}, p_{jt}, ms_{jt}, D_j, G_j, EXP_{jt}, \tau_{jt}^{output}, \tau_{jt}^{input}, \tau_{jt}^{US}),$$

where \hat{m}_{jt} , \hat{k}_{jt} and \hat{l}_{jt} denote expenditures on materials, capital and labor deflated by their respective industry price index, τ_{jt}^{output} is the tariff applied to the product produced by plant j , τ_{jt}^{input} is the tariff applied to the intermediate inputs used by plant j , and τ_{jt}^{US} is the U.S. tariff applied to the product produced by plant j . Under the assumption that demand for materials is increasing in productivity, I could potentially invert the demand function to arrive at a control function for productivity:

7. See de Loecker et al. (2016) for a detailed discussion of this point.

$$\omega_{jt} = h_t(\hat{\mathbf{x}}_{jt}, \mathbf{z}_{jt}),$$

with $\hat{\mathbf{x}}_{jt} = (\hat{m}_{jt}, \hat{l}_{jt}, \hat{k}_{jt})$ and $\mathbf{z}_{jt} = (p_{jt}, ms_{jt}, D_j, G_j, EXP_{jt}, \tau_{jt}^{output}, \tau_{jt}^{input}, \tau_{jt}^{US})$. I use second-order polynomials on $\hat{\mathbf{x}}_{jt}$ and \mathbf{z}_{jt} to approximate the unknown function $h_t(\cdot)$ to control for unobserved productivity.

Selection Correction

To resolve selection bias associated with using single-product producers, I use the probability of remaining single-product as a control. I assume, as Mayer et al. (2014), that the number of products increases with productivity. Let the state vector of plant j at time t be:

$$\mathbf{s}_{jt} = (N_{jt}, K_{jt}, \Omega_{jt}, \mathbf{G}_j, EXP_{jt}, \tau_{jt}^{output}, \tau_{jt}^{input}, \tau_{jt}^{US}),$$

where N_{jt} denotes the number of products produced by plant j at time t , and K_{jt} the capital stock. Denote by $\bar{\omega}_{jt}(\mathbf{s}_{jt})$ the productivity cutoff associated with introduction of a second product as a function of state variables \mathbf{s}_{jt} . Define the indicator variable $\mathcal{I}_{jt} = 1$ if a plant remains single-product. I can then write the probability of remaining single-product as:

$$\begin{aligned} Pr(\mathcal{I}_{jt} = 1) &= Pr(\omega_{jt} \leq \bar{\omega}_{jt}(\mathbf{s}_{jt}) | \bar{\omega}_{jt}(\mathbf{s}_{jt}), \omega_{jt-1}) \\ &= \kappa_{t-1}(\bar{\omega}_{jt}(\mathbf{s}_{jt}), \omega_{jt-1}) \\ &= \kappa_{t-1}(\hat{x}_{jt-1}, \mathbf{z}_{jt-1}) \equiv SP_{jt}, \end{aligned}$$

where the last equality comes from substituting control function of productivity in $t - 1$ and $\mathbf{z}_{jt} = (p_{jt}, ms_{jt}, D_j, G_j, EXP_{jt}, \tau_{jt}^{output}, \tau_{jt}^{input}, \tau_{jt}^{US})$. In practice, I estimate this probability using the fitted values from a probit estimation.

Estimation

I assume that productivity follows a first-order Markov process, with the law of motion:

$$\omega_{jt} = g(\omega_{jt-1}, \tau_{jt-1}^{output}, \tau_{jt-1}^{input}, \tau_{jt-1}^{US}, EXP_{jt-1}, SP_{jt}, R\&D_{jt-1}) + \xi_{jt},$$

where SP_{jt} is the fitted probability of remaining single-product, $R\&D_{jt}$ is research and development expenditures, and ξ_{jt} is the innovation to the productivity shock. The specification for the law of motion for productivity allows tariffs and export status to influence productivity but does not assume that they will necessarily affect it. The data will tell us if there is any significant correlation between productivity and these variables. I also allow research and development expenditures to affect productivity. I perform the estimation of the parameters of the production function and input price control function by constructing moments based on innovations to the productivity shock ξ_{jt} . To do this, I first express ω_{jt} as a function of data and parameters. Plugging in the input price and productivity control functions into the production function, I can write equation 4.4 as:

$$q_{jt} = \phi_{jt}(\hat{\mathbf{x}}_{jt}, \mathbf{z}_{jt}) + \varepsilon_{jt},$$

where the function $\phi(\cdot) = f_j(\hat{\mathbf{x}}_{jt}; \beta_s) + \Lambda(w_t(p_{jt}, ms_{jt}, D_j, G_j, EXP_{jt}; \delta_s), \hat{\mathbf{x}}_{jt}; \beta_s) + h_t(\hat{\mathbf{x}}_{jt}, \mathbf{z}_{jt})$ captures output net of measurement error. Estimating this equation and recovering $\hat{q}_{jt} = \hat{\phi}_{jt}$ allow me to dispose of ε . In practice, I form second-order polynomials on $\hat{\mathbf{x}}_{jt}$ and \mathbf{z}_{jt} to proxy $\phi(\cdot)$, and estimate the fitted values. Once I have a measure of output net of measurement error, I can express productivity directly as a function of data and parameters as:

$$\omega_{jt}(\beta_s, \delta_s) = \hat{\phi}_{jt} - f_j(\hat{\mathbf{x}}_{jt}; \beta_s) - \Lambda(w_t(p_{jt}, ms_{jt}, D_j, G_j, EXP_{jt}; \delta_s), \hat{\mathbf{x}}_{jt}; \beta_s),$$

where the input price control function has been evaluated in $\Lambda(\cdot)$. I approximate $\Lambda(\cdot)$ using a second-order polynomial on the elements of the input price control function $w_t(\cdot)$ and their interactions with input expenditures.⁸ Finally, I form the moment conditions using the innovations to productivity:

$$\xi_{jt}(\beta, \delta) = \omega_{jt}(\beta, \delta) - E[\omega_{jt}(\beta, \delta) | \omega_{jt-1}(\beta, \delta), \tau_{jt-1}^{output}, \tau_{jt-1}^{input}, \tau_{jt-1}^{US}, EXP_{jt-1}, SP_{jt}, R\&D_{jt-1}].$$

Following Akerberg et al. (2015), I estimate both the parameters of the production function β and the input price control function δ by GMM using the moment conditions:

$$E[\xi_{jt}(\beta_s, \delta_s) \mathbf{I}_{jt}] = 0, \quad (4.7)$$

where the instrument matrix \mathbf{I}_{jt} includes lagged materials, current capital, current labor, and their higher-order interactions. It also incorporates lagged market shares, lagged tariffs, lagged prices, lagged export status, and the interaction of lagged prices with inputs and market shares. I also include a time trend and its square to control for aggregate macroeconomic trends.

Estimation yields consistent estimates of the parameters of the production function β and input price control function δ . Identification of these parameters come from the timing assumptions on productivity. I assume that labor and capital do not respond contemporaneously to the innovation to productivity, but materials do, to construct the appropriate moment conditions. I follow de Loecker et al. (2016) and assume that input and output

8. Estimating interactions between product and state dummies and input expenditures is infeasible, so they are excluded.

prices are contemporaneously correlated with innovations to productivity to construct the moments needed to identify the parameters of the input price control function.

As mentioned above, in principle, I would like to estimate the production function and input price control function at the product level, but in practice, I do not have enough observations of single-product plants that produce each product. Therefore, I follow the literature and estimate the production functions and input price control function at the sector level. I use the following sectors in the estimation: food and beverages, textiles, apparel, wood and furniture, paper industries, chemical industries, non-metallic mineral products, metallic manufacturing, and machinery and transportation equipment.

4.3 Recovering the Input Expenditure Shares by Product:

The procedure described above allows estimation of the parameters of the production function, and those of the input price control function. With these estimates, I have all of the elements needed to construct elasticities and markups for single-product plants. However, for multi-product plants, I need a way to recover input expenditure shares by product. Given that around 73% of the plants in the sample are multi-product plants, recovering input expenditure shares by product is very important if we want to analyze the impact of NAFTA on the whole manufacturing industry. I can use the estimates of the parameters of the production function and input price control function, and the restrictions imposed by the structural model of production, to recover input expenditure shares for each product. To illustrate the method of recovering input expenditure shares, I consider a simplified example with no input price differences below.⁹

9. The intuition and procedure work for a more general production function and plant-product input price differences. See Appendix A.2.

Consider a plant that manufactures three products, q_1 , q_2 , and q_3 with a translog production function. Let ρ_i denote the logarithm of the input expenditure share of product i (common across inputs within a product), and m_i , l_i , and k_i the logarithm of the units of materials labor and capital used during production of product i . Under these assumptions, I can write the logarithm of labor used in product i as $l_i = \rho_i + l$. The same is true for the other two inputs. The production function is then:

$$\begin{aligned}
q_i &= \beta_m m_i + \beta_{mm} m_i^2 + \beta_l l_i + \beta_{ll} l_i^2 + \beta_k k_i + \beta_{kk} k_i^2 + \beta_{ml} m_i l_i + \beta_{mk} m_i k_i + \beta_{lk} l_i k_i + \beta_{mlk} m_i l_i k_i + \omega \\
&= \beta_m (m + \rho_i) + \beta_{mm} (m + \rho_i)^2 + \beta_l (l + \rho_i) + \beta_{ll} (l + \rho_i)^2 + \beta_k (k + \rho_i) + \beta_{kk} (k + \rho_i)^2 + \\
&\quad \beta_{ml} (m + \rho_i)(l + \rho_i) + \beta_{mk} (m + \rho_i)(k + \rho_i) + \beta_{lk} (l + \rho_i)(k + \rho_i) + \beta (m + \rho_i)(l + \rho_i)(k + \rho_i) \\
&\quad + \omega
\end{aligned}$$

for $i = \{1, 2, 3\}$, where m , l , and k are logarithms of the total units of materials, labor, and capital used by the plant. After manipulation:

$$\begin{aligned}
q_1 - \beta_m m - \beta_l l - \beta_k k - \beta_{mm} m^2 - \beta_{ll} l^2 - \beta_{kk} k^2 - \beta_{ml} m - \beta_{mk} mk - \beta_{lk} lk - \beta_{mlk} mlk &= A\rho_1 + B\rho_1^2 + C\rho_1^3 + \omega, \\
q_2 - \beta_m m - \beta_l l - \beta_k k - \beta_{mm} m^2 - \beta_{ll} l^2 - \beta_{kk} k^2 - \beta_{ml} m - \beta_{mk} mk - \beta_{lk} lk - \beta_{mlk} mlk &= A\rho_2 + B\rho_2^2 + C\rho_2^3 + \omega, \\
q_3 - \beta_m m - \beta_l l - \beta_k k - \beta_{mm} m^2 - \beta_{ll} l^2 - \beta_{kk} k^2 - \beta_{ml} m - \beta_{mk} mk - \beta_{lk} lk - \beta_{mlk} mlk &= A\rho_3 + B\rho_3^2 + C\rho_3^3 + \omega,
\end{aligned} \tag{4.8}$$

with:

$$\begin{aligned}
A &= \beta_m + \beta_l + \beta_k + 2\beta_{mmm}m + 2\beta_{ll}l + 2\beta_{kk}k + \beta_{ml}m + \beta_{ml}l + \beta_{mk}m \\
&\quad + \beta_{mk}k + \beta_{lk}l + \beta_{lk}l + \beta_{mlk}ml + \beta_{mlk}mk + \beta_{mlk}lk, \\
B &= \beta_{mm} + \beta_{ll} + \beta_{kk} + \beta_{ml} + \beta_{mk} + \beta_{lk} + \beta_{mlk}m + \beta_{mlk}l + \beta_{mlk}k, \\
C &= \beta_{mlk}.
\end{aligned}$$

Given estimates of the parameters of the production function (the β s), the left-hand side of the system of equations 4.8 is data since it depends only on product quantities and plant-level inputs, both of which are included in the dataset. The right-hand side depends on the unknown input expenditure shares ρ_i and unobserved productivity parameter ω . I thus have a nonlinear system of three equations and four unknowns. To solve the system, I need an additional equation, given by the assumption that all inputs used by a plant are allocated to the manufacturing of products. Under this assumption, I must have:

$$\sum_{i=1}^3 \exp(\rho_i) = 1$$

This final equation completes a system of four nonlinear equations and four unknowns, that I can numerically solve to recover both unobserved input expenditure shares and plant-level productivity for multi-product plants.¹⁰ This is where the assumption of productivity being at the plant level is important. Were productivity at the product level, the previous system would have become a system of four equations with six unknowns, that would be impossible to solve. In the more general case, the system of equations described above depends on fitted values of the input price control function for each product. Because of

10. I have a system of nonlinear equations for each multi-product plant and each year in my sample. I, therefore, have to solve for around 46,000 systems of nonlinear equations to recover input expenditures by product.

this, estimating parameters of the input price control function is fundamental since, without these estimates, I would be unable to construct the input price control function for products of multi-product plants.

Returning to the general framework, by recovering the input expenditure shares for each product, I can construct output elasticities for all the products in the sample. I can then use these estimates to construct markups from:

$$\hat{\mu}_{ijt} = \hat{\theta}_{ijt}^M \left(\frac{\exp(\hat{\rho}_{ijt}) \hat{M}_{jt}}{P_{ijt} Q_{ijt}} \right)^{-1},$$

where $\hat{\theta}_{ijt}^M$ is the estimated output elasticity of materials for product i from plant j at time t , $\hat{\rho}_{ijt}$ is the corresponding logarithm of the input expenditure share, and \hat{M}_{jt} denotes the plant's expenditure on materials. I can then use data on prices to construct an estimate of marginal costs:

$$MC_{ijt} = \frac{P_{ijt}}{\hat{\mu}_{ijt}}$$

CHAPTER 5

ESTIMATES OF ELASTICITIES AND MARKUPS

I analyze results from the production function estimation in this chapter. I focus the analysis on estimated elasticities and markups and discuss their plausibility.

5.1 Estimates of Elasticities

Columns (1) through (4) of Table 5.1 show the median estimates of the output elasticities and returns to scale by sector (Table A.8 in the appendix shows the corresponding average elasticities and standard deviations). Column (5) indicates the number of observations used during estimation of the production function. Only products manufactured by single-product plants are used during estimation of parameters of the production function.

Table 5.1: Median Elasticities by Sector, All Products

Sector	Materials	Capital	Labor	RTS	Obs. in Estimation
	(1)	(2)	(3)	(4)	(5)
Food and Beverages	0.86	0.06	0.19	1.12	1,781
Textile Manufacturing	0.62	0.02	0.28	0.97	992
Apparel Manufacturing	0.86	0.05	0.11	1.00	1,691
Wood and Furniture Industries	0.73	0.12	0.08	0.91	490
Paper Industries	0.95	0.01	0.30	1.21	1,968
Chemical Industries	0.65	0.09	0.27	1.03	1,995
Non-Metallic Mineral Products	0.58	0.08	0.42	1.05	1,519
Metallic Manufacturing	0.67	0.18	0.23	1.09	1,493
Machinery and Equipment Manufacturing	0.74	0.02	0.10	0.80	1,073
Total	0.76	0.08	0.18	1.05	1,073

Notes: Estimates of output elasticities of the production function for all products, domestic and exported, and all years in the sample (1994-2008). Columns 1–3 report median elasticities for each sector. Column 4 reports the median returns to scale (RTS), which is the sum of labor, capital, and materials elasticities. Column 5 reports the total number of observations used during estimation of the production function for each sector. The total corresponds to the median observation across all products and years.

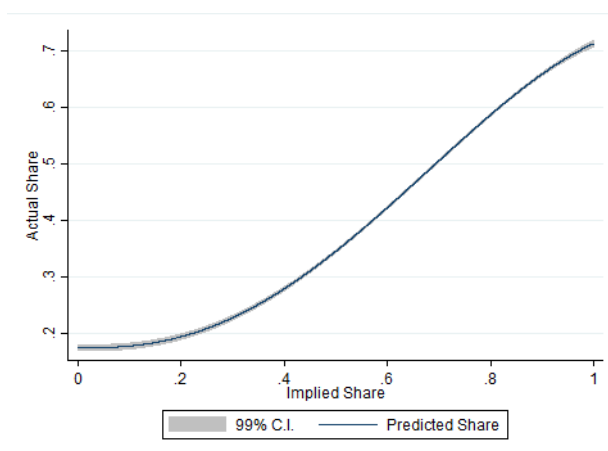
The interpretation of the magnitudes of the elasticities is as follows: an elasticity of materials above equal to 0.86, means that a one percent increase in material inputs will increase output by 0.86 percent. Resulting estimates of the elasticities accord with what other studies that use product level data report, with the largest elasticity for materials, followed by labor, and a small elasticity of capital.¹ From Column 4, most of the sectors are characterized by increasing returns to scale, with few exceptions.

1. See, for example, de Loecker et al. (2016) and Garcia-Marin and Voigtländer (2016).

To analyze the validity of estimates further, I examine the correlation between reported input expenditure shares out of total input expenditures at the plant level and the theoretical expenditure shares implied by the output elasticities under cost minimization. For production, $F(L, K, M)$, cost minimization yields a labor expenditure share equal to $\frac{\theta^L}{\theta^L + \theta^K + \theta^M}$, where θ^L , θ^K , and θ^M are the output elasticities of labor, capital, and materials, respectively. The expression for capital and materials share is analogous.

The following figure shows the relationship between the observed material expenditure share out of total input expenditure and the implied expenditure share given by $\frac{\hat{\theta}^M}{\hat{\theta}^L + \hat{\theta}^K + \hat{\theta}^M}$, where $\hat{\theta}^L$, $\hat{\theta}^K$, and $\hat{\theta}^M$ are the estimates of the output elasticities of labor, capital, and materials, respectively.

Figure 5.1. Average and Implied Material Expenditure Shares



The figure shows the best-fitted polynomial of the share of materials expenditure out of total expenditures in labor, capital, and materials (y-axis), and the materials expenditure share implied by the estimated elasticities (x-axis). The shaded area indicates a 99% confidence interval.

As the figure shows, there is a positive and significant relationship between the observed expenditure shares of materials out of total inputs and the expenditure share implied by my estimated elasticities, further providing evidence of the plausibility of the elasticity

estimates. Figure A.4 in the appendix shows similar positive relationship for the capital and labor share.

To analyze the importance of the input price control function and the selection correction in the estimation, I reestimated the production functions and calculated the resulting output elasticities without them. I find that correcting for input price differences during estimation is crucial. As Table 5.2 below shows, exclusion of the input price control function yields highly implausible estimates for the elasticities, with many sectors having negative median elasticities.² In contrast, failure to correct for the sample selection bias that arises from conditioning on single-product plants yields estimates that are very similar to those obtained during benchmark specification, suggesting that the selection problem is not worrisome.

2. The same is true for average elasticities. See Table A.9 in the Appendix.

Table 5.2: Median Elasticities by Sector, No Correction

Sector	No Selection Correction			No Input Price Correction		
	Materials	Capital	Labor	Materials	Capital	Labor
	(1)	(2)	(3)	(4)	(5)	(6)
Food and Beverages	0.88	0.03	0.16	0.69	-0.12	0.52
Textile Manufacturing	0.69	-0.01	0.21	0.56	0.12	0.28
Apparel Manufacturing	0.87	0.05	0.10	0.52	-0.01	0.12
Wood and Furniture Industries	0.68	0.08	0.07	-0.26	-0.01	-0.39
Paper Industries	0.96	0.01	0.31	0.23	-0.30	1.04
Chemical Industries	0.64	0.11	0.27	0.35	0.38	0.81
Non-Metallic Mineral Products	0.54	0.09	0.43	0.50	0.04	0.48
Metallic Manufacturing	0.68	0.15	0.22	0.80	0.40	0.11
Machinery & Equipment	0.59	0.08	0.16	0.80	-0.64	-0.30

Notes: Estimates of the output elasticities of the production function for all products, domestic and exported, and all years in the sample (1994–2008). Columns 1–3 report median elasticities in each sector for estimation, without including selection correction for the probability of remaining single-product. Columns 4–6 report median elasticities for estimation, without including the input price control function.

5.2 Estimates of Markups

Table 5.3 shows the median estimates of markups by sector and destination.³ A markup of 1.12 in the table below means that the price has a 12% markup above marginal cost. The value of the estimated markups is reasonable and similar to those found by de Loecker et al. (2016) in India and Garcia-Marin and Voigtländer (2016) in Chile, both of which use product-level data. In the Table below and all of the results that follow, we trimmed outliers above the 99th and below the 1st percentiles of the markup distribution by sector and destination to make sure that outliers are not driving the main results. All the results

3. Table A.10 in the appendix shows the average and median markup by sector.

presented in the thesis, however, are robust to using the original untrimmed sample or trimming the top 97th and bottom 3d percentile of the markup distribution.⁴

Table 5.3: Median Markup by Destination

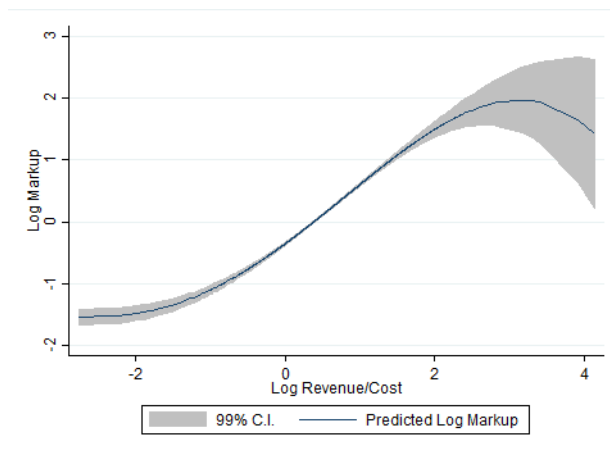
Sector	Markup	
	Domestic	Exported
Sector	(1)	(2)
Food and Beverages	1.12	1.11
Textile Manufacturing	1.11	1.32
Apparel Manufacturing	1.27	1.19
Wood and Furniture Industries	1.06	0.90
Paper Industries	1.47	1.93
Chemical Industries	1.29	1.03
Non-Metallic Mineral Products	1.96	1.79
Metallic Manufacturing	1.14	1.03
Machinery and Equipment Manufacturing	1.27	1.45
Total	1.24	1.19

Notes: I trim outliers above the 99th and below the 1st percentiles of the markup distribution by sector and destination. The total corresponds to the median markup across all products and years in each sample.

To verify that the estimates capture markups accurately, I compare them to accounting measures of revenue/variable costs at the plant level. Figure 5.2 shows a positive and significant correlation between the estimates of markups and accounting measures of revenue/variable costs, supporting the validity of the estimates.

4. See Appendix A.4.

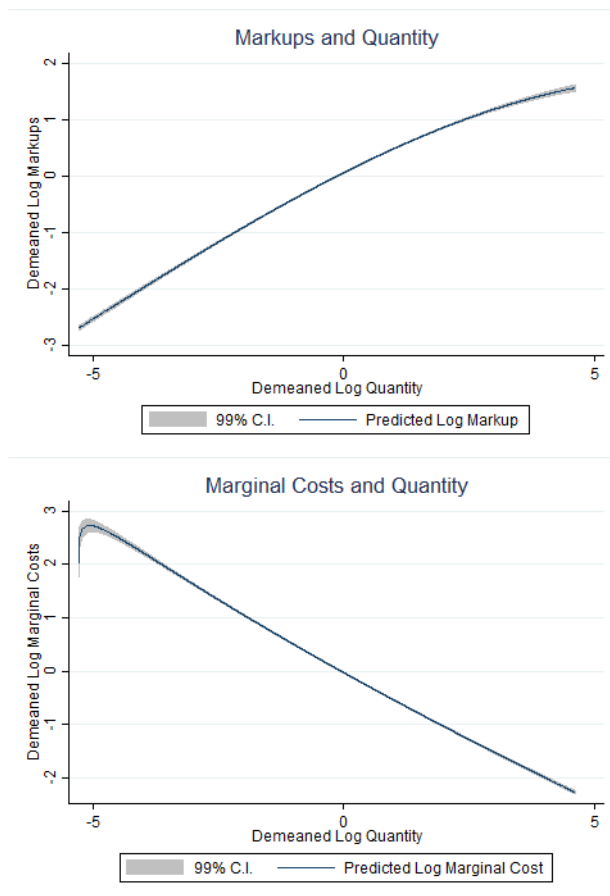
Figure 5.2. Estimated Markups and Accounting Revenue/Variable Costs



The figure shows the best-fitted polynomial of the logarithm of estimated markups (y-axis) and the log of the ratio of accounting revenue over variable costs (x-axis). The shaded area indicates a 99% confidence interval. The figure excludes outliers below the 1st and above the 99th percentiles of the markup distribution in each sector.

Finally, I also confirm that the estimates for markups and marginal costs are consistent with the returns to scale parameters. Since most of the sectors are characterized by increasing return technologies, I expect a negative correlation between quantities produced and marginal costs. Figure 5.3 below confirms this prediction, suggesting that plants that produce larger amounts, on average, have lower marginal costs and higher markups.

Figure 5.3. Markups, Marginal Costs and Quantity Produced



The figure shows the best-fitted polynomials of the logarithm of markups and marginal costs, demeaned by product–market fixed effects (y-axis) and the demeaned logarithm of quantity produced (x-axis). The shaded area indicates a 99% confidence interval. The figure excludes outliers below the 1st and above the 99th percentiles of the markup distribution in each sector.

The estimates also concur with theoretical models in the multi-product plant literature, such as Mayer et al. (2014). Consistent with the predictions of their model, I find that a plant’s most important products, measured by revenue share, have lower marginal costs and that plants charge a higher markup to such products (see Figure A.3 in the Appendix). Having established the validity of my estimates of elasticities, markups, and marginal costs, in the following chapter, I use these estimates to analyze the impact of NAFTA.

CHAPTER 6

THE IMPACT OF TARIFF REDUCTIONS

In this chapter, I use the product-level estimates of markups and marginal cost to analyze the impact of tariff declines from NAFTA on prices through their impact on markups and marginal costs, using data for the period 1994-2008. I also examine the effect of tariffs on estimated markups after controlling for marginal costs to assess whether tariff reductions affected competition.

6.1 The Impact of Tariff Reductions

To analyze the impact of tariff declines during NAFTA on prices, markups, and marginal costs of products directly, I estimate the following regression equation:

$$\log Y_{ijt} = \alpha + \beta_1 \tau_{it}^{output} + \beta_2 \tau_{jt}^{input} + \beta_3 \tau_{it}^{US} + \xi_{ij} + \psi_{st} + \varepsilon_{ijt} \quad (6.1)$$

where Y_{ijt} is either prices, markups, or marginal costs of product i from plant j at time t . τ_{it}^{output} are Mexican output tariffs applied to product i , τ_{jt}^{input} is a weighted measure of Mexican tariffs applied to intermediate inputs of plant j , and τ_{it}^{US} is the tariff applied by the United States on goods i coming from Mexico. ξ_{ij} and ψ_{st} are plant-product and sector-year fixed effects, respectively. I estimate equation 6.1 separately for domestic and exported products. To ensure that outliers in the estimates of markups are not driving the results, I exclude outliers in the top and bottom 1% of the markup distribution within each sector in the regressions. The results, however, are robust to the use of the full sample or other cutoffs. See Section A.4 in the Appendix.

I cluster standard errors at the product level because that is the level of variation of the majority of the policy variables. Results, however, are robust to clustering standard

errors by different groups. A more important issue refers to the fact that the markups and marginal cost measures are estimates themselves. Because of this, ideally, I would construct standard errors using bootstrapping methods to take into account potential measurement error and parameter uncertainty in the first stage of the estimation. In particular, I would bootstrap over the entire procedure to construct standard errors of the coefficients of equation 6.1. The procedure would involve estimating the production function parameters, solving around 46 thousand systems of non-linear equations to recover the unobserved input expenditure shares by product and estimating equation 6.1 for each bootstrap sample. Unfortunately, for each bootstrap sample, the estimation takes around 12 hours to run on INEGI's computers. Because of the significant computing time, and the fact that INEGI's servers have regular maintenance requiring them to be turned off periodically, the construction of standard errors based on bootstrapping methods has so far been unfeasible and is still in progress. However, any measurement error on markups or marginal costs will yield unbiased and consistent estimates as the measurement error is on the dependent variable. The estimator in this case, however, would be inefficient.

The coefficients on tariffs of equation 6.1 are identified from variation in time of the dependent variables and tariffs within a plant-product pair. As mentioned in Section 3.3, identification requires exogeneity of tariff changes at the plant-product level. Following the arguments presented in that section, I will maintain the assumption that tariff cuts were exogenous. However, if tariffs were endogenous because of protectionist policies, for example, I would be overestimating the impact of say output tariffs on markups of domestic products.¹ With this caveat in mind, the following table includes the results of the estimation of equation 6.1 for the sample of domestic products.

1. See Appendix A.2 for a formal argument.

Table 6.1: Impact of Tariffs on Prices, Marginal Costs, and Markups, Domestic Products

	$\log P_{ijt}$	$\log MC_{ijt}$	$\log \mu_{ijt}$
	(1)	(2)	(3)
τ_{it}^{output}	0.13 ^a	0.15 ^b	-0.02
	(.04)	(.08)	(.09)
τ_{jt}^{input}	0.14	0.07	0.07
	(.54)	(.16)	(.16)
τ_{it}^{US}	0.05	1.06 ^a	-1.01 ^a
	(.14)	(.32)	(.32)
Total Impact (%)	-3.43 ^a	-8.24 ^a	4.81 ^b
	(1.43)	(2.67)	(2.48)
Within R^2	0.073	0.01	0.02
N	145,887	145,887	145,887

Notes: Dependent variables in Columns 1–3 are the logs of prices, marginal costs, and markups, respectively. The regressions exclude outliers in the top and bottom 1% of the markup distribution within each sector. Regressions include plant–product and sector-year fixed effects using data for the sample of domestic products and all years (1994-2008). Standard errors are clustered at the product level. I calculate the total impact of tariff declines by taking the average percentage point decrease in tariffs for the 1993-2008 period, -14.6, -9.3 and -5.1 for output, input and U.S. tariffs respectively, and multiplying them by their associated coefficients. Significance: a (1%), b (5%), and c (10%), respectively.

To assess the mechanism by which tariffs are affecting prices, I decompose the impact of changes in tariffs on prices of domestic products into their impact on marginal costs and markups in Table 6.1. Column 1 repeats the estimates of the effect of tariffs on prices of domestic products shown in Column 1 of Table 3.5 in Section 3.3. Columns 2 and 3 show the result of the impact of tariff changes on marginal costs and markups respectively. Because the logarithm of prices exactly equals the sum of the logarithm of marginal costs and markups, the sum of the coefficients on Columns 2 and 3 have to be equal to the

coefficients in Column 1. In this way, I can analyze the impact of each tariff on prices through their impact on marginal costs and markups.

I first analyze the impact of output tariffs. From Column 2, the coefficient on output tariffs on the marginal cost specification is positive and statistically significant. The magnitude of the coefficient implies that a one percentage point decline in output tariffs leads to a reduction in marginal costs of 0.15%. One channel that explains this result is competition. Many studies document that increases in foreign competition, measured by cuts in output tariffs, increase plant-level productivity as it forces plants to reduce their X-inefficiencies.² Using a sample of Mexican plants for 1993–2000, López-Córdova (2003) finds that a one percentage point decline in output tariffs raises revenue total factor productivity by 0.26%. In Subsection A.4.5 in the Appendix, I estimate the impact of tariff declines on my measure of Quantity Total Factor Productivity (TFPQ). Consistent with the results from López-Córdova (2003), I find that a one percentage point decline in output tariffs leads to a 1.3% increase in TFPQ. Since productivity and marginal costs are negatively correlated (see Section A.2 in the Appendix), the rise in productivity might be driving the correlation between marginal costs and output tariffs that I find in the data. The 0.15% decline in marginal cost is not passed through completely to prices which decline by 0.13%. This leads to a small increase in the markup of 0.02% that is not statistically significant. The lack of statistical significance on the markup, however, does not mean that there were no pro-competitive effects. The coefficient on output tariffs on the specification for the markup is capturing two distinct effects. On the one hand, it captures the pro-competitive forces where an increase in foreign competition compels Mexican domestic producers to lower their markups. On the other hand, it is capturing the fact that declines in output tariffs lead to reductions in marginal costs that are not completely passed through to prices increasing the markup. The

2. See López-Córdova (2003), Pavcnik (2002), and Khandelwal and Topalova (2011).

fact that the coefficient is negative, although not statistically significant, suggests that the incomplete pass-through effect dominates.

The coefficients on intermediate input tariffs are not statistically significant in any of the specifications. One of the reasons why this is the case is that the majority of plants in the sample do not use imported intermediates in their production. For example, only 49% of the sample of plants in the sample use imported intermediates, and the fraction among non-exporters is even lower at 35%. Moreover, because specification 6.1 is capturing the short run impact of tariff changes, it might not be capturing cost savings for plants that change their intermediate input suppliers from domestic to foreign sources with a lag. Once we condition on the sample of importing plants, however, we do indeed find that declines in intermediate input tariffs lead to a large and statistically significant decline in marginal costs and an increase in markups.³ Another explanation for the lack of statistical significance is that a decline in tariffs on intermediate inputs might have increased the incentives for local producers to upgrade the quality of their products. To the extent that quality upgrading is costly, this would be reflected in a higher marginal cost, driving a negative correlation between intermediate input tariffs and costs. The estimated coefficient would then be reflecting two opposing forces. On the one hand, cuts in intermediate input tariffs lead to reductions in marginal costs for plants that import intermediates, on the other hand, the decline leads to an increase in marginal costs for plants that upgrade their products. These two opposing forces might then result in an estimated coefficient that is not statistically or economically significant. The quality upgrading hypothesis is currently outside the scope of this work but can be tested once I extend the analysis from the short-run impact of NAFTA to its dynamic impact over time in future work.

3. See Table A.19 in the Appendix.

Finally, I analyze the impact of declines in U.S. tariffs on the three dependent variables. The coefficient on the marginal cost specification is positive and statistically significant. Its magnitude suggests that a decline in U.S. tariffs of one percentage point leads to a reduction in marginal costs of 1.06%. An explanation for this result is that increased market access to the U.S., captured by declines in U.S. tariffs, raises the productivity of plants. López-Córdova (2003), for example, finds that a one percentage point decline in U.S. tariffs applied to Mexican products increases revenue total factor productivity by 3%. Consistent with these results, in Subsection A.4.5 in the Appendix, I find that declines in U.S. tariffs lead to a rise in quantity total factor productivity of around 3.4% in my preferred specification. Increased market access might lead to an increase in productivity from two channels. First, it increases the incentives for Mexican producers to upgrade their technologies to export to the U.S. market. Second, the expansion of markets allows producers to increase their production allowing them to exploit economies of scale. Supporting the first channel, Iacovone and Javorcik (2012) find that Mexican plants significantly increased investment during years immediately before the introduction of new exported products. Complementing their evidence, in Section A.4 in the Appendix I find that reductions in U.S. tariffs significantly increased the probability of introducing a product to the export market. In support of the second channel, I find that the median product in the sample operates under increasing returns to scale in Table 5.1 in the previous chapter. The large impact on marginal costs of a one percentage point reduction in U.S. tariffs is not passed through to prices leading to a significant increase in the markup of around 1.01%

Using the estimated coefficients in Table 6.1 and the observed average decline in tariffs during this period I calculate that tariff declines from NAFTA led to a reduction in the marginal costs of domestic products of 8.24%. This decline only led to a reduction in prices of 3.43% with markups increasing by 4.81%. I analyze the impact of tariff declines on exported products next.

Table 6.2: Impact of Tariffs on Prices, Marginal Costs, and Markups, Exported Products

	$\log P_{ijt}$	$\log MC_{ijt}$	$\log \mu_{ijt}$
	(1)	(2)	(3)
τ_{it}^{output}	0.04	0.52 ^c	-0.48 ^c
	(.08)	(.29)	(.28)
τ_{jt}^{input}	-0.00	1.45 ^a	-1.46 ^a
	(.14)	(.33)	(.35)
τ_{it}^{US}	-0.50 ^c	1.34 ^b	-1.84 ^a
	(0.30)	(.67)	(.66)
Total Impact (%)	1.98	-27.93 ^a	29.92 ^a
	(2.50)	(6.40)	(6.34)
Within R^2	0.035	0.034	0.032
N	28,738	28,738	28,738

Notes: Dependent variables in Columns 1–3 are the logs of prices, marginal costs, and markups, respectively. The regressions exclude outliers in the top and bottom 1% of the markup distribution within each sector. Regressions include plant–product and sector-year fixed effects using data for the sample of exported products and all years (1994-2008). Standard errors are clustered at the product level. I calculate the total impact of tariff declines by taking the average percentage point decrease in tariffs for the 1993-2008 period, -14.6, -9.3 and -5.1 for output, input and U.S. tariffs respectively, and multiplying them by their associated coefficients. Significance: a (1%), b (5%), and c (10%), respectively.

I examine first the impact of output tariffs. From Column 2, the effect of output tariffs on the marginal cost of exported products is positive and statistically significant. The reason for this result is that manufacturers of around 96% of exported products in the sample produce the same product for the domestic market. Declines in output tariffs, therefore, raise competition on their domestic products compelling them to increase plant-level productivity ultimately leading to a reduction in the marginal costs of their exported products. The magnitude of the coefficient suggests that a one percentage point decline in output

tariffs reduces the marginal cost of exported products by 0.52%. Because of almost zero pass-through, this reduction in costs raises the markup by 0.48%.

Looking at intermediate input tariffs, I find that reductions in input tariffs have a substantial impact on marginal costs of exported products. The coefficient suggests that a decline in intermediate input tariffs of one percentage point reduces marginal costs of exported products by 1.45%. Declines in intermediate input tariffs can have a large impact on the marginal costs of exported products via two channels. The first channel is the direct impact through the reduction in the cost of intermediates: for firms that use imported intermediates in their production, a decline in tariffs directly reduces their costs. The second channel is through the impact of cheaper intermediates on productivity. As documented by Amiti and Konings (2007) and Khandelwal and Topalova (2011), the availability of cheaper imported inputs can raise productivity via learning, variety, and quality effects. These two channels work in the same direction leading to a significant reduction in marginal costs. Krueger (2004) provides some anecdotal evidence supporting the second channel for the largest Mexican producer of refrigerators. She documents that before NAFTA, Mexican refrigerators were of poor quality and had a very short lifespan. The reason for the short durability was the low quality of Mexican-made compressors. Once NAFTA came into effect, the manufacturer was able to substitute its Mexican compressor with a better-made American compressor at competitive prices. The subsequent increase in productivity observed by the manufacturer, allowed him to become the largest supplier of smaller, apartment-sized refrigerators to the US market. I find some evidence of this channel in Subsection A.4.5 in the Appendix with reductions in intermediate input tariffs leading to an increase in quantity total factor productivity of around 2.2%. The contrast between domestic and exported products can be explained by the fact that the latter use more imported intermediates. Among exporters, the share of plants using imported intermediates is 72% v.s. 35%

for non-exporters. Because of incomplete pass-through of costs to prices, a one percentage point decline in intermediate input tariffs leads to an increase in the markup of 1.46%.

Finally, I analyze the impact of cuts in U.S. tariffs. I find a positive and significant coefficient of U.S. tariffs on marginal costs. Its magnitude implies that a decline in U.S. tariffs of one percentage point leads to a reduction in marginal costs of 1.34%. The intuition for the decrease in marginal costs is the same as that for domestic products above. Increased market access raises productivity. Looking at the impact of U.S. tariff on the price of exported products, I find that a one percentage point decline in U.S. tariffs leads to an increase in the price of exported products of 0.5%. Finally, a one percentage point decline in U.S. tariffs leads to an increase in the markup of 1.84%. Markups increase by a significant amount because of two forces. On the one hand, reductions in marginal costs raise the markup because of incomplete pass-through. On the other hand declines in U.S. tariff raises prices and therefore markups as exporters can raise prices without increasing the after tariff price paid by U.S. consumers.

The estimates suggest that the observed average decline in tariffs during this period led to a reduction in marginal costs of exported products of 27.93%, to a non-statistically significant increase in prices of 1.98%, and to an increase in markups of 29.92%.

6.2 Pro-competitive effects:

The point estimates presented in Column 3 of Table 6.1 seem to suggest that declines in output tariffs did not have an impact on the markup of domestic products. Considering only these point estimates as evidence of pro-competitive effects, however, is misleading since the specification in Column 3 does not hold marginal costs fixed and therefore might not be capturing the *caeteris paribus* impact of a decline in output tariffs on markups. If plants adjust their markups in response to changes in marginal costs, the coefficient in Column 3

will capture not only the direct impact of tariffs on the markup but also the indirect impact through changes in marginal costs that are driven by changes in tariffs. In fact, the nature of variable markups implies that the covariance between markups and marginal costs is non-zero. Only in the particular case of complete pass-through of marginal costs to prices would this covariance be zero.⁴ The finding that there is a positive correlation between marginal costs and output tariffs suggests that the coefficient in Column 3 is indeed capturing these two effects. Intuitively, changes in output tariffs lead to adjustments in marginal costs that are not entirely passed through to prices, causing movements in markups. The coefficient in Column 3, therefore, captures both the direct impact of output tariffs on markups (the pro-competitive effects) and the indirect impact of marginal costs on markups.

To test for pro-competitive effects, I control for marginal costs. I estimate the following regression:

$$\log \mu_{ijt} = \alpha + \kappa_1 \tau_{it}^{output} + \kappa_2 \tau_{it}^{US} + g(\hat{m}c_{ijt}; \eta) + \xi_{ij} + \psi_{st} + \varepsilon_{ijt} \quad (6.2)$$

where $g(\hat{m}c_{ijt}; \eta)$ is a polynomial on marginal costs used as a control. The specification also includes plant-product fixed effects, ξ_{ij} , and sector-year fixed effects, ψ_{st} . In the results below, I use a third-order polynomial on marginal costs, but results are robust to a linear or second-order polynomial. Measurement error in marginal costs will lead to attenuation bias. I, therefore, instrument the polynomial of marginal costs with its lagged polynomial and intermediate input tariffs. These instruments are valid as long as there is no serial correlation in the measurement error of marginal costs. I estimate equation 6.2 separately for domestic and exported products.

4. See Appendix A.2 for the formal argument. In Table A.7 in the Appendix, I provide evidence of incomplete pass-through of marginal costs to prices.

Table 6.3: The Pro-Competitive Effects of NAFTA, Domestic Products

Dependent Variable: $\log \mu_{ijt}$		
	(1)	(2)
τ_{it}^{output}	0.11 ^a	0.12 ^a
	(.04)	(.04)
τ_{it}^{US}	-0.06	0.00
	(.14)	(.13)
Instruments	No	Yes
First Stage F	-	44.08
Within R^2	0.82	0.83
N	145,887	124,971

Notes: The dependent variable in Columns 1–2 is the log of the markup. Both specifications include third-order polynomials on log marginal costs (coefficients not reported). In Column 2, I instrument the marginal cost polynomial using its lag and intermediate input tariffs. The regressions exclude outliers in the top and bottom 1% of the markup distribution within each sector. Regressions include plant–product fixed effects and sector-year fixed effects using data for the sample of domestic products and all years (1994–2008). Standard errors are clustered at the product level.

Significance: a (1%), b (5%), and c (10%), respectively.

Table 6.3 shows results from estimation of equation 6.2 for the sample of domestic products. I present the baseline specification in Column 1 and instrument for the polynomial on marginal costs using the lagged polynomial and input tariffs in Column 2. From Column 1, once I control for marginal costs the coefficient on the impact of output tariffs on markups becomes positive and statistically significant. Its magnitude suggests that a decrease in output tariffs of 1 percentage point leads to a decline in the markup of domestic products of 0.11%. Thus, output tariff declines during this period have pro-competitive effects. The impact of U.S. tariffs on domestic products is, on the other hand, non-significant. Contrasting this result with the one from Column 3 of Table 6.1, we can see that all of the impact

of U.S. tariffs on the markups of domestic products was coming through their impact on marginal costs. Once I control for marginal costs, U.S. tariffs have no additional effect on the markup of domestic products. From Column 2, instrumenting the marginal-cost polynomial affects the values of the coefficients only slightly, leaving conclusions above unaltered.

Table 6.4: The Pro-Competitive Effects of NAFTA, Exported Products

Dependent Variable: $\log \mu_{ijt}$		
	(1)	(2)
τ_{it}^{output}	0.02	-0.01
	(.08)	(.08)
τ_{it}^{US}	-0.54 ^c	-0.55 ^c
	(.33)	(.33)
Instruments	No	Yes
First Stage F	-	7.66
Within R^2	0.88	0.88
N	28,738	23,207

Notes: The dependent variable in Columns 1–2 is the log of the markup. Both specifications include third-order polynomials on log marginal costs (coefficients not reported). In Column 2, I instrument the marginal cost polynomial using its lag and intermediate input tariffs. The regressions exclude outliers in the top and bottom 1% of the markup distribution within each sector. Regressions include plant–product fixed effects and sector-year fixed effects using data for the sample of exported products and all years (1994-2008). Standard errors are clustered at the product level.

Significance: a (1%), b (5%), and c (10%), respectively.

For exported products, the coefficient on output tariffs in Column 1 of Table 6.4 is not statistically significant. This result shows that the impact of output tariffs on the markup of exported products found in Table 6.2 came from its effect on marginal costs. Holding marginal costs fixed, output tariffs have no additional effect on the markup of exported

products. I obtain a negative and significant effect of U.S. tariffs on markups of exported products. A decline in U.S. tariffs of 1 percentage point leads to an increase in the markup of exported products of 0.54%. This last result is consistent with anticompetitive effects of trade liberalization predicted by the model from de Blas and Russ (2015). This work is the first to document this mechanism empirically.

6.3 Discussion

The results in the previous section suggest that tariff declines from NAFTA led to both an increase in competition in the domestic market, forcing domestic producers to lower their markups pushing down prices, and separately, to a reduction in marginal costs that were not completely passed through to prices. The reason for this incomplete pass-through is that producers offset part of the decline in marginal costs by raising their markups. Using the coefficients from Column 3 in Table 6.1 and the observed reduction in tariffs suggest that markups increased by 4.81% during this period. The fact that we observed that markups rose, however, does not mean that competitive forces were not significant. Without competitive forces, it is likely that prices of domestic products may have declined by less as producers capture more of the gains from declines in marginal costs. The estimates suggest that while Mexican consumers benefitted from a decrease in prices, producers profited by more as the reduction in marginal costs, induced by reductions in tariffs, allowed them to increase their margins despite the increased competitive pressure. Finally, note that while the total declines in prices were small relative to the size of the reductions in tariffs, we cannot rule out quality upgrading as another potential source of consumer gains.

For exported products, the results suggest that tariff declines during NAFTA led to an increase in markups as cuts to U.S. tariffs on Mexican products allowed Mexican producers to raise their prices and because reductions in marginal costs were not passed through to

prices as producers offset the decline in costs by raising markups. These two effects lead to substantial improvements in the profitability of Mexican exporters. The fact that producers increased their markups in response to declines in U.S. tariffs does not mean that U.S. consumers did not benefit from NAFTA. First, reductions in U.S. tariff led to an increase in the price of exported that was smaller than the actual decline in tariffs suggesting that after-tariff prices paid by U.S. consumers still declined. Second, the period was characterized by introductions of new products to the export market, with approximately 15 percent new exported products introduced each year on average (see Table A.5 in the Appendix). Therefore, the U.S. consumers significantly benefitted from the extensive margin as new product varieties were available to them. Also, it is entirely possible that part of the increase in the markup may be driven by the rise in the quality of exported products so that U.S. consumers could have also benefitted from higher quality products.

Finally, note that specifications 6.1 and 6.2 are capturing the short-run impact of changes in tariffs from NAFTA on prices, markups, and marginal costs. To the extent that plants may respond with a lag to changes in tariffs, the results may not be capturing the full impact of tariff declines from NAFTA. This might be the case, for example, if it takes time to integrate cheaper imported intermediates into the production process, if it takes time for foreign competition to respond to changes in tariffs, or if it takes time to upgrade the quality of the product. While these dynamic considerations are important to understand the effects of trade policy better, they are currently outside the scope of this work but correspond to the next step in my research agenda.

All in all, the results above suggest that the definite beneficiaries from NAFTA were Mexican manufacturers. They were able to increase their profitability despite the increase in foreign competition by raising their productivity which allowed them to boost their margins. Moreover, it appears that exporters disproportionately benefitted, as the reductions

in U.S. tariffs on Mexican products permitted and additional expansion in their profit margins.

CHAPTER 7

CONCLUSION

This thesis analyzes the impact of NAFTA on prices and competition in Mexico using detailed, plant and product-level information from Mexican manufacturing plants. Employing the methodology developed by de Loecker et al. (2016), I estimate markups and marginal costs at the product-destination level by exploiting quantity and price data on domestic and exported products.

My results suggest that tariffs declines from NAFTA led to large reductions in marginal costs of domestic and exported products through different channels. Declines in output tariffs lowered the marginal cost of plants as the increase in foreign competition compelled them to raise their productivity. Cuts in tariffs on intermediate inputs directly reduced the marginal cost of plants that use imported intermediates. Finally, declines in U.S. tariffs lowered marginal costs as the increased market access allowed plants to expand production and led them to upgrade their technology. These large reductions in marginal costs, however, were not completely passed through to consumers in the form of lower prices, as producers increased their markups in response to declines in costs.

Results controlling for changes in marginal costs suggest that declines in output tariffs have the expected pro-competitive effects; an increase in foreign competition compelled Mexican manufacturers to reduce markups on domestic products. I also found that exporters responded to declines in U.S. tariffs by increasing their markups on exported products. This last result suggests that the direct gain for consumers from a decrease in tariffs on incumbent imported goods might be lower than previously thought as producers adjust their prices to increase their profitability.

The empirical estimates presented in this work suggest that while both Mexican consumers and producers benefitted from tariff reductions from NAFTA, producers benefitted

more as they were able to increase their profitability, despite the increase in foreign competition, by lowering costs.

In closing, this thesis has analyzed the short-run effects of changes in tariffs from a free trade agreement to understand better the impact of trade policy. However, a lot of the mechanisms through which trade policy affect economic outcomes identified in this work take time to materialize. For this reason, extending the analysis to study the dynamic effects of changes in tariffs is of the utmost importance to improve our understanding of trade policy especially as very little work has been done in this area and therefore is the next step on my research agenda.

APPENDIX A
APPENDIX: DATA, METHODOLOGY, AND ADDITIONAL
RESULTS

A.1 Data

The estimation presented in this thesis uses data from a variety of sources. In this section I describe the data used during estimation, their sources and the construction of the main variables.

A.1.1 Data from INEGI

A.1.1.1 Sampling Methodology for EIA and EIM

For the EIA and EIM surveys, INEGI chose the sample based on classes of activity and plants in each activity.

Classes:

1. Based on the industrial census of 1993. The 205 classes of activity are ranked in decreasing order, based on total value of production at factory gate prices.
2. The most important activities, jointly representing 85% of manufacturing output, are selected.
3. Other classes of special interest to defining national accounts are added, even if their contributions are small.

Plants

1. Plants are ranked in decreasing order based on production value (at factory gate prices).

2. Plants are sequentially added to the sample until the total number of plants accounts for approximately 85% of a class's output value.
3. All plants larger than than 100 employees are included regardless of whether the 85% threshold has been already reached.
4. The maximum number of plants in a class is 120.
5. For highly concentrated classes, in which the 85% threshold is reached by adding fewer than 15 plants, all plants are included.

Once a plant is included in the sample, it is classified according to its principal product. While these surveys are skewed toward the largest plant, they cover a large percentage of value added in manufacturing in the formal sector. Since the informal sector accounts for 11% of value added in manufacturing in Mexico, on average, the share of value added of formal establishments in manufacturing not covered by the sample is very small. The average for 2003 through 2015 was calculated based on data from INEGI. Data before 2003 is unavailable, but given the stability of the share for this period (11.8% in 2003, and 10.42% in 2015), it is highly unlikely that it would have been significantly different in earlier years.

A.1.1.2 Example of Products in EIM

A.1.1.3 Price deflators

Estimation requires real inputs of capital, labor, and materials. To construct these measures, I augment survey data with price indices from various sources. INEGI provides price deflators for domestic intermediate inputs. Data are published monthly for the 4-digit NAICS classification, and thus they are one level of aggregation higher than my class definition.

Table A.1: Example of Products

CMAP94 CODE	Product Code	Description
36		Nonmetallic Mineral Products Sector
3612		Manufacturing of Clay Materials for Construction Subsector
361203		Manufacturing of Bricks and Tiles from Non-Refractory Clay
	361203001	Blocks
	361203002	Lattice Bricks
	361203003	Regular Bricks
	361203004	Breeze Block
	361203005	Coated Bricks
	361203006	Natural Bricks
	361203011	Tiles
	361203012	Coated Tiles
	361203013	Natural Tiles
	361203021	Spanish Tiles
	361203021	French Tiles

Note: CMAP94 corresponds to the Mexican Classification of Activities and Products. The first column shows the CMAP94 number for sector, subsector or industry. The second column includes the CMAP94 product code, and finally, the third column shows the description.

Table A.2: Example of Products 2

CMAP94 CODE	Product Code	Description
32		Textiles, Clothing, and Leather Sector
3214		Manufacturing of Knitwear Products Subsector
321401		Manufacturing of Socks and Stockings Industry
	321401001	Natural Fiber Socks
	321401002	Synthetic Fiber Socks
	321401011	Natural Fiber Ankle Socks
	321401012	Synthetic Fiber Ankle Socks
	321401021	Stockings
	321401022	Pantyhose
	321401023	Ankle Stockings
	321401031	Leotards
	321401032	Tights
	321401033	Anklets

Note: CMAP94 corresponds to the Mexican Classification of Activities and Products. The first column shows the CMAP94 number for sector, subsector or industry. The second column includes the CMAP94 product code, and finally, the third column shows the description.

Each NAICS code is matched with the CMAP94 class using the concordance provided by INEGI. By doing this, I match 86% of CMAP classes with a 4-digit NAICS. For the remaining 14% that I could not match directly, I use the intermediate input price index that more closely matched the corresponding NAICS classification.¹ For imported intermediates, I follow Iacovone (2008) and use the U.S. intermediate input price deflator for exported, non-agricultural supplies and materials (excluding fuels and building materials), adjusted for exchange rate fluctuations.² I use investment price deflators by type provided by INEGI to convert investment flows into real terms. Since investment price deflators are unavailable by industry, I use national deflators. INEGI provides separate deflators for non-residential construction, production equipment not including transportation equipment, and transportation equipment.

A.1.1.4 Constructing the Capital Stock

I construct the capital stock series with the perpetual inventory method, using the book value reported in the 1994 survey as an initial value. According to this method, capital of type z from plant j during period t , K_{jt}^z evolves according to:

$$K_{jt}^z = (1 - \delta_z)K_{jt-1}^z + I_{jt-1}^z,$$

where δ_z is the depreciation rate of capital of type z , and $I_{j,t-1}^z$ is investment at time $t - 1$ from plant j of capital of type z .

1. The majority of unmatched industries occurred because the price series exists only after 2011. These classes were small enough before such that an intermediate input price series could not be constructed appropriately.

2. Available from the U.S. Bureau of Labor Statistics. Exchange rate data comes from the Bank of Mexico.

Table A.3: Capital Depreciation Rates

Type of Fixed Assets	Fiscal Depreciation Band	Applied Depreciation Rate
Machinery and Equipment	5-15%	10%
Buildings	3-8%	5.5%
Transportation Equipment	15-25%	20%
Office Equipment and Others	7-35%	21%

Note: This table includes the fiscal depreciation bands from the Mexican Ministry of Finance.

I chose the classification of capital that matches both the 1994–2003 and 2003–2008 surveys. The types of capital used are:

- Machinery and production equipment, deflated by the total machinery and equipment price deflator.
- Transportation equipment, deflated by the national price deflator of transportation equipment.
- Construction of buildings and land, deflated by the total construction price deflator.
- Other fixed assets, including office equipment and others such as computers, deflated by the total investment price index.

I use the mid-point of the Mexican fiscal depreciation band from Iacovone (2008) as δ_j during construction of the capital stock variable.

A.1.1.5 Summary Statistics and Graphs

A.1.2 Data on Tariffs

Data on tariffs comes from the *World Bank's World Integrated Trade Solution* available at <https://wits.worldbank.org> at the 6-digit HS-level. Since there is no concordance available between HS-6 classification and the Mexican *CMA94* classification, I

Table A.4: Summary Statistics for Plants

Sector	# of Plants			# Employees	Median (Thousands of Dollars)			
	Total	Exporter	Single		Sales	VA/Worker	Materials	Capital
Food and Beverages	814	224	151	173	15,012.6	25.9	8,503.6	2,374.7
Textile Manufacturing	235	118	85	153	5,353.4	18.1	2,423.5	1,540.7
Apparel Manufacturing	410	135	143	69	2,273.8	14.1	1,037.5	288.3
Wood and Furniture	150	42	43	89	2,181.7	11.7	1,048.1	422.8
Paper Industries	318	81	165	151	6,939.6	26.8	2,423.9	1,374.9
Chemical Industries	707	339	167	133	6,912.0	24.2	2,872.7	1,671.8
Non-Metallic Minerals	292	79	125	85	2,867.9	26.1	670.0	862.7
Metallic Manufacturing	354	183	123	126	5,033.7	19.3	2,246.3	1,146.9
Machinery & Equipment	325	192	96	171	6,189.2	18.6	2,635.4	1,278.8

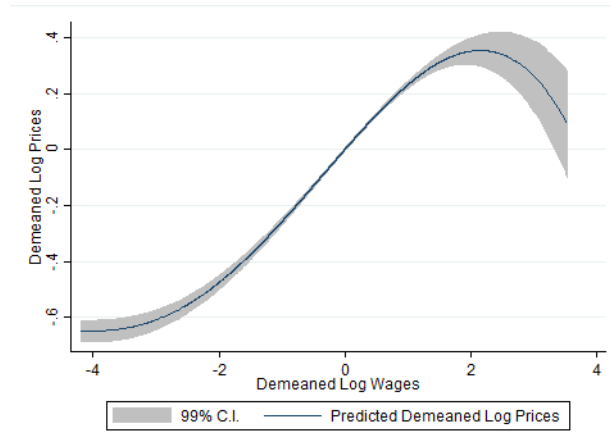
Notes: Includes averages across all years in the sample. Units are in 1994 US dollars, converted from Mexican pesos using the average 1994 exchange rate.

Table A.5: Product Churning, Average by Sector

	All Products				Domestic				Exported			
	Add	Drop	Net	Total	Add	Drop	Net	Total	Add	Drop	Net	Total
Food and Beverages	.100	.088	.012	.188	.094	.086	.008	.180	.146	.102	.044	.248
Textile Manufacturing	.109	.096	.013	.205	.099	.094	.004	.193	.142	.101	.041	.243
Apparel Manufacturing	.122	.105	.017	.227	.114	.103	.011	.217	.172	.123	.049	.295
Wood and Furniture	.123	.101	.022	.224	.116	.099	.016	.215	.192	.139	.053	.331
Paper Industries	.111	.097	.014	.207	.105	.096	.009	.201	.162	.112	.049	.274
Chemical Industries	.103	.091	.012	.195	.094	.089	.005	.183	.141	.102	.040	.243
Non-Metallic Minerals	.105	.092	.013	.197	.102	.091	.011	.193	.132	.098	.034	.230
Metallic Manufacturing	.107	.091	.016	.198	.101	.091	.010	.191	.124	.090	.034	.214
Machinery & Equipment	.113	.088	.025	.201	.106	.086	.020	.192	.133	.093	.041	.226

Notes: *Add* refers to the number of products introduced at t divided by the total number of products at t . *Drop* refers to products ceasing to be produced at t divided by the total number of products at t . *Net* refers to $Add - Drop$. *Total* refers to $Add + Drop$.

Figure A.1. Prices and Average Wages



The figure shows the best-fitted polynomials of the logarithm of prices demeaned by product–market fixed effects (y-axis) and the demeaned logarithm of the average wages (x-axis). Average wages were constructed by dividing total wage bill by total number employees. The shaded area indicates a 99% confidence interval.

constructed concordance manually. The process involved matching approximately 5,000 products in the *CMAP94* classification to one or sometimes multiple HS codes using the *CMAP94* product description provided by INEGI. When multiple HS-6 codes corresponded to a single *CMAP94* product, I used the average tariff across corresponding HS-6 codes. Utilizing this concordance, I constructed a measure of output tariffs for each product in the *CMAP94* classification using the effectively applied tariffs of Mexico on goods coming from the U.S. I also constructed a measure of U.S. effectively applied tariffs to goods coming from Mexico using the concordance.

Tariff data for Mexico before 1995 is only available for the year 1991. Tariff schedules in Mexico, however, remain unchanged from 1991 to 1993 (Faber (2014)). I, therefore, use the tariff schedule of Mexico from 1991 as its schedule for the year 1993. To construct the tariff schedule for the year 1994, I use the institutional details of NAFTA. In particular, I use the fact that under NAFTA tariffs on goods coming from the U.S. were either set to zero in 1994 or declined by a constant yearly magnitude from 1993 to 1995. For example,

Table A.6: Correlation Matrix of Tariffs

	Output Tariffs	Input Tariffs	U.S. Tariffs
Output Tariffs	1.00		
Input Tariffs	0.77	1.00	
U.S. Tariffs	0.60	0.58	1.00

Notes: The table shows the correlation matrix for my three measures of tariffs, output tariffs, tariffs on intermediate inputs, and U.S. tariffs on Mexican products for the years 1994-2008.

if a tariff was 15% in 1993 and 5% in 1995, I assume that that the tariff in 1994 is 10%. By contrast, if the tariff was 0% in 1995, I assume that the tariff was set at 0% in 1994.

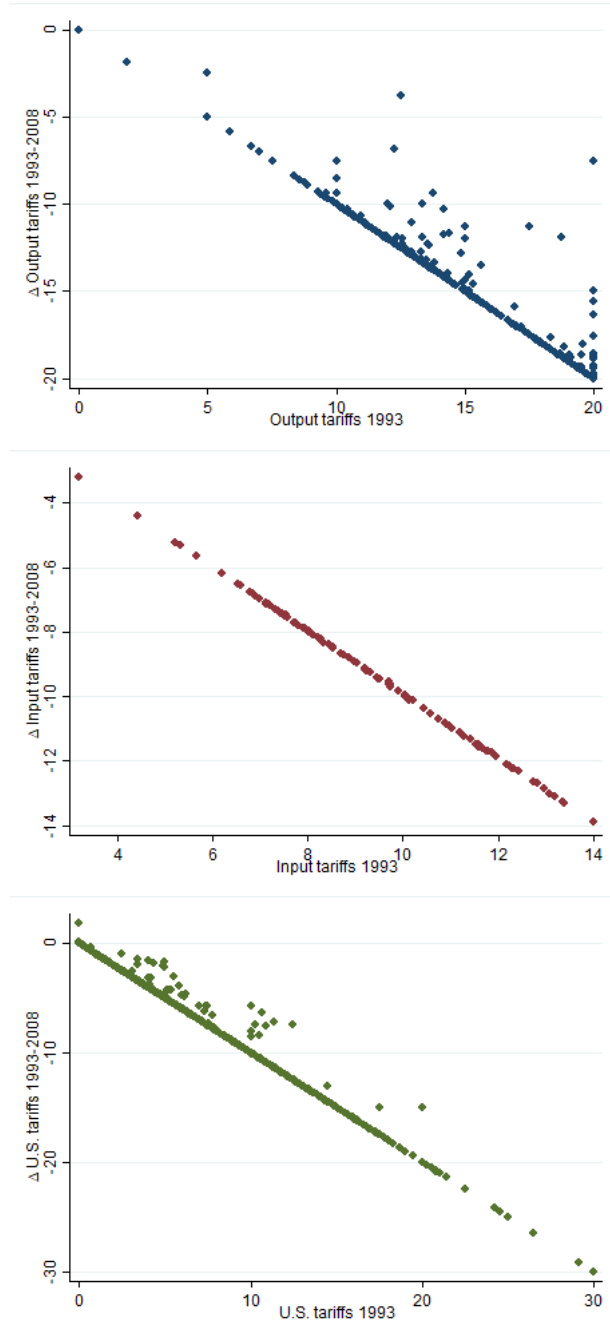
To construct the measure of intermediate input tariff described in the main text of the thesis, I had to use two concordances to match the Input-Output tables which are in NAICS classification, to the CMAP94. To do this, I first use a concordance to match the NAICS classification to the *International Standard Industrial Classification (ISIC)*. I then use the second concordance to match the ISIC classification to the CMAP94 Clase classification. Both concordances were provided by INEGI upon request.

The following figures show scatter plot between the level of the tariff measures in 1993 (before NAFTA), and the change in the tariffs between 1993 and 2008.

As we can see, there is a negative correlation between the initial level of tariffs and the change in tariffs from 1993 to 2008. This shows that declines in tariffs from NAFTA were largest in products that had large initial tariffs before NAFTA. The graphs provide further evidence against the hypothesis that tariffs were set to protect specific products or industries. If this were the case, then we would expect that products with higher initial tariffs, i.e., products with initial protection, would face a lower subsequent tariff decline. But this is not what we find in the data.

In the following table, we show the correlation matrix of my tariffs measures.

Figure A.2. Scatter plot 1993 tariffs and 1993-2008 change in tariffs.



Scatter plot of the 1993 level of output, intermediate input, and U.S. tariffs and the change in tariffs between 1993 and 2008.

As the table shows, the three tariff measures are positively correlated. The correlation, however, is not perfect suggesting that there is enough residual variation leftover to identify the coefficients on tariffs in the main specification.

A.2 Details on the Empirical Framework and Additional Theoretical Results

This appendix includes additional details on the empirical framework presented in Chapter 4. The section also includes additional theoretical results on marginal costs, selection, and pass-through.

A.2.1 Assumptions

Consider the production function of product i from plant j in sector s at time t :

$$Q_{ijt} = F_i(M_{ijt}, L_{ijt}, K_{ijt}; \beta_s) \Omega_{jt}.$$

Let W_{ijt}^M , W_{ijt}^L , and W_{ijt}^K be the corresponding prices of material, labor and capital inputs, respectively.

Assumption 1: The production function is product-specific.

Assumption 2: $F_i(\cdot)$ is continuous and twice differentiable with respect to material inputs. Material inputs are static so they can be adjusted freely, without dynamic considerations.

Assumption 3: The Hicks–Neutral plant-level productivity Ω_{jt} is log additive and plant-specific.

Assumption 4: All expenditures on inputs are attributable to products.

Assumption 5: State variables of the plant are $\mathbf{s}_{jt} = \{N_{jt}, \mathbf{K}_{ijt}, \Omega_{jt}, \mathbf{G}_j, \mathbf{r}_{ijt}\}$, where N_{jt} denotes the number of products, \mathbf{G}_j denotes the location of the plant, and \mathbf{r}_{ijt} are all payoff-relevant, serially correlated variables like tariffs.

Assumption 6: Plants minimize short-run costs, taking output quantity and input prices as givens.

A.2.2 Recovering the Input Expenditure Shares General Case

To solve for input expenditures shares $\rho_{ijt}^x = \log\left(\frac{W_{ijt}^x X_{ijt}}{\hat{X}_{jt}}\right)$ for multi-product plants, I purge quantities from measurement error as before by constructing $\hat{q}_{ijt} = E[q_{ijt} | \phi_{ijt}]$. Using the assumptions above, I can write the production function as:

$$\hat{q}_{ijt} = f(\hat{\mathbf{x}}_{jt}, \hat{\beta}_s, \hat{w}_{ijt}, \rho_{ijt}) + \omega_{jt}$$

For a functional form $f(\cdot)$, I can write the equation as:

$$\hat{q}_{ijt} - f_1(\hat{\mathbf{x}}_{jt}, \hat{\beta}_s, \hat{w}_{ijt}) = f_2(\hat{\mathbf{x}}_{jt}, \hat{\beta}_s, \hat{w}_{ijt}, \rho_{ijt}) + \omega_{jt}$$

Given estimates of the input price control function and the production function, the LHS of this equation is data, and the RHS depends on unknowns ρ_{ijt} and ω_{jt} . The previous equation must hold for each product from each plant. Since input expenditure shares must sum to 1, the following system of equations must hold for each plant j that produces J products at time t :

$$\begin{aligned}
\hat{q}_{1jt} - f_1(\hat{\mathbf{x}}_{jt}, \hat{\beta}_s, \hat{w}_{1jt}) &= f_2(\hat{\mathbf{x}}_{jt}, \hat{\beta}_s, \hat{w}_{1jt}, \rho_{1jt}) + \omega_{jt} \\
&\cdot \\
&\cdot \\
\hat{q}_{Jjt} - f_1(\hat{\mathbf{x}}_{jt}, \hat{\beta}_s, \hat{w}_{Jjt}) &= f_2(\hat{\mathbf{x}}_{jt}, \hat{\beta}_s, \hat{w}_{Jjt}, \rho_{Jjt}) + \omega_{jt} \\
\sum_{j=1}^J \exp(\rho_{ijt}) &= 1
\end{aligned}$$

I have a system of $J + 1$ equations in $J + 1$ unknowns, J ρ_{ijt} 's and ω_{jt} . Numerically solving these equations, I get estimates of $\hat{\rho}_{ijt}$ and productivity $\hat{\omega}_{jt}$, that I can use to recover the markups as:

$$\hat{\mu}_{ijt} = \hat{\theta}_{ijt}^M \left(\frac{P_{ijt} Q_{ijt}}{\exp(\hat{\rho}_{ijt}) \hat{M}_{it}} \right)$$

and then use the prices to construct marginal costs.

A.2.3 Marginal Cost, Productivity and Input Prices

In this subsection, I show how marginal cost depends on quantity productivity under standard production functions. Consider a plant with the following Cobb-Douglas production function:

$$Q = L^\alpha K^\beta \Omega$$

where Q is the quantity produced, Ω is Hicks-Neutral Quantity Productivity, L is labor, and K is capital. The plant's cost minimization problem yields the following conditional demand functions for labor and capital:

$$L = \left(\frac{Q}{\Omega}\right)^{\frac{1}{\alpha+\beta}} \left(\frac{r}{w} \frac{\alpha}{\beta}\right)^{\frac{\beta}{\alpha+\beta}}$$

$$K = \left(\frac{Q}{\Omega}\right)^{\frac{1}{\alpha+\beta}} \left(\frac{w}{r} \frac{\beta}{\alpha}\right)^{\frac{\alpha}{\alpha+\beta}}$$

and cost function:

$$C(Q, \Omega, w, r) = \left(\frac{Q}{\Omega}\right)^{\frac{1}{\alpha+\beta}} w^{\frac{\alpha}{\alpha+\beta}} r^{\frac{\beta}{\alpha+\beta}} \left(\frac{\alpha}{\beta}\right)^{\frac{\beta-\alpha}{\alpha+\beta}}.$$

The plant's marginal cost function is therefore:

$$MC(Q, \Omega, w, r) = \frac{\partial C(Q, A, r, w)}{\partial Q} = \frac{1}{\alpha+\beta} Q^{\frac{1-\alpha-\beta}{\alpha+\beta}} \left(\frac{1}{A}\right)^{\frac{1}{\alpha+\beta}} w^{\frac{\alpha}{\alpha+\beta}} r^{\frac{\beta}{\alpha+\beta}} \left(\frac{\alpha}{\beta}\right)^{\frac{\beta-\alpha}{\alpha+\beta}}.$$

From this equation, it is easy to verify:

$$\frac{\partial MC(Q, \Omega, w, r)}{\partial Q} = \frac{(1-\alpha-\beta)}{(\alpha+\beta)^2} Q^{\frac{1-2\alpha-2\beta}{\alpha+\beta}} \left(\frac{1}{\Omega}\right)^{\frac{1}{\alpha+\beta}} w^{\frac{\alpha}{\alpha+\beta}} r^{\frac{\beta}{\alpha+\beta}} \left(\frac{\alpha}{\beta}\right)^{\frac{\beta-\alpha}{\alpha+\beta}} \leq 0$$

$$\frac{\partial MC(Q, \Omega, w, r)}{\partial \Omega} = -\left(\frac{1}{\alpha+\beta}\right)^2 Q^{\frac{1-\alpha-\beta}{\alpha+\beta}} \left(\frac{1}{\Omega}\right)^{\frac{1+\alpha+\beta}{\alpha+\beta}} w^{\frac{\alpha}{\alpha+\beta}} r^{\frac{\beta}{\alpha+\beta}} \left(\frac{\alpha}{\beta}\right)^{\frac{\beta-\alpha}{\alpha+\beta}} < 0$$

$$\frac{\partial MC(Q, \Omega, w, r)}{\partial w} = \frac{\alpha}{(\alpha+\beta)^2} Q^{\frac{1-\alpha-\beta}{\alpha+\beta}} \left(\frac{1}{\Omega}\right)^{\frac{1}{\alpha+\beta}} w^{\frac{-\beta}{\alpha+\beta}} r^{\frac{\beta}{\alpha+\beta}} \left(\frac{\alpha}{\beta}\right)^{\frac{\beta-\alpha}{\alpha+\beta}} > 0$$

$$\frac{\partial MC(Q, \Omega, w, r)}{\partial r} = \frac{\beta}{(\alpha+\beta)^2} Q^{\frac{1-\alpha-\beta}{\alpha+\beta}} \left(\frac{1}{\Omega}\right)^{\frac{1}{\alpha+\beta}} w^{\frac{\alpha}{\alpha+\beta}} r^{\frac{-\alpha}{\alpha+\beta}} \left(\frac{\alpha}{\beta}\right)^{\frac{\beta-\alpha}{\alpha+\beta}} > 0$$

The sign of the derivative of marginal costs with respect to quantities depends on the parameters. If $\alpha + \beta < 1$, so returns to scale are decreasing, marginal costs are increasing with quantity. In contrast, under increasing returns to scale with $\alpha + \beta > 1$, marginal costs

are decreasing in quantity. Therefore, marginal costs are increasing in input prices, they are decreasing in productivity, and they might be decreasing or decreasing on quantity produced, with the sign depending on returns to scale.

A.2.4 *Pass-through*

This subsection shows that the covariance between the logarithm of markups and the logarithm of marginal costs is non-zero unless there is complete pass-through of marginal cost to prices. I also show the results of pass-through regressions of prices on the estimates of marginal costs. Consider the following pass-through regression:

$$\log P = \alpha + \beta^{PT} \log MC + \varepsilon$$

The pass-through elasticity then is:

$$\beta^{PT} = \frac{Cov(\log P, \log MC)}{Var(\log MC)}$$

and now:

$$\begin{aligned} Cov(\log MC, \log \mu) &= 0 \iff \\ Cov(\log MC, \log P - \log MC) &= 0 \iff \\ Cov(\log MC, \log P) - Var(\log MC) &= 0 \iff \\ \frac{Cov(\log P, \log MC)}{Var(\log MC)} &= \beta^{PT} = 1 \end{aligned}$$

where the second equality uses the fact that $\log P = \log MC + \log \mu$. Therefore, only under complete pass-through of marginal cost to prices is the covariance between markups

Table A.7: Pass-Through Regression

	Domestic			Exported		
	(1)	(2)	(3)	(4)	(5)	(6)
$\log MC_{ijt}$	0.064 ^a	0.098 ^a	0.115 ^a	0.018 ^a	0.043 ^a	0.050 ^c
	(.004)	(.0097)	(.011)	(.007)	(.0145)	(.028)
Within R^2	0.021	0.079	0.078	0.023	0.034	0.083
Instruments	-	$\tau_{jt}^{input}, \log \hat{m}c_{ijt-1}$	$\tau_{jt}^{input}, \log \hat{m}c_{ijt-2}$	-	$\tau_{jt}^{input}, \log \hat{m}c_{ijt-1}$	$\tau_{jt}^{input}, \log \hat{m}c_{ijt-2}$
N	148,873	127,341	111,189	29,334	23,680	19,997
F		1,608	482		779	147

Notes: The dependent variable is the log of prices. Columns 1 and 4 show the OLS specification. Column 2 and 5 instrument marginal costs using lagged value and intermediate input tariffs. Column 3 and 6 instrument marginal costs with 2-year lag and intermediate input tariffs. Regressions include plant-product fixed effect and year-fixed effects using data for the entire sample (1994–2008). Standard errors are clustered at the product level.

Significance: a (1%), b (5%), and c (10%), respectively.

and marginal costs zero. Using the same logic, $Cov(\log MC, \log \mu) < 0$ if and only if $\beta^{PT} < 1$. That is, as long as there is incomplete pass-through of marginal cost to prices, the covariance between markups and marginal is negative.

The following table show the results from the following regression of marginal costs to prices:

$$\log P_{ijt} = \alpha + \beta \log MC_{ijt} + \xi_{ij} + \varphi_{st} + \varepsilon_{ijt}$$

where MC_{ijt} is the estimate of marginal cost, ξ_{ij} are plant-product fixed effect, and φ_{st} are sector year fixed effect. I estimate the specification separately for the sample of domestic and exported products.

From the table we can clearly see that there is incomplete pass-through as $\beta < 1$ in all of the specifications. We can also see that pass-through is significantly smaller for exported products.

A.2.5 The Effect of Endogeneity from Protectionism

In this subsection I analyze the effect of endogeneity in tariffs arising from protectionism. Let $\kappa_{ijt} \in [0, 1]$ denote an unobserved measure of protectionism for product i of plant j at time t , with κ_{ijt} closer to one indicating more protectionism. For simplicity we assume that this single index κ_{ijt} captures all the relevant protectionist measures. Consider the following simplified version of equation 3.1 from Chapter 3:

$$\log P_{ijt} = \alpha + \beta \tau_{it}^{out\ put} + \varepsilon_{ijt}$$

and assume that the unobserved protectionist measure κ_{ijt} enters the error term ε_{ijt} linearly. In particular, assume that:

$$\varepsilon_{ijt} = \kappa_{ijt} + u_{ijt}$$

where u_{ijt} is the true idiosyncratic error term with $E[u_{ijt}] = 0$ and $E[\tau_{it}^{out\ put} u_{ijt}] = 0$.

The probability limit of the OLS estimator is given by:

$$\begin{aligned} plim \hat{\beta} &= \frac{Cov(\log P_{ijt}, \tau_{it}^{out\ put})}{Var[\tau_{it}^{out\ put}]} \\ &= \frac{Cov(\alpha + \beta \tau_{it}^{out\ put} + \varepsilon_{ijt}, \tau_{it}^{out\ put})}{Var[\tau_{it}^{out\ put}]} \\ &= \beta + \frac{Cov(\kappa_{ijt} + u_{ijt}, \tau_{it}^{out\ put})}{Var[\tau_{it}^{out\ put}]} \\ &= \beta + \frac{Cov(\kappa_{ijt}, \tau_{it}^{out\ put})}{Var[\tau_{it}^{out\ put}]} \end{aligned}$$

If $\frac{Cov(\kappa_{ijt}, \tau_{it}^{output})}{Var[\tau_{it}^{output}]} \neq 0$, then the OLS estimator will be inconsistent and biased. The sign of the bias will depend on the sign of $Cov(\kappa_{ijt}, \tau_{it}^{output})$ since

$$plim \hat{\beta} - \beta = \frac{Cov(\kappa_{ijt}, \tau_{it}^{output})}{Var[\tau_{it}^{output}]}$$

and $Var[\tau_{it}^{output}] > 0$. Now, if tariff schedules from NAFTA were set up to protect certain plant-product pairs we would expect that $Cov(\kappa_{ijt}, \tau_{it}^{output}) > 0$, as more protected products (high κ_{ijt}) would have higher output tariffs. In this case, $plim \hat{\beta} - \beta > 0$, so OLS would be over estimating the impact of tariff changes on prices. The same argument goes through for markups the dependent variable. A similar analysis can be performed for my other tariff measures.

A.3 Additional Results on Estimates of Elasticities and Markups

This section shows additional results on the estimates of the production function elasticities as well as markups.

A.4 Robustness and Additional Results on the Impact of Tariffs

This section presents results from the estimation of various specifications to test the robustness of the main empirical specification. The section also includes additional empirical results of the impact of tariffs on a number of variables.

A.4.1 Sample Selection

In this subsection, we repeat the results of specification 6.1 for different samples to test the robustness of the results to various sample selections. As a first robustness test, we

Table A.8: Average Elasticities by Sector

Sector	Materials (1)	Capital (2)	Labor (3)	RTS (4)	Obs. during Estimation (5)
Food and Beverages	0.85 (0.17)	0.06 (0.05)	0.19 (0.11)	1.10 (0.22)	1,781
Textile Manufacturing	0.59 (0.12)	0.01 (0.20)	0.22 (0.27)	0.81 (0.45)	992
Apparel Manufacturing	0.87 (0.15)	0.05 (0.05)	0.11 (0.06)	1.03 (0.16)	1,691
Wood and Furniture Industries	0.69 (0.34)	0.10 (0.11)	0.06 (0.39)	0.86 (0.29)	490
Paper Industries	1.04 (0.35)	0.05 (0.14)	0.38 (0.24)	1.47 (0.68)	1,968
Chemical Industries	0.70 (0.26)	0.11 (0.23)	0.31 (0.25)	1.12 (0.36)	1,995
Non-Metallic Mineral Products	0.55 (0.30)	0.08 (0.11)	0.42 (0.31)	1.06 (0.20)	1,519
Metallic Manufacturing	0.66 (0.11)	0.17 (0.07)	0.20 (0.15)	1.03 (0.28)	1,493
Machinery and Equipment Manufacturing	0.77 (0.21)	0.05 (0.24)	0.17 (0.48)	0.99 (0.67)	1,073

Notes: Estimates of output elasticities of the production function for all products, domestic and exported, and all years in the sample (1994-2008). Columns 1–3 report average elasticities and standard deviations (in parenthesis) for each sector. Column 4 reports average returns to scale (RTS), which is the sum of labor, capital, and materials elasticities. Column 5 reports the total number of observations used during estimation of the production function for each sector.

Table A.9: Average Elasticities by Sector, No Correction

Sector	No Selection Correction				No Input Price Correction			
	Materials (1)	Capital (2)	Labor (3)	RTS (4)	Materials (5)	Capital (6)	Labor (7)	RTS (8)
Food and Beverages	0.88 (0.17)	0.03 (0.06)	0.16 (0.11)	1.07 (0.16)	0.70 (0.41)	-0.15 (0.35)	0.48 (0.26)	1.03 (0.60)
Textile Manufacturing	0.66 (0.20)	-0.05 (0.29)	0.19 (0.21)	0.80 (0.56)	0.79 (1.06)	0.44 (1.06)	0.57 (1.14)	1.80 (2.87)
Apparel Manufacturing	0.88 (0.17)	0.05 (0.05)	0.09 (0.06)	1.02 (0.16)	0.48 (0.41)	-0.03 (0.65)	0.10 (0.81)	0.54 (0.34)
Wood and Furniture Industries	0.61 (0.38)	-0.02 (0.32)	0.03 (0.43)	0.62 (0.60)	-0.55 (1.72)	-0.38 (1.68)	-0.97 (3.09)	-1.90 (5.27)
Paper Industries	1.03 (0.36)	0.04 (0.09)	0.36 (0.17)	1.42 (0.58)	0.21 (0.26)	-0.34 (0.34)	1.04 (0.40)	0.92 (0.37)
Chemical Industries	0.66 (0.22)	0.11 (0.27)	0.29 (0.25)	1.07 (0.30)	0.33 (0.42)	0.38 (0.08)	0.79 (0.68)	1.49 (0.65)
Non-Metallic Mineral Products	0.51 (0.28)	0.10 (0.07)	0.44 (0.31)	1.05 (0.24)	0.60 (0.56)	0.10 (0.41)	0.49 (0.42)	1.18 (0.48)
Metallic Manufacturing	0.67 (0.12)	0.14 (0.07)	0.19 (0.15)	1.01 (0.28)	0.79 (0.59)	0.41 (0.09)	0.09 (0.61)	1.30 (0.23)
Machinery & Equipment	0.61 (0.18)	0.09 (0.22)	0.15 (0.50)	0.84 (0.38)	0.83 (0.92)	-0.44 (0.91)	-0.32 (1.11)	0.07 (0.61)

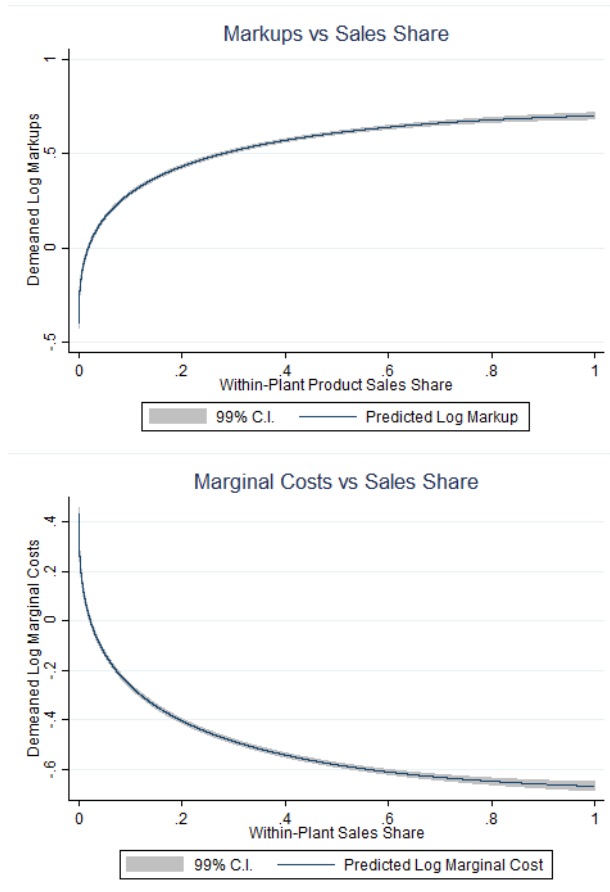
Notes: Estimates of output elasticities of the production function for all products, domestic and exported, and all years in the sample (1994–2008). Columns 1–4 report average elasticities and standard deviations (in parenthesis) in each sector for estimation, without including selection correction for the probability of remaining single-product. Columns 5–8 report average elasticities and standard deviations for estimation, without including the input price control function. Columns 4 and 8 report average returns to scale (RTS), which is the sum of labor, capital, and materials elasticities.

Table A.10: Average and Median Markups

Sector	Mean	Median
Food and Beverages	1.87	1.12
Textile Manufacturing	1.81	1.15
Apparel Manufacturing	2.25	1.26
Wood and Furniture Industries	2.46	1.04
Paper Industries	3.79	1.50
Chemical Industries	2.95	1.23
Non-Metallic Mineral Products	3.87	1.91
Metallic Manufacturing	2.55	1.10
Machinery and Equipment Manufacturing	3.01	1.27
Total	2.62	1.23

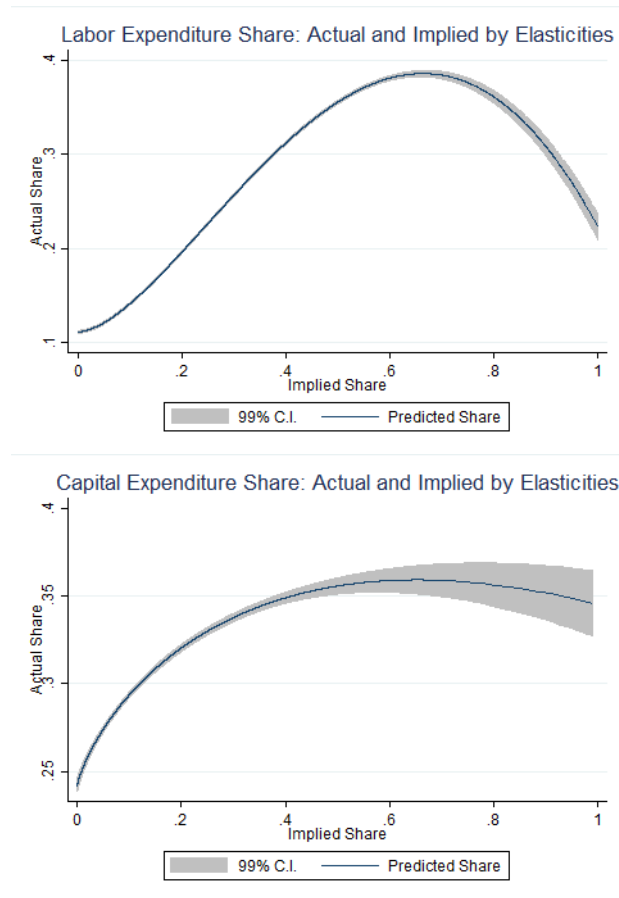
Notes: Average and median estimates of markups for all products, domestic and exported, and all years in the sample (1994–2008). Outliers below the 1st and above the 99th percentiles for each sector are trimmed.

Figure A.3. Markups, Marginal Costs and Sales Share



The figure shows the best-fitted polynomials of the logarithm of markups and marginal costs, demeaned by product–market fixed effects (y-axis) and within-plant product sales share (x-axis). The figure excludes outliers below the 1st and above the 99th percentiles of the markup distribution in each sector. The shaded area indicates a 99% confidence interval.

Figure A.4. Actual and Implied Expenditure Shares



The figure shows the best-fitted polynomials of the observed share of labor and capital input expenditures out of total expenditures in labor, capital, and materials (y-axis), and the input expenditures share implied by the estimated elasticities (x-axis). The shaded area indicates a 99% confidence interval.

Table A.11: The Impact of Tariffs on Prices, Marginal Costs, and Markups, Domestic Products, Full Sample

	$\log P_{ijt}$	$\log MC_{ijt}$	$\log \mu_{ijt}$
	(1)	(2)	(3)
τ_{it}^{output}	0.12 ^b	0.19 ^b	-0.07
	(.05)	(.09)	(.09)
τ_{jt}^{input}	0.12 ^b	0.08	0.04
	(.05)	(.18)	(.19)
τ_{it}^{US}	0.06	1.07 ^a	-1.02 ^a
	(.14)	(.35)	(.36)
Within R^2	0.07	0.01	0.02
N	148,873	148,873	148,873

Notes: Dependent variables in Columns 1–3 are the logs of prices, marginal costs, and markups, respectively. markup distribution within each sector. Regressions include plant–product and sector-year fixed effects using data for the sample of domestic products and all years (1994-2008). Standard errors are clustered at the product level.

Significance: a (1%), b (5%), and c (10%), respectively.

repeat the main specifications using all the observations in the sample without excluding any outliers. The following tables show the results.

The next set of results repeat the estimation but exclude the top and bottom 3% of the markup distribution within each sector.

As a final robustness check of sample selection, I also estimated the main specification using the sample of plant-products that appear for the whole 1994-2008 period. The following tables show the results of this estimation.

A.4.2 Functional Form Specification: Log-Log

This subsection shows the results of the estimation of the impact of tariff declines on prices, markups and marginal costs for a different functional form specification. I estimate a log-log specification, given by the following equation:

Table A.12: The Impact of Tariffs on Prices, Marginal Costs, and Markups, Exported Products, Full Sample

	$\log P_{ijt}$	$\log MC_{ijt}$	$\log \mu_{ijt}$
	(1)	(2)	(3)
τ_{it}^{output}	0.01	0.46 ^a	-0.45 ^b
	(.06)	(.17)	(.18)
τ_{jt}^{input}	-0.03	1.45 ^b	-1.44 ^b
	(.20)	(.59)	(.59)
τ_{it}^{US}	-0.71 ^c	2.11 ^a	-2.82 ^a
	(.38)	(.79)	(.85)
Within R^2	0.03	0.03	0.03
N	29,334	29,334	29,334

Notes: Dependent variables in Columns 1–3 are the logs of prices, marginal costs, and markups, respectively. markup distribution within each sector. Regressions include plant–product and sector-year fixed effects using data for the sample of exported products and all years (1994-2008). Standard errors are clustered at the product level.

Significance: a (1%), b (5%), and c (10%), respectively.

Table A.13: The Impact of Tariffs on Prices, Marginal Costs, and Markups, Domestic Products, 3% Trim

	$\log P_{ijt}$	$\log MC_{ijt}$	$\log \mu_{ijt}$
	(1)	(2)	(3)
τ_{it}^{output}	0.13 ^a	0.14 ^c	-0.01
	(.05)	(.08)	(.08)
τ_{jt}^{input}	0.15 ^a	0.08	0.07
	(.05)	(.14)	(.13)
τ_{it}^{US}	0.06	0.83 ^a	-0.77 ^a
	(.14)	(.35)	(.36)
Within R^2	0.08	0.01	0.02
N	139,933	139,933	139,933

Notes: Dependent variables in Columns 1–3 are the logs of prices, marginal costs, and markups, respectively. The regressions exclude outliers in the top and bottom 3% of the markup distribution within each sector. Regressions include plant–product and sector-year fixed effects using data for the sample of domestic products and all years (1994-2008). Standard errors are clustered at the product level.

Significance: a (1%), b (5%), and c (10%), respectively.

Table A.14: The Impact of Tariffs on Prices, Marginal Costs, and Markups, Exported Products, 3% Trim

	$\log P_{ijt}$	$\log MC_{ijt}$	$\log \mu_{ijt}$
	(1)	(2)	(3)
τ_{it}^{output}	0.10 (.07)	0.41 ^b (.21)	-0.30 (.20)
τ_{jt}^{input}	-0.01 (.20)	1.48 ^a (.54)	-1.49 ^a (.54)
τ_{it}^{US}	-0.37 (.39)	0.88 (.67)	-1.24 ^c (.67)
Within R^2	0.04	0.04	0.03
N	27,557	27,557	27,557

Notes: Dependent variables in Columns 1–3 are the logs of prices, marginal costs, and markups, respectively. The regressions exclude outliers in the top and bottom 3% of the markup distribution within each sector. Regressions include plant–product and sector-year fixed effects using data for the sample of exported products and all years (1994-2008). Standard errors are clustered at the product level. Significance: a (1%), b (5%), and c (10%), respectively.

Table A.15: The Impact of Tariffs on Prices, Marginal Costs, and Markups, Domestic Products Same Sample

	$\log P_{ijt}$	$\log MC_{ijt}$	$\log \mu_{ijt}$
	(1)	(2)	(3)
τ_{it}^{output}	0.13 ^a (.04)	0.16 ^c (.10)	-0.04 (.08)
τ_{jt}^{input}	0.12 ^c (.07)	0.06 (.11)	0.06 (.11)
τ_{it}^{US}	0.09 (.16)	0.93 ^b (.41)	-0.84 ^b (.38)
Within R^2	0.08	0.01	0.02
N	125,710	125,710	125,710

Notes: Dependent variables in Columns 1–3 are the logs of prices, marginal costs, and markups, respectively. The regressions exclude outliers in the top and bottom 1% of the markup distribution within each sector. Regressions include plant–product and sector-year fixed effects using data for the sample of domestic products that are produced in all years (1994-2008). Standard errors are clustered at the product level. Significance: a (1%), b (5%), and c (10%), respectively.

Table A.16: The Impact of Tariffs on Prices, Marginal Costs, and Markups, Exported Products Same Sample

	$\log P_{ijt}$	$\log MC_{ijt}$	$\log \mu_{ijt}$
	(1)	(2)	(3)
τ_{it}^{output}	0.10 ^c	0.19	-0.02
	(.05)	(.24)	(.09)
τ_{jt}^{input}	0.05	2.18 ^a	-2.13 ^a
	(.19)	(.44)	(.16)
τ_{it}^{US}	-0.92 ^b	1.48 ^c	-2.40 ^a
	(.48)	(.80)	(.79)
Within R^2	0.05	0.01	0.04
N	16,703	16,703	16,703

Notes: Dependent variables in Columns 1–3 are the logs of prices, marginal costs, and markups, respectively. The regressions exclude outliers in the top and bottom 1% of the markup distribution within each sector. Regressions include plant–product and sector-year fixed effects using data for the sample of exported products that are produced in all years (1994–2008). Standard errors are clustered at the product level. Significance: a (1%), b (5%), and c (10%), respectively.

$$\log Y_{ijt} = \alpha + \beta_1 \log(1 + \tau_{it}^{output}) + \beta_2 \log(1 + \tau_{jt}^{input}) + \beta_3 \log(1 + \tau_{it}^{US}) + \xi_{ij} + \varphi_{st} + \varepsilon_{ijt} \quad (\text{A.1})$$

where Y_{ijt} is either prices, markups, or marginal costs of product i from plant j at time t . τ_{it}^{output} are Mexican import tariffs applied to product i , τ_{jt}^{input} is a weighted measure of Mexican tariffs applied to intermediate inputs of plant j , τ_{it}^{US} is the tariff applied by the United States on goods i coming from Mexico. ξ_{ij} and φ_{st} are plant–product and sector-year fixed effects, respectively. The following tables show the results of these specifications.

A.4.3 Heterogeneity of Results

In this appendix I explore the heterogeneity of the results from my main specifications along a number of dimensions.

Table A.17: The Impact of Tariffs on Prices, Marginal Costs, and Markups, Domestic Products Log-Log

	$\log P_{ijt}$	$\log MC_{ijt}$	$\log \mu_{ijt}$
	(1)	(2)	(3)
$\log(1 + \tau_{it}^{output})$	0.24 ^a	0.26 ^c	-0.02
	(.10)	(.14)	(.12)
$\log(1 + \tau_{jt}^{input})$	0.18 ^a	0.17	0.01
	(.05)	(.14)	(.14)
$\log(1 + \tau_{it}^{US})$	0.08	1.22 ^b	-1.14 ^a
	(.16)	(.41)	(.39)
Within R^2	0.07	0.01	0.02
N	145,887	145,887	145,887

Notes: Dependent variables in Columns 1–3 are the logs of prices, marginal costs, and markups, respectively. The regressions exclude outliers in the top and bottom 1% of the markup distribution within each sector. Regressions include plant–product and sector-year fixed effects using data for the sample of domestic products and all years (1994-2008). Standard errors are clustered at the product level. Significance: a (1%), b (5%), and c (10%), respectively.

Table A.18: The Impact of Tariffs on Prices, Marginal Costs, and Markups, Exported Products Log-Log

	$\log P_{ijt}$	$\log MC_{ijt}$	$\log \mu_{ijt}$
	(1)	(2)	(3)
$\log(1 + \tau_{it}^{output})$	0.05	0.79 ^c	-0.74 ^b
	(.13)	(.41)	(.09)
$\log(1 + \tau_{jt}^{input})$	-0.00	1.85 ^a	-1.85 ^a
	(.17)	(.43)	(.47)
$\log(1 + \tau_{it}^{US})$	-0.79 ^b	2.25 ^b	-3.04 ^a
	(.38)	(.82)	(.86)
Within R^2	0.03	0.03	0.03
N	28,738	28,738	28,738

Notes: Dependent variables in Columns 1–3 are the logs of prices, marginal costs, and markups, respectively. The regressions exclude outliers in the top and bottom 1% of the markup distribution within each sector. Regressions include plant–product and sector-year fixed effects using data for the sample of exported products and all years (1994-2008). Standard errors are clustered at the product level. Significance: a (1%), b (5%), and c (10%), respectively.

Main Specification

In this subsection I analyze the heterogeneity of the results of my main specification. I focus in the heterogeneity of the results by import and export status. In particular, I estimate the following two variations of the main specification:

$$\log Y_{ijt} = \alpha + \beta_1 \tau_{it}^{output} + \beta_2 \tau_{jt}^{input} + \beta_3 \tau_{it}^{US} + Import \times [\gamma_1 \tau_{it}^{output} + \gamma_2 \tau_{jt}^{input} + \gamma_3 \tau_{it}^{US}] + \xi_{ij} + \psi_{st} + \varepsilon_{ijt} \quad (A.2)$$

$$\log Y_{ijt} = \alpha + \beta_1 \tau_{it}^{output} + \beta_2 \tau_{jt}^{input} + \beta_3 \tau_{it}^{US} + Export \times [\gamma_1 \tau_{it}^{output} + \gamma_2 \tau_{jt}^{input} + \gamma_3 \tau_{it}^{US}] + \xi_{ij} + \psi_{st} + \varepsilon_{ijt} \quad (A.3)$$

where *Import* is an indicator variable equal to one if the plant imports intermediate inputs and *Export* is an indicator function equal to one if the plant exports. The following tables show the results for these specifications.

Markup specification

In this subsection I explore the heterogeneity of my markup specification. The first tables show the heterogeneity of the results by separating the sample of products between homogenous products and non-homogenous products. The classification of products follows Rauch (1999) classification. Under this classification, a product is classified as homogenous if it is traded in an organized exchange.

I also analyzed the heterogeneity of the results by size. I repeat the markup specification 6.2, but separate the estimation sample between large plants, which are those classified as those having more than 150 employees, and small plants having less than 150 employees. The following table shows the results for these specifications.

I also analyzed the heterogeneous impact of tariffs on markups by initial level of the markup. To do this, I estimate the following specification:

Table A.19: The Impact of Tariffs on Prices, Marginal Costs, and Markups, Domestic Products by Import Status

	$\log P_{ijt}$	$\log MC_{ijt}$	$\log \mu_{ijt}$
	(1)	(2)	(3)
τ_{it}^{output}	0.13 ^c (.07)	0.11 (.16)	0.02 (.16)
τ_{jt}^{input}	0.11 ^c (.06)	-.13 (.19)	0.24 (.18)
τ_{it}^{US}	0.13 (.16)	1.07 ^a (.37)	-0.93 ^a (.37)
<i>Import</i> \times τ_{it}^{output}	-0.01 (.06)	0.08 (.16)	-0.09 (.16)
<i>Import</i> \times τ_{jt}^{input}	0.02 (.04)	0.35 ^a (.13)	-0.33 ^b (.14)
<i>Import</i> \times τ_{it}^{US}	-0.17 (.14)	0.07 (.38)	-0.24 (.38)
Within R^2	0.07	0.01	0.02
N	145,887	145,887	145,887

Notes: Dependent variables in Columns 1–3 are the logs of prices, marginal costs, and markups, respectively. The regressions exclude outliers in the top and bottom 1% of the markup distribution within each sector. Regressions include plant–product and sector-year fixed effects using data for the sample of domestic products and all years (1994–2008). Standard errors are clustered at the product level. Significance: a (1%), b (5%), and c (10%), respectively.

Table A.20: The Impact of Tariffs on Prices, Marginal Costs, and Markups, Exported Products by Import Status

	$\log P_{ijt}$	$\log MC_{ijt}$	$\log \mu_{ijt}$
	(1)	(2)	(3)
τ_{it}^{output}	0.37 ^c	0.18 ^b	0.15
	(.21)	(.09)	(.59)
τ_{jt}^{input}	0.09	-0.13	-1.27 ^c
	(.19)	(.18)	(.68)
τ_{it}^{US}	-1.83 ^a	1.07 ^a	-4.97 ^a
	(.55)	(.37)	(1.07)
<i>Import</i> \times τ_{it}^{output}	-0.35 ^c	0.08	-0.59
	(.19)	(.16)	(.54)
<i>Import</i> \times τ_{jt}^{input}	-0.18	0.35 ^a	-0.31
	(.18)	(.14)	(.48)
<i>Import</i> \times τ_{it}^{US}	1.15 ^a	0.07	2.85 ^a
	(.46)	(.38)	(.97)
Within R^2	0.03	0.03	0.03
N	28,738	28,738	28,738

Notes: Dependent variables in Columns 1–3 are the logs of prices, marginal costs, and markups, respectively. The regressions exclude outliers in the top and bottom 1% of the markup distribution within each sector. Regressions include plant–product and sector-year fixed effects using data for the sample of domestic products and all years (1994–2008). Standard errors are clustered at the product level. Significance: a (1%), b (5%), and c (10%), respectively.

Table A.21: The Impact of Tariffs on Prices, Marginal Costs, and Markups, Domestic Products by Export Status

	$\log P_{ijt}$	$\log MC_{ijt}$	$\log \mu_{ijt}$
	(1)	(2)	(3)
τ_{it}^{output}	0.16 ^a (.05)	0.08 ^c (.04)	0.08 (.12)
τ_{jt}^{input}	0.09 ^c (.05)	-0.06 (.18)	0.16 (.18)
τ_{it}^{US}	0.03 (.14)	0.94 ^a (.34)	-0.91 ^a (.35)
$Export \times \tau_{it}^{output}$	-0.07 (.05)	0.22 (.16)	-0.29 ^c (.16)
$Export \times \tau_{jt}^{input}$	0.11 ^b (.05)	0.52 ^a (.17)	-0.42 ^a (.17)
$Export \times \tau_{it}^{US}$	0.13 (.15)	0.40 (.42)	-0.27 (.42)
Within R^2	0.07	0.01	0.02
N	145,887	145,887	145,887

Notes: Dependent variables in Columns 1–3 are the logs of prices, marginal costs, and markups, respectively. The regressions exclude outliers in the top and bottom 1% of the markup distribution within each sector. Regressions include plant–product and sector-year fixed effects using data for the sample of domestic products and all years (1994–2008). Standard errors are clustered at the product level. Significance: a (1%), b (5%), and c (10%), respectively.

Table A.22: The Pro-Competitive Effects of NAFTA, Domestic Products by Classification

	Homogenous		Non-Homogenous	
	(1)	(2)	(3)	(4)
τ_{it}^{output}	0.78 ^c	0.96 ^c	0.07 ^c	0.07 ^c
	(.40)	(.56)	(.04)	(.04)
τ_{it}^{US}	0.49	1.24	-0.03	-0.00
	(1.19)	(1.28)	(.14)	(.14)
Instruments	No	Yes	No	Yes
First Stage F	-	12.33	-	40.63
Within R^2	0.86	0.86	0.81	0.83
N	8,721	7,591	136,228	116,600

Notes: The dependent variable in Columns 1–4 is the log of the markup. All specifications include third-order polynomials on log marginal costs (coefficients not reported). In Column 2 and 4, I instrument the marginal cost polynomial using its lag and intermediate input tariffs. The regressions exclude outliers in the top and bottom 1% of the markup distribution within each sector. Regressions include plant–product fixed effects and sector-year fixed effects using data for the sample of domestic products and all years (1994-2008). Standard errors are clustered at the product level.

Significance: a (1%), b (5%), and c (10%), respectively.

Table A.23: The Pro-Competitive Effects of NAFTA, Exported Products by Classification

	Homogenous		Non-Homogenous	
	(1)	(2)	(3)	(4)
τ_{it}^{output}	0.83	0.61	-0.02	-0.03
	(.80)	(.77)	(.07)	(.08)
τ_{it}^{US}	1.05	0.56	-0.67 ^c	-0.64 ^c
	(.70)	(.78)	(.36)	(.35)
Instruments	No	Yes	No	Yes
First Stage F	-	8.27	-	47.36
Within R^2	0.88	0.86	0.88	0.88
N	1,333	1,045	27,405	22,162

Notes: The dependent variable in Columns 1–4 is the log of the markup. All specifications include third-order polynomials on log marginal costs (coefficients not reported). In Column 2 and 4, I instrument the marginal cost polynomial using its lag and intermediate input tariffs. The regressions exclude outliers in the top and bottom 1% of the markup distribution within each sector. Regressions include plant–product fixed effects and sector-year fixed effects using data for the sample of exported products and all years (1994-2008). Standard errors are clustered at the product level.

Significance: a (1%), b (5%), and c (10%), respectively.

Table A.24: The Pro-Competitive Effects of NAFTA, Domestic Products by Size

	Large		Small	
	(1)	(2)	(3)	(4)
τ_{it}^{output}	0.12 ^a	0.13 ^a	0.12	0.15
	(.04)	(.04)	(.09)	(.10)
τ_{it}^{US}	-0.14	-0.10	0.26	0.27
	(.16)	(.16)	(.25)	(.22)
Instruments	No	Yes	No	Yes
First Stage F	-	50.82	-	22.35
Within R^2	0.85	0.85	0.84	0.85
N	73,612	64,455	75,261	61,929

Notes: The dependent variable in Columns 1–4 is the log of the markup. All specifications include third-order polynomials on log marginal costs (coefficients not reported). In Column 2 and 4, I instrument the marginal cost polynomial using its lag and intermediate input tariffs. The regressions exclude outliers in the top and bottom 1% of the markup distribution within each sector. Regressions include plant–product fixed effects and sector-year fixed effects using data for the sample of domestic products and all years (1994-2008). Large plants are those with more than 150 employees. Standard errors are clustered at the product level. Significance: a (1%), b (5%), and c (10%), respectively.

Table A.25: The Pro-Competitive Effects of NAFTA, Exported Products by Size

	Large		Small	
	(1)	(2)	(3)	(4)
τ_{it}^{output}	-0.05	-0.07	0.15	0.17
	(.05)	(.06)	(.15)	(.14)
τ_{it}^{US}	-0.39	-0.40	-2.34 ^a	-2.19 ^a
	(.32)	(.41)	(.09)	(.08)
Instruments	No	Yes	No	Yes
First Stage F	-	10.20	-	8.98
Within R^2	0.89	0.85	0.86	0.86
N	21,734	17,902	7,600	5,572

Notes: The dependent variable in Columns 1–4 is the log of the markup. All specifications include third-order polynomials on log marginal costs (coefficients not reported). In Column 2 and 4, I instrument the marginal cost polynomial using its lag and intermediate input tariffs. The regressions exclude outliers in the top and bottom 1% of the markup distribution within each sector. Regressions include plant–product fixed effects and sector-year fixed effects using data for the sample of exported products and all years (1994-2008). Large plants are those with more than 150 employees. Standard errors are clustered at the product level. Significance: a (1%), b (5%), and c (10%), respectively.

Table A.26: The Pro-Competitive Effects of NAFTA, Domestic Products by Initial Markup

	(1)	(2)
τ_{it}^{output}	0.08 ^b	0.11 ^b
	(.04)	(.04)
τ_{it}^{US}	-0.06	-0.01
	(.14)	(.04)
$High_Tariff_{0,ijt} \times \tau_{it}^{output}$	0.10 ^c	0.07
	(.06)	(.05)
$High_Tariff_{0,ijt} \times \tau_{it}^{US}$	0.24	0.32
	(.21)	(.23)
Instruments	No	Yes
First Stage F	-	39.70
Within R^2	0.84	0.85
N	148,873	127,341

Notes: The dependent variable in Columns 1 and 2 is the log of the markup. Both specifications include third-order polynomials on log marginal costs (coefficients not reported). In Column 2, I instrument the marginal cost polynomial using its lag and intermediate input tariffs. The regressions exclude outliers in the top and bottom 1% of the markup distribution within each sector. Regressions include plant–product fixed effects and sector-year fixed effects using data for the sample of domestic products and all years (1994–2008). Standard errors are clustered at the product level.

Significance: a (1%), b (5%), and c (10%), respectively.

$$\log \mu_{ijt} = \alpha + \beta_1 \tau_{it}^{output} + \beta_2 \tau_{it}^{US} + High_Tariff_{0,ijt} \times [\gamma_1 \tau_{it}^{output} + \gamma_2 \tau_{it}^{US}] + g(\log MC_{ijt}) + \xi_{ij} + \psi_{st} + \varepsilon_{ijt} \quad (A.4)$$

where $High_Tariff_{0,ijt}$ is an indicator function equal to one if product i 's markup in 1994 is in the the top 10% of that product category. The following tables show the results from the estimation.

A.4.4 The Impact of Tariffs on the Introduction of New Products

In this subsection, I analyze the impact of tariff changes from NAFTA on product introduction. In particular, I estimate the following probit model at the plant level:

Table A.27: The Pro-Competitive Effects of NAFTA, Exported Products by Initial Markup

	(1)	(2)
τ_u^{output}	-0.00 (.06)	-0.03 (.06)
τ_u^{US}	-0.68 ^c (.40)	-0.60 (.44)
$High_Tariff_{0,ijt} \times \tau_u^{output}$	0.86 (.53)	0.23 (.55)
$High_Tariff_{0,ijt} \times \tau_u^{US}$	-0.05 (.86)	0.04 (1.04)
Instruments	No	Yes
First Stage F	-	9.42
Within R^2	0.89	0.88
N	28,738	23,207

Notes: The dependent variable in Columns 1 and 2 is the log of the markup. Both specifications include third-order polynomials on log marginal costs (coefficients not reported). In Column 2, I instrument the marginal cost polynomial using its lag and intermediate input tariffs. The regressions exclude outliers in the top and bottom 1% of the markup distribution within each sector. Regressions include plant–product fixed effects and sector-year fixed effects using data for the sample of exported products and all years (1994-2008). Standard errors are clustered at the product level.

Significance: a (1%), b (5%), and c (10%), respectively.

$$Pr(Intro_{jt} = 1) = \Phi(\alpha + \beta_1 \tau_{jt}^{output} + \beta_2 \tau_{jt}^{input} + \beta_3 \tau_{jt}^{US} + EXP_{jt} \times [\beta_4 \tau_{jt}^{output} + \beta_5 \tau_{jt}^{input} + \beta_6 \tau_{jt}^{US}] + \gamma X_{jt}) \quad (\text{A.5})$$

where $Intro_{jt}$ is an indicator function that is equal to 1 if plant j introduces a product in year t , and $\Phi(\cdot)$ is the cumulative distribution function of the standard normal distribution. τ_{jt}^{output} , τ_{jt}^{input} and τ_{jt}^{US} , are plant-level output, intermediate input and U.S. tariffs respectively. Output and U.S. plant level tariffs are constructed as a sales-weighted average of the tariffs on products sold by the plant. EXP_{jt} is an indicator function that is equal to 1 if plant j is an exporter plant. Finally, X_{jt} is a vector of plant level controls which include the plant's level of labor, capital, and material expenditures, a plant's import and export status, as well as year, state and sector fixed effects. The tariffs are interacted with the export status indicator to capture the heterogenous impact of tariff changes for plants that export products to the U.S.

Equation A.5 is estimated using contemporaneous as well as lagged independent variables. Table A.28 below shows the results of the estimation.

As we can see from Table A.28, declines in output and U.S. tariffs significantly increase the probability of introducing a new product by exporters. This result suggests that exporters respond to increased competitive pressure on their domestic products, and to an increase in market access, by introducing new products to the export markets. The results are robust to the exclusion of plant level controls.

A.4.5 *The Impact of Tariffs on Quantity Total Factor Productivity*

In this subsection, I study the impact of changes in tariffs arising from NAFTA, on Quantity Total Factor Productivity (TFPQ). As shown in Section 4.3, the empirical framework used to estimate production functions and construct product level markups allows me to recover a measure of TFPQ. TFPQ represents a more appropriate measure of productivity than the

Table A.28: The Impact of NAFTA on Product Introduction

	Contemporaneous			Lagged		
	(1)	(2)	(3)	(4)	(5)	(6)
τ_{jt}^{output}	0.000 (.001)	0.000 (.001)	-0.001* (.001)	0.001 (.001)	0.001 (.001)	-0.001 (.001)
τ_{jt}^{input}	0.029*** (.003)	0.029*** (.003)	0.023** (.003)	0.028*** (.003)	0.027*** (.003)	0.021*** (.003)
τ_{jt}^{US}	0.007 (.005)	0.007 (.005)	0.009* (.005)	0.004 (.004)	0.003 (.004)	0.006 (.004)
$\tau_{jt}^{output} \times EXP_{jt}$	-0.003* (.002)	-0.003 (.002)	-0.004*** (.002)	-0.005*** (.002)	-0.005*** (.002)	-0.006*** (.002)
$\tau_{jt}^{input} \times EXP_{jt}$	-0.008** (.004)	-0.008** (.004)	-0.006 (.004)	-0.008* (.004)	-0.008* (.004)	-0.005 (.004)
$\tau_{jt}^{US} \times EXP_{jt}$	-0.024*** (.008)	-0.021*** (.008)	-0.018** (.008)	-0.015** (.007)	-0.012* (.007)	-0.010* (.006)
Plant Controls	✓	✓	✓	✓	✓	✓
Year FE	✓	✓		✓	✓	
State FE		✓	✓		✓	✓
Sector-Year FE			✓			✓
Pseudo R^2	0.069	0.071	0.077	0.027	0.030	0.036
N	54,091	54,091	54,091	48,571	48,571	48,571

Notes: Columns 1- 6 gives the results of the probit specification. Columns 1-3 include the specification with the independent variables in their contemporaneous values, and Column 4-6 shows the results with the independent variables lagged one year. All specifications include labor, capital, and material expenditures as well as import and export status as plant-level controls. The coefficients on controls are omitted for brevity but are available upon request. Regressions include plant-level for the years 1994-2008.

Significance: a (1%), b (5%), and c (10%), respectively.

more commonly used Revenue Total Factor Productivity (TFPR), as it does not confound changes in productivity with movements in prices or markups.³ I estimate the following equation based on the specification used by López-Córdova (2003):

$$\omega_{jt} = \alpha + \beta_1 \tau_{jt}^{output} + \beta_2 \tau_{jt}^{input} + \beta_3 \tau_{jt}^{US} + \gamma X_{jt} + \varepsilon_{jt} \quad (\text{A.6})$$

where ω_{jt} is the logarithm of TFPQ of plant j . τ_{jt}^{output} , τ_{jt}^{input} and τ_{jt}^{US} , are plant-level output, intermediate input and U.S. tariffs respectively. Output and U.S. plant level tariffs are constructed as a sales-weighted average of the tariffs on products sold by plant j . X_{jt} is a vector of plant level controls which include the plant's import and export status, the total industry sales of plant j excluding its sales, and the Herfindahl–Hirschman Index, HHI, of market concentration in the industry of plant j , as well as year, state and sector fixed effects. Table A.29 below shows the results of the estimation with different fixed effects.

As we can see from Table A.29, declines in tariffs lead to large and statistically significant increase in plant-level TFPQ. The magnitude of the coefficients in Column 3, for example, suggest that a one percentage point decline in output tariffs raises TFPQ by 1.3%, a one percentage point reduction in input tariffs increases TFPQ by 2.2% and finally cuts in U.S. tariffs of one percentage point raises TFPQ by 3.4%.

3. The majority of papers analyzing the impact of trade policy on productivity use a measure of revenue productivity. Examples include the studies by Pavcnik (2002), López-Córdova (2003), Amiti and Konings (2007), Khandelwal and Topalova (2011), and Iacovone (2012).

Table A.29: The Impact of NAFTA on TFPQ

	(1)	(2)	(3)	(4)	(5)
τ_{jt}^{output}	-1.272*** (.224)	-1.225*** (.218)	-1.255*** (.221)	-1.363*** (.245)	-0.200*** (.056)
τ_{jt}^{input}	-2.307*** (.467)	-2.453*** (.466)	-2.197*** (.781)	-1.868* (1.001)	-2.024*** (.166)
τ_{jt}^{US}	-4.009*** (.769)	-3.802*** (.762)	-3.383*** (.852)	-1.824* (1.073)	-0.550** (.264)
Plant Controls	✓	✓	✓	✓	✓
State FE		✓	✓	✓	
Year FE			✓		
Sector-Year FE				✓	✓
Plant FE					✓
R^2	0.072	0.083	0.084	0.107	0.088
N	37,498	37,498	37,498	37,498	37,498

Notes: The dependent variable in Columns 1- 5 is the logarithm of a plant's productivity. The specifications in Columns 1-5 vary only on the set of fixed effects included in the estimation. The R^2 reported in Column 5 corresponds to the within R^2 . All specifications include import and export status, total industry sales excluding the plant's sales and the HHI index of concentration as plant-level controls. The coefficients on controls are omitted for brevity but are available upon request. Regressions include plant-level for the years 1994-2008. Standard errors are clustered at the plant level.

Significance: a (1%), b (5%), and c (10%), respectively.

APPENDIX B

APPENDIX: CONCORDANCE BETWEEN CMAP 94 AND HS-6 CLASSIFICATION

In this appendix, I include the concordance between the CMAP94 product classification used by INEGI and the HS-6 classification. To construct the concordance, I matched approximately 5,000 product codes from the CMAP94 classification to one or sometimes multiple HS codes using the CMAP94 product description provided by INEGI. The following tables include this concordance. The column labeled CMAP94 Clase code has the CMAP94 Clase identifier. The column labeled CMAP94 Product Code has the unique product identification number within each Clase. Finally, the column labeled HS-6 Code has the HS 6 digit product code. Note that a product in the table is a unique Clase-product code combination. For example, the product toy airplane has a Clase code 390006 corresponding to Toys, a unique product identifier within the Clase of 012 and an HS-6 digit code 950390.

B.1 Concordance

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
311101	001	2011001	311102	004	2044101
311101	002	2045001	311102	005	2032101
311101	003	2081001	311102	011	2023001
311101	004	2050001	311102	012	2045001
311101	005	2041001	311102	013	2050001
311101	006	2031101	311102	014	2044301
311101	011	2072401	311102	015	2032999
311101	012	2071101	311102	021	2072701
311101	021	2013001	311102	022	2071401
311101	022	2050001	311102	031	16023101
311101	023	2031999	311102	031	16023201
311101	031	15010001	311102	031	16023999
311101	032	15020001	311102	032	16025001
311101	041	2071301	311102	032	16025099
311101	041	2071399	311102	033	16024101
311101	041	2072601	311102	033	16024201
311101	041	2072699	311102	033	16024901
311101	041	2073599	311102	033	16024999
311101	042	2061001	311102	041	2101101
311101	043	2063001	311102	041	2101201
311101	051	5069099	311102	041	2101999
311101	052	41011001	311102	041	2102001
311101	052	41012101	311102	041	2109001
311101	052	41012201	311102	041	2109002
311101	052	41012999	311102	041	2109003
311101	052	41013099	311102	041	2109099
311101	052	41014001	311102	042	16010001
311101	052	41021001	311102	042	16010099
311101	052	41022101	311104	001	2031999
311101	052	41022999	311104	002	2031999
311101	052	41031001	311104	003	2013001
311101	052	41032001	311104	004	2064999
311101	052	41039001	311104	005	2101201
311101	052	41039099	311104	011	16010099
311101	052	41041001	311104	012	16010099
311101	053	2109099	311104	013	16010099
311101	053	16010099	311104	014	16010099
311101	054	55069099	311104	015	16010099
311101	055	5051001	311104	016	16010099
311101	056	16010001	311104	017	16010099
311101	056	16010099	311104	019	16010099
311102	001	2021001	311104	021	2109099
311102	002	2045001	311104	022	2109099
311102	003	2050001	311104	023	2109099

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
311104	024	2109099	311201	004	4013001
311104	025	2109099	311201	004	4013099
311104	029	2109099	311201	005	4011001
311104	031	2071301	311201	005	4011099
311104	032	2013001	311201	005	4012001
311104	033	2031999	311201	005	4012099
311104	034	2109099	311201	005	4013001
311104	035	2109099	311201	005	4013099
311104	036	16010099	311201	006	4011001
311104	041	41011001	311201	006	4011099
311104	041	41012101	311201	006	4012001
311104	041	41012201	311201	006	4012099
311104	041	41012999	311201	006	4013001
311104	041	41013099	311201	006	4013099
311104	041	41014001	311201	007	4011001
311104	041	41021001	311201	007	4011099
311104	041	41022101	311201	007	4012001
311104	041	41022999	311201	007	4012099
311104	041	41031001	311201	007	4013001
311104	041	41032001	311201	007	4013099
311104	041	41039001	311201	011	4039099
311104	041	41039099	311201	011	4049099
311104	041	41041001	311201	011	4059001
311104	042	2109099	311201	011	4059099
311104	043	15010001	311201	012	4051001
311104	044	15020001	311201	012	4051099
311104	045	15020001	311201	013	4061001
311104	045	15020001	311201	013	4062001
311104	045	15020001	311201	013	4063001
311104	045	15020001	311201	013	4063099
311104	045	15020001	311201	013	4064001
311104	045	15020001	311201	013	4069001
311104	045	15020001	311201	013	4069002
311201	001	4029901	311201	013	4069003
311201	002	4021001	311201	013	4069004
311201	002	4021099	311201	013	4069005
311201	002	4022101	311201	013	4069006
311201	002	4022199	311201	013	4069099
311201	002	4022999	311201	021	20091101
311201	003	4029101	311201	021	20091901
311201	004	4011001	311201	021	20091999
311201	004	4011099	311201	022	20091999
311201	004	4012001	311201	023	33021001
311201	004	4012099	311201	023	33021002

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
311202	001	4011001	311203	001	4021001
311202	001	4011099	311203	001	4021099
311202	001	4012001	311203	001	4022101
311202	001	4012099	311203	001	4022199
311202	001	4013001	311203	001	4022999
311202	001	4013099	311203	002	4021001
311202	002	4011001	311203	002	4021099
311202	002	4011099	311203	002	4022101
311202	002	4012001	311203	002	4022199
311202	002	4012099	311203	002	4022999
311202	002	4013001	311203	003	4021001
311202	002	4013099	311203	003	4021099
311202	011	4069004	311203	003	4022101
311202	012	4069004	311203	003	4022199
311202	013	4069004	311203	003	4022999
311202	014	4061001	311203	004	4021001
311202	015	4069099	311203	004	4021099
311202	016	4069099	311203	004	4022101
311202	017	4061001	311203	004	4022199
311202	018	4069004	311203	004	4022999
311202	021	4069004	311203	005	4021001
311202	022	4061001	311203	005	4021099
311202	023	4061001	311203	005	4022101
311202	024	4069002	311203	005	4022199
311202	031	4069099	311203	005	4022999
311202	041	4051001	311203	011	4029901
311202	041	4051099	311203	021	4029101
311202	051	4029999	311203	031	4039099
311202	052	15171001	311203	031	4049099
311202	061	4029901	311203	031	4059001
311202	061	4029999	311203	031	4059099
311202	062	4029901	311203	032	4021001
311202	062	4029999	311203	032	4021099
311202	071	4031001	311203	032	4022101
311202	072	4031001	311203	032	4022199
311202	081	29393001	311203	032	4022999
311202	081	29393002	311301	001	20057001
311202	082	29393001	311301	001	7112001
311202	082	29393002	311301	011	20087001
311202	083	17021101	311301	012	20088001
311202	083	17021901	311301	013	8045001
311202	083	17021999	311301	014	8045001
311202	084	4041001	311301	015	8133001
311202	084	4041099	311301	016	20082001

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
311301	021	8111001	311303	043	20055999
311301	031	7091001	311303	044	16042099
311301	032	20031001	311303	045	21069099
311301	033	7096001	311303	049	21069099
311301	034	20056001	311303	051	21069099
311301	035	20059001	311303	052	21069099
311301	036	20021001	311303	053	21069099
311301	036	20029099	311303	059	21069099
311301	036	21032001	311303	061	21069099
311301	036	21032099	311303	062	21069099
311301	041	7041002	311303	069	21069099
311301	042	7111001	311303	071	20098001
311301	042	20012001	311303	079	20098001
311301	043	20054001	311303	081	21069099
311301	044	20058001	311304	001	3061301
311301	045	20049002	311304	002	3061301
311301	051	20098001	311304	009	3061301
311301	052	20097001	311304	011	3079999
311301	053	20091101	311304	012	3079999
311301	053	20091901	311304	013	3079999
311301	054	20094001	311304	014	3061201
311301	054	20094099	311304	015	3075999
311301	055	20092001	311304	021	3049099
311301	056	20096001	311304	021	3031001
311301	061	20095001	311304	021	3032101
311301	071	20079904	311304	021	3032201
311301	072	21039099	311304	021	3032999
311301	079	21039099	311304	021	3033101
311303	001	21041001	311304	021	3033201
311303	002	21041001	311304	021	3033301
311303	003	21041001	311304	021	3033999
311303	004	21041001	311304	021	3034101
311303	005	21041001	311304	021	3034201
311303	006	21041001	311304	021	3034301
311303	007	21041001	311304	021	3034999
311303	008	21041001	311304	021	3035001
311303	011	21041001	311304	021	3036001
311303	019	21041001	311304	021	3037101
311303	021	21041001	311304	021	3037201
311303	029	21041001	311304	021	3037301
311303	031	21039099	311304	021	3037401
311303	032	21039099	311304	021	3037501
311303	041	16025099	311304	021	3037601
311303	042	20019099	311304	021	3037701

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
311304	021	3037801	311304	033	16059099
311304	021	3037999	311304	034	3055101
311304	022	3042001	311304	034	3055199
311304	031	3054101	311304	034	3055901
311304	031	3054201	311304	034	3055999
311304	031	3054901	311304	034	3056101
311304	032	3054999	311304	034	3056201
311304	032	16041101	311304	034	3056301
311304	032	16041201	311304	034	3056999
311304	032	16041301	311304	041	15041001
311304	032	16041399	311304	041	15041099
311304	032	16041401	311304	041	15042001
311304	032	16041499	311304	041	15042099
311304	032	16041501	311304	042	3051001
311304	032	16041601	311304	043	3051001
311304	032	16041699	311304	044	21032099
311304	032	16041999	311305	001	16041601
311304	032	16042099	311305	001	16041699
311304	032	16043001	311305	002	16041401
311304	032	16043099	311305	003	16041501
311304	032	16051001	311305	004	16041301
311304	032	16052001	311305	011	16059099
311304	032	16053001	311305	012	16059099
311304	032	16054001	311305	013	16052001
311304	032	16054099	311305	014	16059099
311304	032	16059099	311305	015	16051001
311304	033	16041101	311305	016	16053001
311304	033	16041201	311305	017	16059099
311304	033	16041301	311305	018	16059099
311304	033	16041399	311305	021	12122001
311304	033	16041401	311305	021	12122099
311304	033	16041499	311305	022	16043001
311304	033	16041501	311305	023	16043001
311304	033	16041601	311305	024	16054099
311304	033	16041699	311305	031	3079999
311304	033	16041999	311305	032	3079101
311304	033	16042099	311305	033	3054101
311304	033	16043001	311305	033	3054201
311304	033	16043099	311305	033	3054901
311304	033	16051001	311305	033	3054999
311304	033	16052001	311305	034	3031001
311304	033	16053001	311305	034	3032101
311304	033	16054001	311305	034	3032201
311304	033	16054099	311305	034	3032999

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
311305	034	3033101	311402	001	9011101
311305	034	3033201	311402	001	9011201
311305	034	3033301	311402	002	9011101
311305	034	3033999	311402	002	9011201
311305	034	3034101	311402	011	9011101
311305	034	3034201	311402	011	9011201
311305	034	3034301	311402	021	9011101
311305	034	3034999	311402	021	9011201
311305	034	3035001	311402	031	9019001
311305	034	3036001	311402	032	21011201
311305	034	3037101	311402	033	9019099
311305	034	3037201	311403	001	9012101
311305	034	3037301	311403	001	9012201
311305	034	3037401	311403	002	9012101
311305	034	3037501	311403	002	9012201
311305	034	3037601	311403	011	9012101
311305	034	3037701	311403	011	9012201
311305	034	3037801	311403	012	9012101
311305	034	3037999	311403	012	9012201
311305	035	3055101	311404	001	11010001
311305	035	3055199	311404	002	11010001
311305	035	3055901	311404	011	11031101
311305	035	3055999	311404	012	11031101
311305	035	3056101	311404	013	11010001
311305	035	3056201	311404	014	11010001
311305	035	3056301	311404	015	23023001
311305	035	3056999	311404	016	11031101
311305	041	15041001	311404	017	11031101
311305	041	15041099	311404	018	11010001
311305	041	15042001	311405	001	11022001
311305	041	15042099	311405	011	11081201
311305	042	3051001	311405	021	11022001
311305	043	3051001	311501	001	21061003
311305	044	21032099	311501	002	21069002
311401	001	10063001	311501	002	19053001
311401	002	10063001	311501	003	19059099
311401	003	10063001	311501	011	19022001
311401	004	10063001	311501	011	19023099
311401	011	10061001	311501	021	19022001
311401	012	10062001	311501	021	19023099
311401	013	23022001	311501	031	19059099
311401	021	11023001	311502	001	19059099
311401	031	11031401	311502	002	19059099
311401	041	11031401	311502	009	19059099

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
311502	011	19059099	311503	065	19053001
311502	019	19059099	311503	071	19059099
311502	021	19059099	311503	072	19059099
311502	022	19059099	311701	001	15155001
311502	029	19059099	311701	002	15121101
311502	031	19059099	311701	002	15121999
311502	032	19059099	311701	003	15121101
311502	041	19059099	311701	003	15121999
311502	051	19059099	311701	004	15152101
311502	051	19059099	311701	004	15152999
311502	051	19059099	311701	005	15091001
311502	051	19059099	311701	005	15091099
311502	052	19059099	311701	005	15099001
311502	052	19059099	311701	005	15099002
311502	052	19059099	311701	005	15099099
311502	052	19059099	311701	006	15122101
311502	061	19059099	311701	006	15122999
311502	062	19059099	311701	007	15071001
311502	063	19059099	311701	007	15079099
311502	064	19059099	311701	011	15131101
311502	071	19059099	311701	011	15131999
311502	072	19059099	311701	021	15141001
311502	073	19059099	311701	031	15010001
311502	079	19059099	311701	032	15171001
311503	001	19054001	311701	041	12089099
311503	002	19054001	311701	042	12081001
311503	003	19054001	311701	051	12089099
311503	004	19054001	311701	052	12089099
311503	005	19054001	311701	053	12089099
311503	011	19054001	311801	001	17011101
311503	012	19054001	311801	002	17011101
311503	021	19054001	311801	003	17011101
311503	022	19054001	311801	004	17011101
311503	031	19059099	311801	011	17019901
311503	032	19053001	311801	012	17031001
311503	041	19053001	311801	021	22071001
311503	051	19022001	311801	031	12129201
311503	051	19023099	311801	032	12129201
311503	052	19022001	311901	001	18062099
311503	052	19023099	311901	001	18063101
311503	061	19053001	311901	001	18063201
311503	062	19053001	311901	002	18050001
311503	063	19053001	311901	002	18061001
311503	064	19053001	311901	002	18061099

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
311901	011	18069001	311902	053	18061099
311901	012	18063101	311902	059	18061099
311901	013	18062099	311902	061	18061099
311901	021	18010001	311902	062	18061099
311901	022	18069099	311902	063	18061099
311901	023	18069099	311902	069	18061099
311901	024	18040001	311902	071	18061099
311901	025	18031001	311902	072	18061099
311901	025	18032001	311902	073	18061099
311901	026	18050001	311902	074	18061099
311901	026	18061001	311902	075	18061099
311901	026	18061099	311902	079	18061099
311902	001	18061099	311902	081	18061099
311902	002	18061099	311902	082	18061099
311902	003	18061099	311902	083	18061099
311902	004	18061099	311902	089	18061099
311902	005	18061099	311903	001	17041001
311902	006	18061099	311903	002	17041001
311902	007	18061099	311903	011	17049099
311902	009	18061099	311903	012	17049099
311902	011	18061099	311903	013	17049099
311902	012	18061099	312110	001	210111
311902	019	18061099	312110	002	210111
311902	021	18061099	312110	011	21011201
311902	022	18061099	312110	012	21011201
311902	023	18061099	312110	021	21012001
311902	024	18061099	312110	022	21011201
311902	025	18061099	312110	023	21011201
311902	026	18061099	312110	024	4029199
311902	029	18061099	312121	001	21069007
311902	031	18061099	312121	002	21069007
311902	032	18061099	312121	009	21069007
311902	033	18061099	312121	011	21069007
311902	034	18061099	312121	019	21069007
311902	035	18061099	312121	021	20097001
311902	036	18061099	312121	022	20091901
311902	037	18061099	312121	023	20092001
311902	038	18061099	312121	024	20096001
311902	041	18061099	312121	029	20099099
311902	042	18061099	312121	031	33011101
311902	043	18061099	312121	031	33011201
311902	049	18061099	312121	031	33011301
311902	051	18061099	312121	031	33011499
311902	052	18061099	312121	031	33011901

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
312121	031	33012101	312127	023	20081199
312121	031	33012201	312127	024	19059099
312121	031	33012301	312127	025	20054001
312121	031	33012401	312127	026	20055999
312121	031	33012599	312127	027	20081199
312121	031	33012601	312127	028	20052001
312121	031	33012901	312127	031	20081999
312121	032	32041999	312127	032	20081999
312121	033	32041999	312127	041	19041001
312121	034	21069001	312127	041	19042001
312121	035	21069001	312127	041	19049099
312121	036	21069001	312127	042	19041001
312121	039	21069001	312127	042	19042001
312123	001	11081201	312127	042	19049099
312123	011	11081201	312127	049	19041001
312123	021	23067001	312127	049	19042001
312123	031	23021001	312127	049	19049099
312123	041	23021001	312127	051	16024901
312123	051	15152101	312127	052	16024901
312123	051	15152999	312127	053	16024999
312123	052	23021001	312127	054	16024999
312123	053	11081201	312127	059	16024999
312123	054	23021001	312129	001	4081101
312126	001	21069001	312129	001	4081999
312126	011	21069001	312129	001	4089101
312126	012	21069001	312129	009	4089101
312126	013	21069001	312129	011	20051001
312126	019	21069001	312129	021	21069099
312126	021	21069001	312129	031	17019901
312126	031	15161001	312129	031	17019999
312126	031	15162001	312129	041	21069001
312126	032	21023001	312129	042	21069001
312126	039	21069001	312129	051	21069099
312127	001	19059099	312129	059	21069099
312127	002	19059099	312200	001	23099001
312127	003	19059099	312200	002	23099001
312127	004	19059099	312200	003	23099001
312127	009	19059099	312200	009	23099001
312127	011	19059099	312200	011	23099001
312127	012	19059099	312200	012	23099001
312127	013	19059099	312200	019	23099001
312127	019	19059099	312200	021	23091001
312127	021	20081199	312200	029	23091001
312127	022	20081199	313011	001	22089099

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
313011	002	22089099	313014	011	22072001
313011	011	20095001	313014	012	22087001
313012	001	22084099	313014	012	22087099
313012	011	22084001	313014	013	22087001
313012	012	22084001	313014	013	22087099
313012	013	22084001	313014	014	22087001
313012	021	22087001	313014	014	22087099
313012	021	22087099	313014	015	22087001
313012	031	22084099	313014	015	22087099
313012	041	22087001	313014	021	22089099
313012	051	22060001	313014	031	22089099
313012	051	22060099	313014	032	22082002
313013	001	22082003	313014	033	22084001
313013	002	22082002	313014	034	22042101
313013	011	22042101	313014	034	22042102
313013	011	22042102	313014	034	22042103
313013	011	22042103	313014	034	22042104
313013	011	22042104	313014	034	22042199
313013	011	22042199	313031	001	22042101
313013	012	22042101	313031	001	22042102
313013	012	22042102	313031	001	22042103
313013	012	22042103	313031	001	22042104
313013	012	22042104	313031	001	22042199
313013	012	22042199	313031	002	22042101
313013	013	22042101	313031	002	22042102
313013	013	22042102	313031	002	22042103
313013	013	22042103	313031	002	22042104
313013	013	22042104	313031	002	22042199
313013	013	22042199	313031	003	22042101
313013	021	22041001	313031	003	22042102
313013	022	22082003	313031	003	22042103
313013	031	22051001	313031	003	22042104
313013	031	22051099	313031	003	22042199
313013	031	22059001	313031	011	22042104
313013	031	22059099	313031	021	22087001
313013	041	22043099	313031	022	22051001
313014	001	22085001	313031	022	22051099
313014	002	22086001	313031	022	22059001
313014	003	22083001	313031	022	22059099
313014	003	22083002	313031	031	22082003
313014	003	22083003	313031	041	22082003
313014	003	22083004	313031	042	22082002
313014	003	22083099	313031	051	22087001
313014	011	22071001	313031	051	22087099

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
313031	061	22043099	321112	012	56072999
313040	001	11071001	321112	013	56072101
313040	001	11072001	321112	013	56072999
313040	002	11071001	321112	014	56072101
313040	002	11072001	321112	014	56072999
313040	003	11071001	321112	021	56072999
313040	003	11072001	321112	022	56072999
313040	011	22030001	321112	023	56072999
313040	012	22030001	321112	024	56072999
313040	013	22030001	321112	025	56072999
313040	014	22030001	321120	001	52041101
313040	021	22019002	321120	001	52041999
313041	001	11071001	321120	001	52042001
313041	001	11072001	321120	001	52051101
313041	002	11071001	321120	001	52051201
313041	002	11072001	321120	001	52051301
313041	003	11071001	321120	001	52051401
313041	003	11072001	321120	001	52051501
313041	011	22030001	321120	001	52052101
313041	012	22030001	321120	001	52052201
313041	013	22030001	321120	001	52052301
313041	014	22030001	321120	001	52052401
313041	021	22019002	321120	001	52052601
313050	001	22021001	321120	001	52052701
313050	002	22021001	321120	001	52052801
313050	011	22011001	321120	001	52053101
313050	012	22019001	321120	001	52053201
314001	001	24011001	321120	001	52053301
314001	001	24011099	321120	001	52053401
314001	002	24012001	321120	001	52053501
314001	002	24012002	321120	001	52054101
314001	002	24012099	321120	001	52054201
314001	011	24013001	321120	001	52054301
314001	012	24013001	321120	001	52054401
314002	001	24022001	321120	001	52054601
314002	002	24022001	321120	001	52054701
321111	001	53041001	321120	001	52054801
321111	011	56072999	321120	001	52061101
321111	012	56072999	321120	001	52061201
321111	013	53049099	321120	001	52061301
321112	001	53041001	321120	001	52061401
321112	011	56072101	321120	001	52061501
321112	011	56072999	321120	001	52062101
321112	012	56072101	321120	001	52062201

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
321120	001	52062301	321120	013	54023201
321120	001	52062401	321120	013	54024101
321120	001	52062501	321120	013	54025199
321120	001	52063101	321120	013	54026199
321120	001	52063201	321120	013	55011001
321120	001	52063301	321120	013	55031001
321120	001	52063401	321120	013	55061001
321120	001	52063501	321120	014	55091101
321120	001	52064101	321120	014	55091201
321120	001	52064201	321120	014	59021001
321120	001	52064301	321120	014	54023101
321120	001	52064401	321120	014	54023201
321120	001	52064501	321120	014	54024101
321120	001	52071001	321120	014	54025199
321120	001	52079099	321120	014	54026199
321120	002	53082001	321120	014	55011001
321120	003	53041001	321120	014	55031001
321120	004	53089099	321120	014	55061001
321120	011	55091101	321120	021	52041101
321120	011	55091201	321120	021	52041999
321120	011	59021001	321120	021	52042001
321120	011	54023101	321120	021	52051101
321120	011	54023201	321120	021	52051201
321120	011	54024101	321120	021	52051301
321120	011	54025199	321120	021	52051401
321120	011	54026199	321120	021	52051501
321120	011	55011001	321120	021	52052101
321120	011	55031001	321120	021	52052201
321120	011	55061001	321120	021	52052301
321120	012	55091101	321120	021	52052401
321120	012	55091201	321120	021	52052601
321120	012	59021001	321120	021	52052701
321120	012	54023101	321120	021	52052801
321120	012	54023201	321120	021	52053101
321120	012	54024101	321120	021	52053201
321120	012	54025199	321120	021	52053301
321120	012	54026199	321120	021	52053401
321120	012	55011001	321120	021	52053501
321120	012	55031001	321120	021	52054101
321120	012	55061001	321120	021	52054201
321120	013	55091101	321120	021	52054301
321120	013	55091201	321120	021	52054401
321120	013	59021001	321120	021	52054601
321120	013	54023101	321120	021	52054701

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
321120	021	52054801	321120	032	54026199
321120	021	52061101	321120	032	55011001
321120	021	52061201	321120	032	55031001
321120	021	52061301	321120	032	55061001
321120	021	52061401	321120	033	55091101
321120	021	52061501	321120	033	55091201
321120	021	52062101	321120	033	59021001
321120	021	52062201	321120	033	54023101
321120	021	52062301	321120	033	54023201
321120	021	52062401	321120	033	54024101
321120	021	52062501	321120	033	54025199
321120	021	52063101	321120	033	54026199
321120	021	52063201	321120	033	55011001
321120	021	52063301	321120	033	55031001
321120	021	52063401	321120	033	55061001
321120	021	52063501	321120	034	55091101
321120	021	52064101	321120	034	55091201
321120	021	52064201	321120	034	59021001
321120	021	52064301	321120	034	54023101
321120	021	52064401	321120	034	54023201
321120	021	52064501	321120	034	54024101
321120	021	52071001	321120	034	54025199
321120	021	52079099	321120	034	54026199
321120	022	53082001	321120	034	55011001
321120	023	53041001	321120	034	55031001
321120	024	53089099	321120	034	55061001
321120	031	55091101	321120	035	54031001
321120	031	55091201	321120	035	54033101
321120	031	59021001	321120	035	54033201
321120	031	54023101	321120	035	54034101
321120	031	54023201	321120	035	55041001
321120	031	54024101	321120	041	52041101
321120	031	54025199	321120	041	52041999
321120	031	54026199	321120	041	52042001
321120	031	55011001	321120	041	52051101
321120	031	55031001	321120	041	52051201
321120	031	55061001	321120	041	52051301
321120	032	55091101	321120	041	52051401
321120	032	55091201	321120	041	52051501
321120	032	59021001	321120	041	52052101
321120	032	54023101	321120	041	52052201
321120	032	54023201	321120	041	52052301
321120	032	54024101	321120	041	52052401
321120	032	54025199	321120	041	52052601

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
321120	041	52052701	321120	051	54024101
321120	041	52052801	321120	051	54025199
321120	041	52053101	321120	051	54026199
321120	041	52053201	321120	051	55011001
321120	041	52053301	321120	051	55031001
321120	041	52053401	321120	051	55061001
321120	041	52053501	321120	052	55091101
321120	041	52054101	321120	052	55091201
321120	041	52054201	321120	052	59021001
321120	041	52054301	321120	052	54023101
321120	041	52054401	321120	052	54023201
321120	041	52054601	321120	052	54024101
321120	041	52054701	321120	052	54025199
321120	041	52054801	321120	052	54026199
321120	041	52061101	321120	052	55011001
321120	041	52061201	321120	052	55031001
321120	041	52061301	321120	052	55061001
321120	041	52061401	321120	053	55091101
321120	041	52061501	321120	053	55091201
321120	041	52062101	321120	053	59021001
321120	041	52062201	321120	053	54023101
321120	041	52062301	321120	053	54023201
321120	041	52062401	321120	053	54024101
321120	041	52062501	321120	053	54025199
321120	041	52063101	321120	053	54026199
321120	041	52063201	321120	053	55011001
321120	041	52063301	321120	053	55031001
321120	041	52063401	321120	053	55061001
321120	041	52063501	321120	054	55091101
321120	041	52064101	321120	054	55091201
321120	041	52064201	321120	054	59021001
321120	041	52064301	321120	054	54023101
321120	041	52064401	321120	054	54023201
321120	041	52064501	321120	054	54024101
321120	041	52071001	321120	054	54025199
321120	041	52079099	321120	054	54026199
321120	042	53082001	321120	054	55011001
321120	043	53041001	321120	054	55031001
321120	044	53089099	321120	054	55061001
321120	051	55091101	321120	055	54031001
321120	051	55091201	321120	055	54033101
321120	051	59021001	321120	055	54033201
321120	051	54023101	321120	055	54034101
321120	051	54023201	321120	055	55041001

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
321120	071	5030001	321202	015	54031001
321120	072	5029099	321202	015	54033101
321120	073	5029099	321202	015	54033201
321120	074	5021001	321202	015	54034101
321120	075	5029099	321202	015	55041001
321120	076	5029099	321202	021	55041001
321120	077	5029099	321202	021	55041001
321202	001	52030001	321202	021	55041001
321202	002	51051001	321202	021	55041001
321202	002	51052101	321202	021	55041001
321202	011	54032001	321202	021	55041001
321202	012	54024905	321202	021	55041001
321202	012	54025902	321202	031	51011101
321202	012	54026902	321202	031	51011199
321202	012	55013001	321202	031	51011901
321202	012	55033001	321202	031	51011999
321202	012	55063001	321202	041	51053001
321202	013	55091101	321202	041	51053002
321202	013	55091201	321202	041	51053099
321202	013	59021001	321202	041	51054001
321202	013	54023101	321202	051	51054001
321202	013	54023201	321202	051	51054001
321202	013	54024101	321202	051	51054001
321202	013	54025199	321202	051	51054001
321202	013	54026199	321202	051	51054001
321202	013	55011001	321202	051	51054001
321202	013	55031001	321202	051	51054001
321202	013	55061001	321202	051	51054001
321202	014	54022099	321202	051	51054001
321202	014	54023301	321202	051	51054001
321202	014	54024201	321202	051	51054001
321202	014	54024301	321202	051	51054001
321202	014	54024302	321202	051	51054001
321202	014	54025202	321202	051	51054001
321202	014	54026299	321202	051	51054001
321202	014	55012099	321202	051	51054001
321202	014	55032099	321202	051	51054001
321202	014	55062001	321202	051	51054001
321202	014	55092101	321202	051	51054001
321202	014	55092201	321202	051	51054001
321202	014	55095101	321202	051	51054001
321202	014	55095201	321202	051	51054001
321202	014	55095301	321202	051	51054001
321202	014	55095999	321202	051	51054001

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
321202	052	51054001	321203	001	52051401
321202	052	51054001	321203	001	52051501
321202	052	51054001	321203	001	52052101
321202	052	51054001	321203	001	52052201
321202	052	51054001	321203	001	52052301
321202	052	51054001	321203	001	52052401
321202	052	51054001	321203	001	52052601
321202	052	51054001	321203	001	52052701
321202	052	51054001	321203	001	52052801
321202	052	51054001	321203	001	52053101
321202	052	51054001	321203	001	52053201
321202	052	51054001	321203	001	52053301
321202	052	51054001	321203	001	52053401
321202	052	51054001	321203	001	52053501
321202	052	51054001	321203	001	52054101
321202	052	51054001	321203	001	52054201
321202	052	51054001	321203	001	52054301
321202	052	51054001	321203	001	52054401
321202	052	51054001	321203	001	52054601
321202	052	51054001	321203	001	52054701
321202	052	51054001	321203	001	52054801
321202	052	51054001	321203	001	52061101
321202	052	51054001	321203	001	52061201
321202	052	51054001	321203	001	52061301
321202	052	51054001	321203	001	52061401
321202	052	51054001	321203	001	52061501
321202	052	51054001	321203	001	52062101
321202	052	51054001	321203	001	52062201
321202	052	51054001	321203	001	52062301
321202	052	51054001	321203	001	52062401
321202	052	51054001	321203	001	52062501
321202	052	51054001	321203	001	52063101
321202	052	51054001	321203	001	52063201
321202	052	51054001	321203	001	52063301
321202	052	51054001	321203	001	52063401
321202	052	51054001	321203	001	52063501
321202	052	51054001	321203	001	52064101
321202	052	51054001	321203	001	52064201
321203	001	52041101	321203	001	52064301
321203	001	52041999	321203	001	52064401
321203	001	52042001	321203	001	52064501
321203	001	52051101	321203	001	52071001
321203	001	52051201	321203	001	52079099
321203	001	52051301	321203	011	55091101

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
321203	011	55091201	321203	022	55041001
321203	011	59021001	321203	022	55041001
321203	011	54023101	321203	022	55041001
321203	011	54023201	321203	022	55041001
321203	011	54024101	321203	022	55041001
321203	011	54025199	321203	022	55041001
321203	011	54026199	321203	022	55041001
321203	011	55011001	321203	022	55041001
321203	011	55031001	321203	022	55041001
321203	011	55061001	321203	022	55041001
321203	012	54022099	321203	022	55041001
321203	012	54023301	321203	022	55041001
321203	012	54024201	321203	022	55041001
321203	012	54024301	321203	022	55041001
321203	012	54024302	321203	022	55041001
321203	012	54025202	321203	022	55041001
321203	012	54026299	321203	022	55041001
321203	012	55012099	321203	022	55041001
321203	012	55032099	321203	022	55041001
321203	012	55062001	321203	022	55041001
321203	012	55092101	321203	022	55041001
321203	012	55092201	321203	022	55041001
321203	012	55095101	321203	022	55041001
321203	012	55095201	321203	022	55041001
321203	012	55095301	321203	022	55041001
321203	012	55095999	321203	022	55041001
321203	013	54031001	321203	022	55041001
321203	013	54033101	321203	031	55041001
321203	013	54033201	321203	031	55041001
321203	013	54034101	321203	031	55041001
321203	013	55041001	321203	031	55041001
321203	021	55041001	321203	031	55041001
321203	021	55041001	321203	031	55041001
321203	021	55041001	321203	031	55041001
321203	021	55041001	321203	031	55041001
321203	021	55041001	321203	031	55041001
321203	021	55041001	321203	031	55041001
321203	021	55041001	321203	031	55041001
321203	021	55041001	321203	031	55041001
321203	021	55041001	321203	031	55041001
321203	021	55041001	321203	031	55041001
321203	022	55041001	321203	031	55041001
321203	022	55041001	321203	031	55041001
321203	022	55041001	321203	031	55041001
321203	022	55041001	321203	031	55041001
321203	022	55041001	321203	031	55041001
321203	022	55041001	321203	031	55041001
321203	022	55041001	321203	031	55041001

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
321208	052	55041001	321215	003	30059001
321208	052	55041001	321215	003	30059001
321208	053	55041001	321215	003	30059001
321208	053	55041001	321215	003	30059001
321208	053	55041001	321215	003	30059001
321208	053	55041001	321215	003	30059001
321208	054	55041001	321215	004	30059001
321208	061	55041001	321215	004	30059001
321208	062	55041001	321215	004	30059001
321208	071	55041001	321215	004	30059001
321208	072	55041001	321215	004	30059001
321208	072	55041001	321215	004	30059001
321210	001	55041001	321215	004	30059001
321210	002	55041001	321215	004	30059001
321210	009	55041001	321215	009	30059001
321210	011	55041001	321215	009	30059001
321210	012	55041001	321215	009	30059001
321214	001	30059001	321215	009	30059001
321214	011	30059001	321215	009	30059001
321214	012	30059001	321215	009	30059001
321214	021	30059001	321215	009	30059001
321214	022	30059001	321215	009	30059001
321214	023	30059001	321215	011	30059001
321214	031	30059001	321215	012	30059001
321214	032	30059001	321215	019	30059001
321214	041	30059001	321215	021	30059001
321215	001	30059001	321215	022	30059001
321215	001	30059001	321215	023	30059001
321215	001	30059001	321215	024	30059001
321215	001	30059001	321215	025	30059001
321215	001	30059001	321216	001	30059001
321215	001	30059001	321216	001	30059001
321215	001	30059001	321216	001	30059001
321215	001	30059001	321216	002	30059001
321215	002	30059001	321216	002	30059001
321215	002	30059001	321216	002	30059001
321215	002	30059001	321216	011	30059001
321215	002	30059001	321216	012	30059001
321215	002	30059001	321216	013	30059001
321215	002	30059001	321216	014	30059001
321215	002	30059001	321216	014	30059001
321215	002	30059001	321216	014	30059001
321215	003	30059001	321216	021	30059001
321215	003	30059001	321311	001	63025101

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
321311	002	63025301	321312	003	94049099
321311	003	63025201	321312	003	94049099
321311	011	63022101	321312	003	94049099
321311	011	63023101	321312	004	94049099
321311	012	63022201	321312	004	94049099
321311	012	63023201	321312	004	94049099
321311	013	63022999	321312	005	94049099
321311	013	63023999	321312	005	94049099
321311	021	63022101	321312	005	94049099
321311	021	63023101	321312	005	94049099
321311	022	63022201	321312	005	94049099
321311	022	63023201	321312	011	94049099
321311	023	63022999	321312	011	94049099
321311	023	63023999	321312	011	94049099
321311	031	63029101	321312	011	94049099
321311	032	63029301	321312	011	94049099
321311	033	63029201	321312	011	94049099
321311	041	63029101	321312	011	94049099
321311	042	63029201	321312	011	94049099
321311	051	94049099	321312	012	94049099
321311	052	94049099	321312	012	94049099
321311	053	94049099	321312	012	94049099
321311	061	62079101	321312	012	94049099
321311	061	62079201	321312	012	94049099
321311	061	62079901	321312	012	94049099
321311	061	62079999	321312	012	94049099
321311	061	62089101	321312	013	94049099
321311	061	62089201	321312	013	94049099
321311	061	62089299	321312	013	94049099
321311	061	62089901	321312	014	94049099
321311	062	94049099	321312	014	94049099
321311	063	94049099	321312	014	94049099
321311	064	62114299	321312	014	94049099
321311	065	94049099	321312	014	94049099
321312	001	94049099	321312	014	94049099
321312	001	94049099	321312	014	94049099
321312	001	94049099	321312	014	94049099
321312	001	94049099	321312	014	94049099
321312	001	94049099	321312	014	94049099
321312	002	94049099	321312	021	94049099
321312	002	94049099	321312	021	94049099
321312	002	94049099	321312	021	94049099
321312	003	94049099	321312	021	94049099
321312	003	94049099	321312	021	94049099

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
321312	022	94049099	321312	041	94049099
321312	022	94049099	321312	041	94049099
321312	022	94049099	321312	041	94049099
321312	023	94049099	321312	041	94049099
321312	023	94049099	321312	042	94049099
321312	023	94049099	321312	042	94049099
321312	023	94049099	321312	042	94049099
321312	023	94049099	321312	042	94049099
321312	024	94049099	321312	043	94049099
321312	024	94049099	321312	043	94049099
321312	024	94049099	321312	043	94049099
321312	025	94049099	321312	043	94049099
321312	025	94049099	321321	001	63061101
321312	025	94049099	321321	001	63061201
321312	025	94049099	321321	001	63061999
321312	025	94049099	321321	002	63061101
321312	031	94049099	321321	002	63061201
321312	031	94049099	321321	002	63061999
321312	031	94049099	321321	003	63061101
321312	031	94049099	321321	003	63061201
321312	031	94049099	321321	003	63061999
321312	031	94049099	321321	004	63061101
321312	031	94049099	321321	004	63061201
321312	031	94049099	321321	004	63061999
321312	032	94049099	321321	005	63061101
321312	032	94049099	321321	005	63061201
321312	032	94049099	321321	005	63061999
321312	032	94049099	321321	006	63061101
321312	032	94049099	321321	006	63061201
321312	032	94049099	321321	006	63061999
321312	032	94049099	321321	011	63079099
321312	033	94049099	321321	012	63079099
321312	033	94049099	321321	013	63079099
321312	033	94049099	321321	021	54075399
321312	034	94049099	321321	021	54076999
321312	034	94049099	321321	021	54077399
321312	034	94049099	321321	021	54078299
321312	034	94049099	321321	021	54079199
321312	034	94049099	321321	021	54079299
321312	034	94049099	321321	021	54079399
321312	034	94049099	321321	021	54079499
321312	034	94049099	321321	021	54081099
321312	034	94049099	321321	021	54082199
321312	034	94049099	321321	021	54082299

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
321321	021	54082399	321321	051	63062201
321321	021	54083199	321321	051	63062999
321321	021	54083299	321321	061	63063999
321321	021	54083399	321321	062	63063101
321321	022	54075399	321321	063	63063101
321321	022	54076999	321321	069	63063999
321321	022	54077399	321332	001	57019099
321321	022	54078299	321332	002	57011001
321321	022	54079199	321332	003	57019099
321321	022	54079299	321332	009	57019099
321321	022	54079399	321332	011	57019099
321321	022	54079499	321332	012	57019099
321321	022	54081099	321332	013	57019099
321321	022	54082199	321332	019	57019099
321321	022	54082299	321332	021	57011001
321321	022	54082399	321332	022	57019099
321321	022	54083199	321332	031	58063101
321321	022	54083299	321332	032	58063201
321321	022	54083399	321332	033	58061099
321321	031	63062101	321332	034	58050001
321321	031	63062201	321332	039	58063999
321321	031	63062999	321332	041	57019099
321321	032	63062101	321401	001	61159101
321321	032	63062201	321401	001	61159201
321321	032	63062999	321401	001	61159999
321321	033	63062101	321401	002	61159301
321321	033	63062201	321401	011	61159101
321321	033	63062999	321401	011	61159201
321321	034	63062101	321401	011	61159999
321321	034	63062201	321401	012	61159301
321321	034	63062999	321401	021	61151101
321321	041	63062101	321401	021	61151201
321321	041	63062201	321401	021	61151999
321321	041	63062999	321401	022	61151101
321321	042	63062101	321401	022	61151201
321321	042	63062201	321401	022	61151999
321321	042	63062999	321401	023	61151101
321321	043	63062101	321401	023	61151201
321321	043	63062201	321401	023	61151999
321321	043	63062999	321401	031	61121201
321321	044	63062101	321401	032	61121201
321321	044	63062201	321401	033	61121201
321321	044	63062999	321402	001	61103099
321321	051	63062101	321402	002	61101001

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
321402	003	61102099	321402	031	61103099
321402	004	61103099	321402	031	61103099
321402	011	61103099	321402	031	61103099
321402	011	61103099	321402	031	61103099
321402	011	61103099	321402	031	61103099
321402	012	61103099	321402	031	61103099
321402	012	61103099	321402	031	61103099
321402	012	61103099	321402	031	61103099
321402	012	61103099	321402	031	61103099
321402	012	61103099	321402	041	61103099
321402	012	61103099	321402	041	61103099
321402	012	61103099	321402	041	61103099
321402	012	61103099	321402	041	61103099
321402	013	61103099	321402	042	61103099
321402	013	61103099	321402	042	61103099
321402	013	61103099	321402	042	61103099
321402	013	61103099	321402	042	61103099
321402	013	61103099	321402	043	61103099
321402	013	61103099	321402	043	61103099
321402	013	61103099	321402	043	61103099
321402	013	61103099	321402	043	61103099
321402	013	61103099	321402	043	61103099
321402	014	61103099	321402	043	61103099
321402	014	61103099	321402	043	61103099
321402	015	61103099	321402	043	61103099
321402	016	61103099	321402	043	61103099
321402	016	61103099	321403	001	61103099
321402	016	61103099	321403	001	61103099
321402	016	61103099	321403	001	61103099
321402	017	61103099	321403	002	61103099
321402	017	61103099	321403	002	61103099
321402	018	61103099	321403	002	61103099
321402	018	61103099	321403	003	61103099
321402	018	61103099	321403	003	61103099
321402	018	61103099	321403	004	61103099
321402	021	61103099	321403	004	61103099
321402	021	61103099	321403	004	61103099
321402	021	61103099	321403	005	61103099
321402	021	61103099	321403	005	61103099
321402	021	61103099	321403	005	61103099
321402	031	61103099	321403	009	61103099
321402	031	61103099	321403	009	61103099
321402	031	61103099	321403	009	61103099
321402	031	61103099	321403	011	61103099
321402	031	61103099	321403	011	61103099

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
321403	011	61103099	321403	027	61103099
321403	012	61103099	321403	027	61103099
321403	012	61103099	321403	027	61103099
321403	012	61103099	321403	027	61103099
321403	013	61103099	321403	028	61103099
321403	013	61103099	321403	028	61103099
321403	013	61103099	321403	028	61103099
321403	014	61103099	321403	029	61103099
321403	014	61103099	321403	029	61103099
321403	014	61103099	321403	029	61103099
321403	015	61103099	321403	029	61103099
321403	015	61103099	321403	029	61103099
321403	015	61103099	321403	029	61103099
321403	016	61103099	321403	031	61103099
321403	016	61103099	321403	031	61103099
321403	016	61103099	321403	031	61103099
321403	019	61103099	321403	031	61103099
321403	019	61103099	321403	031	61103099
321403	019	61103099	321403	031	61103099
321403	021	61103099	321403	032	61103099
321403	021	61103099	321403	032	61103099
321403	021	61103099	321403	032	61103099
321403	021	61103099	321403	032	61103099
321403	021	61103099	321403	033	61103099
321403	021	61103099	321403	033	61103099
321403	022	61103099	321403	033	61103099
321403	022	61103099	321403	033	61103099
321403	022	61103099	321404	001	61103099
321403	022	61103099	321404	001	61103099
321403	022	61103099	321404	001	61103099
321403	022	61103099	321404	001	61103099
321403	023	61103099	321404	002	61103099
321403	023	61103099	321404	002	61103099
321403	023	61103099	321404	009	61103099
321403	024	61103099	321404	009	61103099
321403	024	61103099	321404	009	61103099
321403	025	61103099	321404	009	61103099
321403	025	61103099	321404	011	61103099
321403	025	61103099	321404	011	61103099
321403	026	61103099	321404	011	61103099
321403	026	61103099	321404	011	61103099
321403	026	61103099	321404	012	61103099
321403	027	61103099	321404	012	61103099
321403	027	61103099	321404	012	61103099

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
321404	012	61103099	321405	004	61099001
321404	013	61103099	321405	004	61099001
321404	013	61103099	321405	005	61099001
321404	013	61103099	321405	005	61099001
321404	013	61103099	321405	005	61099001
321404	014	61103099	321405	005	61099001
321404	014	61103099	321405	006	61099001
321404	014	61103099	321405	006	61099001
321404	014	61103099	321405	006	61099001
321404	015	61103099	321405	006	61099001
321404	015	61103099	321405	007	61099001
321404	015	61103099	321405	007	61099001
321404	015	61103099	321405	007	61099001
321404	019	61103099	321405	007	61099001
321404	019	61103099	321405	008	61099001
321404	019	61103099	321405	008	61099001
321404	019	61103099	321405	011	61099001
321404	021	61103099	321405	011	61099001
321404	021	61103099	321405	011	61099001
321404	021	61103099	321405	021	61099001
321404	021	61103099	321405	021	61099001
321404	022	61103099	321405	021	61099001
321404	022	61103099	321405	021	61099001
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321404	022	61103099	321405	022	61099001
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321404	023	61103099	321405	023	61099001
321404	029	61103099	321405	023	61099001
321404	029	61103099	321405	024	61099001
321404	029	61103099	321405	024	61099001
321404	029	61103099	321405	024	61099001
321405	001	61033101	321405	024	61099001
321405	001	61033201	321405	025	61099001
321405	001	61033301	321405	025	61099001
321405	001	61033901	321405	025	61099001
321405	002	61121101	321405	025	61099001
321405	002	61121201	321405	026	61099001
321405	002	61121901	321405	026	61099001
321405	003	61091001	321405	026	61099001
321405	003	61099001	321405	027	61099001
321405	004	61099001	321405	027	61099001
321405	004	61099001	321405	027	61099001

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
321405	055	61099001	322001	001	62011101
321405	055	61099001	322001	001	62011201
321405	055	61099001	322001	001	62011399
321405	055	61099001	322001	001	62011999
321405	061	61099001	322001	002	62032101
321405	061	61099001	322001	002	62032201
321405	061	61099001	322001	002	62032301
321405	061	61099001	322001	002	62032999
321405	061	61099001	322001	003	62033101
321405	061	61099001	322001	003	62033201
321405	062	61099001	322001	003	62033301
321405	062	61099001	322001	003	62033901
321405	063	61099001	322001	004	62011101
321405	063	61099001	322001	004	62011201
321405	063	61099001	322001	004	62011399
321405	064	61099001	322001	004	62011999
321405	064	61099001	322001	005	62034101
321405	064	61099001	322001	005	62034201
321405	071	61099001	322001	005	62034399
321405	071	61099001	322001	005	62034999
321405	071	61099001	322001	006	62051099
321405	071	61099001	322001	006	62052001
321405	072	61099001	322001	006	62053099
321405	072	61099001	322001	006	62059001
321405	073	61099001	322001	007	62033101
321405	073	61099001	322001	007	62033201
321405	073	61099001	322001	007	62033301
321405	073	61099001	322001	007	62033901
321405	074	61099001	322001	008	62031101
321405	074	61099001	322001	008	62031201
321405	074	61099001	322001	008	62031901
321405	074	61099001	322001	011	62034101
321405	075	61099001	322001	011	62034201
321405	075	61099001	322001	011	62034399
321405	075	61099001	322001	011	62034999
321405	075	61099001	322001	012	62034101
321405	076	61099001	322001	012	62034201
321405	076	61099001	322001	012	62034399
321405	076	61099001	322001	012	62034999
321405	076	61099001	322001	021	61091001
321405	079	61099001	322001	021	61099001
321405	079	61099001	322001	022	61033101
321405	079	61099001	322001	022	61033201
321405	079	61099001	322001	022	61033301

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
322001	022	61033901	322003	007	62046201
322001	023	61091001	322003	007	62046399
322001	023	61099001	322003	007	62046901
322001	024	61101001	322003	008	62061001
322001	024	61102001	322003	008	62062001
322001	024	61103099	322003	008	62063001
322001	024	61109001	322003	008	62064001
322001	025	61121101	322003	008	62069001
322001	025	61121201	322003	011	62043101
322001	025	61121901	322003	011	62043201
322001	031	42031099	322003	011	62043301
322001	041	61051099	322003	011	62043901
322001	041	61052001	322003	012	62041101
322001	041	61059001	322003	012	62041201
322001	041	62051099	322003	012	62041301
322001	041	62052001	322003	012	62041901
322001	041	62053099	322003	013	62044101
322001	041	62059001	322003	013	62044201
322003	001	62021101	322003	013	62044399
322003	001	62021201	322003	013	62044401
322003	001	62021399	322003	013	62044901
322003	001	62021999	322003	014	62044101
322003	002	62061001	322003	014	62044201
322003	002	62062001	322003	014	62044399
322003	002	62063001	322003	014	62044401
322003	002	62064001	322003	014	62044901
322003	002	62069001	322003	021	62046101
322003	003	62042101	322003	021	62046201
322003	003	62042201	322003	021	62046399
322003	003	62042301	322003	021	62046901
322003	003	62042999	322003	022	62046101
322003	004	62043101	322003	022	62046201
322003	004	62043201	322003	022	62046399
322003	004	62043301	322003	022	62046901
322003	004	62043901	322003	031	61021001
322003	005	62045101	322003	031	61022001
322003	005	62045201	322003	031	61023001
322003	005	62045301	322003	031	61029099
322003	005	62045901	322003	032	61043101
322003	006	62021101	322003	032	61043201
322003	006	62021201	322003	032	61043301
322003	006	62021399	322003	032	61043901
322003	006	62021999	322003	033	61046101
322003	007	62046101	322003	033	61046201

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
322003	033	61046399	322005	011	61061001
322003	033	61046901	322005	011	61061001
322003	034	61121101	322005	011	61061001
322003	034	61121201	322005	011	61061001
322003	034	61121901	322005	012	61061001
322003	035	61091001	322005	012	61061001
322003	035	61099001	322005	012	61061001
322003	036	61043101	322005	012	61061001
322003	036	61043201	322005	012	61061001
322003	036	61043301	322005	012	61061001
322003	036	61043901	322005	013	61061001
322003	037	61101001	322005	013	61061001
322003	037	61102001	322005	013	61061001
322003	037	61103099	322005	013	61061001
322003	037	61109001	322005	013	61061001
322003	038	61044101	322005	021	61061001
322003	038	61044201	322005	021	61061001
322003	038	61044301	322005	021	61061001
322003	038	61044499	322005	021	61061001
322003	038	61044901	322005	021	61061001
322003	041	42031099	322005	021	61061001
322005	001	42031099	322005	021	61061001
322005	001	42031099	322005	021	61061001
322005	001	42031099	322005	021	61061001
322005	001	42031099	322005	021	61061001
322005	001	42031099	322005	021	61061001
322005	001	42031099	322005	021	61061001
322005	001	42031099	322005	021	61061001
322005	001	42031099	322005	021	61061001
322005	001	42031099	322005	021	61061001
322005	001	42031099	322005	021	61061001
322005	001	42031099	322005	021	61061001
322005	001	42031099	322005	021	61061001
322005	001	42031099	322005	021	61061001
322005	001	42031099	322005	022	61061001
322005	001	42031099	322005	022	61061001
322005	001	42031099	322005	022	61061001
322005	001	42031099	322005	022	61061001
322005	002	54079101	322005	022	61061001
322005	003	61051001	322005	022	61061001
322005	003	61061001	322005	022	61061001
322005	011	61061001	322005	022	61061001
322005	011	61061001	322005	022	61061001
322005	011	61061001	322005	022	61061001
322005	011	61061001	322006	001	61061001
322005	011	61061001	322006	001	61061001
322005	011	61061001	322006	001	61061001

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
322009	041	42031099	322009	054	42031099
322009	041	42031099	322009	059	42031099
322009	041	42031099	322009	059	42031099
322009	041	42031099	322009	059	42031099
322009	041	42031099	322009	059	42031099
322009	041	42031099	322009	059	42031099
322009	041	42031099	322009	059	42031099
322009	041	42031099	322009	059	42031099
322009	041	42031099	322009	059	42031099
322009	041	42031099	322009	061	42031099
322009	041	42031099	322009	061	42031099
322009	041	42031099	322009	061	42031099
322009	041	42031099	322009	061	42031099
322009	051	42031099	322009	061	42031099
322009	051	42031099	322009	061	42031099
322009	051	42031099	322009	061	42031099
322009	051	42031099	322009	061	42031099
322009	051	42031099	322009	061	42031099
322009	051	42031099	322009	061	42031099
322009	051	42031099	322009	061	42031099
322009	051	42031099	322009	061	42031099
322009	051	42031099	322009	061	42031099
322009	051	42031099	322009	061	42031099
322009	051	42031099	322009	061	42031099
322009	051	42031099	322009	061	42031099
322009	051	42031099	322009	061	42031099
322009	052	42031099	322009	061	42031099
322009	052	42031099	322011	001	62121001
322009	052	42031099	322011	002	62121001
322009	052	42031099	322011	003	62123001
322009	052	42031099	322011	004	62122001
322009	052	42031099	322011	005	62129001
322009	052	42031099	322011	006	61082201
322009	052	42031099	322011	009	62129099
322009	053	42031099	322011	011	62121001
322009	053	42031099	322011	012	62121001
322009	053	42031099	322011	013	62123001
322009	053	42031099	322011	014	62122001
322009	053	42031099	322011	015	62129001
322009	053	42031099	322011	016	61082201
322009	053	42031099	322011	019	62129099
322009	053	42031099	322011	021	62121001
322009	054	42031099	322011	022	62121001
322009	054	42031099	322011	023	62123001
322009	054	42031099	322011	024	62122001
322009	054	42031099	322011	025	62129001
322009	054	42031099	322011	029	62129099
322009	054	42031099	322011	031	62089101
322009	054	42031099	322011	031	62089201

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
322011	031	62089901	323001	011	41043901
322011	032	62089101	323001	012	41051101
322011	032	62089201	323001	012	41051201
322011	032	62089901	323001	012	41051901
322011	033	61124101	323001	012	41052001
322011	034	62121001	323001	013	41061101
322011	034	61082201	323001	013	41061201
322011	035	62089101	323001	013	41061901
322011	035	62089201	323001	013	41062099
322011	035	62089901	323001	014	41071001
322011	036	62089101	323001	015	41041001
322011	036	62089201	323001	015	41042101
322011	036	62089901	323001	015	41042201
322011	037	61082201	323001	015	41042999
322011	039	62129099	323001	015	41043101
323001	001	41041001	323001	015	41043901
323001	001	41042101	323001	016	41041001
323001	001	41042201	323001	016	41042101
323001	001	41042999	323001	016	41042201
323001	001	41043101	323001	016	41042999
323001	001	41043901	323001	016	41043101
323001	002	41061101	323001	016	41043901
323001	002	41061201	323001	019	41079099
323001	002	41061901	323001	021	41041001
323001	002	41062099	323001	021	41042101
323001	003	41071001	323001	021	41042201
323001	004	41041001	323001	021	41042999
323001	004	41042101	323001	021	41043101
323001	004	41042201	323001	021	41043901
323001	004	41042999	323001	022	41051101
323001	004	41043101	323001	022	41051201
323001	004	41043901	323001	022	41051901
323001	005	41041001	323001	022	41052001
323001	005	41042101	323001	023	41061101
323001	005	41042201	323001	023	41061201
323001	005	41042999	323001	023	41061901
323001	005	41043101	323001	023	41062099
323001	005	41043901	323001	024	41071001
323001	009	41079099	323001	025	41041001
323001	011	41041001	323001	025	41042101
323001	011	41042101	323001	025	41042201
323001	011	41042201	323001	025	41042999
323001	011	41042999	323001	025	41043101
323001	011	41043101	323001	025	41043901

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
323001	026	41041001	323001	042	41052001
323001	026	41042101	323001	043	41061101
323001	026	41042201	323001	043	41061201
323001	026	41042999	323001	043	41061901
323001	026	41043101	323001	043	41062099
323001	026	41043901	323001	044	41071001
323001	029	41079099	323001	045	41041001
323001	031	41041001	323001	045	41042101
323001	031	41042101	323001	045	41042201
323001	031	41042201	323001	045	41042999
323001	031	41042999	323001	045	41043101
323001	031	41043101	323001	045	41043901
323001	031	41043901	323001	046	41041001
323001	032	41051101	323001	046	41042101
323001	032	41051201	323001	046	41042201
323001	032	41051901	323001	046	41042999
323001	032	41052001	323001	046	41043101
323001	033	41061101	323001	046	41043901
323001	033	41061201	323001	049	41079099
323001	033	41061901	323001	051	41041001
323001	033	41062099	323001	051	41042101
323001	034	41071001	323001	051	41042201
323001	035	41041001	323001	051	41042999
323001	035	41042101	323001	051	41043101
323001	035	41042201	323001	051	41043901
323001	035	41042999	323001	052	41041001
323001	035	41043101	323001	052	41042101
323001	035	41043901	323001	052	41042201
323001	036	41041001	323001	052	41042999
323001	036	41042101	323001	052	41043101
323001	036	41042201	323001	052	41043901
323001	036	41042999	323001	053	41041001
323001	036	41043101	323001	053	41042101
323001	036	41043901	323001	053	41042201
323001	039	41079099	323001	053	41042999
323001	041	41041001	323001	053	41043101
323001	041	41042101	323001	053	41043901
323001	041	41042201	323001	059	41079099
323001	041	41042999	323001	061	41079099
323001	041	41043101	323001	071	41041001
323001	041	41043901	323001	071	41042101
323001	042	41051101	323001	071	41042201
323001	042	41051201	323001	071	41042999
323001	042	41051901	323001	071	41043101

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
323001	071	41043901	323003	025	42033001
323001	072	41051101	323003	026	42050099
323001	072	41051201	323003	027	42029101
323001	072	41051901	323003	028	42050099
323001	072	41052001	323003	031	42050099
323001	073	41041001	323003	032	42050099
323001	073	41042101	323003	033	42050099
323001	073	41042201	323003	039	42050099
323001	073	41042999	323003	041	42050099
323001	073	41043101	323003	042	42050099
323001	073	41043901	323003	049	42050099
323001	074	41061101	323003	051	42033001
323001	074	41061201	323003	059	42050099
323001	074	41061901	323003	061	42022201
323001	074	41062099	323003	062	42021201
323001	075	41079099	323003	063	42021201
323001	076	41071001	323003	064	42021201
323001	077	41041001	323003	069	42021201
323001	077	41042101	323003	071	42021201
323001	077	41042201	323003	072	42022201
323001	077	41042999	323003	073	42022201
323001	077	41043101	323003	074	42022201
323001	077	41043901	323003	079	42022201
323001	078	41041001	323003	081	42029201
323001	078	41042101	323003	082	39269099
323001	078	41042201	323003	083	42029201
323001	078	41042999	323003	084	42029201
323001	078	41043101	323003	085	42029201
323001	078	41043901	323003	086	39269099
323001	079	41079099	323003	089	39269099
323003	001	42022101	324001	001	64035101
323003	002	42021101	324001	001	64035901
323003	003	42021101	324001	002	64035199
323003	004	42021101	324001	002	64035999
323003	009	42021101	324001	003	64035199
323003	011	42021101	324001	003	64035999
323003	012	42023101	324001	011	64039199
323003	013	42023101	324001	011	64039901
323003	014	42023101	324001	012	64039199
323003	019	42023101	324001	012	64039901
323003	021	42029101	324001	013	64039199
323003	022	42023101	324001	013	64039901
323003	023	42029101	324001	021	64035101
323003	024	42023101	324001	021	64035901

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
324001	022	64035199	331102	011	44083999
324001	022	64035999	331102	012	44083999
324001	023	64035199	331102	013	44083999
324001	023	64035999	331102	021	44089099
324001	031	64039199	331102	022	44089099
324001	031	64039901	331102	023	44089099
324001	032	64039199	331102	031	44129999
324001	032	64039901	331102	032	44129999
324001	033	64039199	331102	033	44129999
324001	033	64039901	331102	041	44189001
324001	041	64035101	331102	042	44189001
324001	041	64035901	331102	051	44189001
324001	042	64035199	331102	052	44189001
324001	042	64035999	331102	061	94039001
324001	043	64035199	331102	062	44189099
324001	043	64035999	331102	063	94033001
324001	051	64039199	331102	063	94034001
324001	051	64039901	331102	063	94035001
324001	052	64039199	331102	063	94036001
324001	052	64039901	331102	071	44079999
324001	053	64039199	331102	072	44079101
324001	053	64039901	331102	073	44071001
324001	061	64042001	331102	079	44079999
324001	071	64041199	331102	081	44072401
324001	071	64041901	331102	082	44079903
324002	001	64041199	331102	089	44079999
324002	001	64041901	331103	001	44182001
324002	002	64041199	331103	002	44182001
324002	002	64041901	331103	003	44182001
324002	003	64039199	331103	009	44182001
324002	003	64039901	331103	011	44182001
324002	004	64041199	331103	012	44182001
324002	004	64041901	331103	019	44182001
324002	011	64041199	331103	021	44182001
324002	011	64041901	331103	022	44182001
324002	012	64041199	331103	023	44182001
324002	012	64041901	331103	029	44182001
324002	013	64039199	331103	031	44189099
324002	013	64039901	331103	032	44189099
324002	014	64041199	331103	033	44189099
324002	014	64041901	331103	034	44189099
331102	001	44081001	331103	035	44189099
331102	002	44081001	331103	039	44189099
331102	003	44081001	331103	041	44182001

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
331103	042	44182001	331201	082	44189099
331103	049	44182001	332001	001	94034001
331103	051	44182001	332001	002	94035001
331103	052	44182001	332001	003	94035001
331103	059	44182001	332001	004	94035001
331103	061	44184001	332001	005	94036099
331103	062	44184001	332001	006	94034001
331103	063	44184001	332001	007	94034001
331103	071	44189099	332001	008	94033001
331103	072	44160004	332001	011	94033001
331103	073	44189099	332001	012	94033001
331103	074	44209099	332001	013	94033001
331103	075	44160004	332001	014	94036099
331103	076	44183001	332001	015	94035001
331103	077	44189099	332001	016	94035001
331103	078	44181001	332001	017	94036099
331103	079	44219099	332001	018	94034001
331201	001	44209099	332001	021	94036099
331201	002	44209099	332001	022	94036099
331201	003	44209099	332001	031	94034001
331201	011	44209099	332001	032	94033001
331201	012	44209099	332001	033	94035001
331201	013	44209099	332001	034	94035001
331201	021	44209099	332001	035	94035001
331201	022	44209099	332001	036	94036099
331201	023	44209099	332001	037	94034001
331201	031	44209099	332001	038	94034001
331201	032	44209099	332001	041	94033001
331201	033	44209099	332001	042	94033001
331201	041	44209099	332001	043	94033001
331201	049	44209099	332001	044	94033001
331201	051	44151001	332001	045	94036099
331201	059	44151001	332001	046	94035001
331201	061	44160001	332001	047	94035001
331201	062	44160001	332001	048	94036099
331201	063	44160001	332001	051	94034001
331201	064	44160001	332001	052	94036099
331201	065	44160001	332001	053	94036099
331201	066	44160001	332001	061	94016101
331201	067	44160001	332001	061	94017101
331201	071	44151001	332001	062	94016101
331201	072	44151001	332001	062	94017101
331201	079	44151001	332001	063	94016101
331201	081	44189099	332001	063	94017101

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
332001	064	94016101	332003	053	94042999
332001	064	94017101	332003	054	94042999
332001	069	94016101	332003	055	94042999
332001	069	94017101	332003	056	94042999
332001	071	94034001	332003	061	94049099
332001	072	94035001	332003	062	94049099
332001	073	94035001	332003	063	94049099
332001	074	94035001	332003	071	94049099
332001	075	94036001	332003	072	94049099
332001	076	94034001	332003	073	94049099
332001	077	94034001	332003	074	94049099
332001	078	94036001	332003	079	94049099
332001	081	94033001	332003	081	94049099
332001	082	94033001	332003	082	94049099
332001	083	94033001	332003	083	94049099
332001	084	94033001	332003	084	94049099
332001	085	94035001	332003	089	94049099
332001	086	94035001	332003	091	94041001
332001	087	94036001	332003	092	94035001
332001	088	94036001	332003	093	94016101
332001	089	94036001	341021	001	94016101
332001	091	44182001	341021	001	94016101
332001	092	44182001	341021	001	94016101
332001	093	94039001	341021	001	94016101
332003	001	94042199	341021	002	94016101
332003	002	94042199	341021	002	94016101
332003	003	94042199	341021	002	94016101
332003	011	94042999	341021	002	94016101
332003	012	94042999	341021	003	94016101
332003	013	94042999	341021	003	94016101
332003	021	94042999	341021	003	94016101
332003	022	94042999	341021	003	94016101
332003	023	94042999	341021	004	94016101
332003	031	94042199	341021	004	94016101
332003	032	94042199	341021	004	94016101
332003	033	94042199	341021	004	94016101
332003	041	94042999	341021	005	94016101
332003	042	94042999	341021	009	94016101
332003	043	94042999	341021	009	94016101
332003	044	94042999	341021	009	94016101
332003	045	94042999	341021	009	94016101
332003	046	94042999	341021	011	94016101
332003	051	94042999	341021	011	94016101
332003	052	94042999	341021	011	94016101

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
341021	024	94016101	341021	061	94016101
341021	024	94016101	341021	061	94016101
341021	024	94016101	341021	061	94016101
341021	024	94016101	341021	061	94016101
341021	024	94016101	341021	061	94016101
341021	029	94016101	341021	061	94016101
341021	029	94016101	341021	061	94016101
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341021	031	94016101	341021	061	94016101
341021	032	94016101	341021	061	94016101
341021	033	94016101	341021	061	94016101
341021	039	94016101	341021	061	94016101
341021	041	94016101	341021	061	94016101
341021	042	94016101	341021	061	94016101
341021	043	94016101	341021	061	94016101
341021	044	94016101	341021	061	94016101
341021	044	94016101	341021	061	94016101
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341021	049	94016101	341021	061	94016101
341021	051	94016101	341021	061	94016101
341021	052	94016101	341021	061	94016101
341021	053	94016101	341021	061	94016101
341021	053	94016101	341021	062	94016101
341021	059	94016101	341021	062	94016101
341021	061	94016101	341021	062	94016101
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341021	061	94016101	341021	062	94016101
341021	061	94016101	341021	062	94016101
341021	061	94016101	341021	062	94016101
341021	061	94016101	341021	062	94016101
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341021	061	94016101	341021	062	94016101
341021	061	94016101	341021	062	94016101

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
341022	022	94016101	341033	023	48209099
341022	022	94016101	341033	024	48209099
341022	031	94016101	341033	025	48209099
341022	032	94016101	341033	026	48209099
341022	039	48195099	341033	027	48209099
341031	001	48191001	341033	028	48209099
341031	002	48191001	341033	031	48209099
341031	003	48191001	341033	032	48209099
341031	009	48192001	341033	033	48209099
341031	011	48194099	341033	034	48209099
341031	012	48236001	341033	039	48209099
341031	012	48237001	341033	041	48203001
341031	013	48191001	341033	042	48203001
341031	014	48195099	341033	043	48203001
341031	015	48194099	341033	044	48203001
341031	016	48194099	341033	049	48203001
341031	019	48195099	341033	051	48172001
341031	021	48195099	341033	052	48172001
341032	001	48193001	341033	053	48172001
341032	001	48194099	341033	054	48172001
341032	002	48193001	341033	059	48172001
341032	002	48194099	341033	061	48171001
341032	009	48193001	341033	062	48171001
341032	009	48194099	341033	063	48172001
341032	011	48195099	341033	064	48172001
341032	012	48171001	341033	065	48172001
341032	013	48194099	341033	066	48172001
341032	014	48194099	341033	069	48171001
341032	019	48194099	341033	071	48219099
341033	001	48202001	341033	072	48219099
341033	002	48202001	341033	073	48219099
341033	003	48202001	341033	074	48219099
341033	004	48202001	341033	079	48219099
341033	005	48202001	341033	081	48169099
341033	006	48202001	341033	082	48169099
341033	007	48202001	341033	083	48169099
341033	008	48202001	341033	089	48169099
341033	011	48202001	341034	001	48236001
341033	012	48202001	341034	002	48232099
341033	013	48202001	341034	003	48232099
341033	014	48202001	341034	004	48183001
341033	019	48202001	341034	005	48142001
341033	021	48209099	341034	005	48143001
341033	022	48209099	341034	005	48149099

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
341034	006	48236001	342001	019	49029001
341034	007	48236001	342001	021	49011001
341034	009	48236001	342001	022	49030001
341034	011	48236001	342001	023	49019999
341034	012	48236001	342001	024	49019999
341034	013	48236001	342001	025	49011001
341034	014	48236001	342001	026	49119101
341034	015	48237003	342002	001	49011001
341034	016	48232099	342002	002	49011001
341034	017	48236001	342002	003	49011001
341034	018	48236001	342002	009	49011001
341034	021	48236001	342002	011	49011001
341034	022	48236001	342002	012	49011001
341034	023	48236001	342002	013	49011001
341034	029	48236001	342002	014	49011001
341034	031	48209099	342002	015	49011001
341034	032	48236001	342002	016	49011001
341034	033	48236001	342002	017	49011001
341034	034	48221001	342002	019	49011001
341034	034	48229099	342002	021	49011001
341034	035	48193001	342002	022	49011001
341034	035	48194099	342002	023	49011001
341034	036	48114001	342002	024	49011001
341034	037	48232099	342002	025	49011001
341034	038	48232099	342002	026	49011001
341034	041	48182001	342002	027	49011001
341034	042	48193001	342002	028	49011001
341034	042	48194099	342002	031	49011001
341034	043	48183001	342002	032	49011001
341034	044	48171001	342002	033	49011001
341034	045	48184099	342002	039	49011001
341034	049	48236001	342002	041	49011001
342001	001	49021001	342002	042	49011001
342001	002	49021001	342002	043	49011001
342001	003	49021001	342002	044	49011001
342001	009	49021001	342002	045	49011001
342001	011	49029001	342002	046	49011001
342001	012	49029001	342002	047	49011001
342001	013	49029001	342002	049	49011001
342001	014	49029001	342002	051	49011001
342001	015	49029001	342002	052	49011001
342001	016	49029001	342002	053	49011001
342001	017	49029001	342002	054	49011001
342001	018	49029001	342002	059	49011001

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
342002	061	49011001	342003	053	48201099
342002	062	49011001	342003	054	49011099
342002	063	49011001	342003	055	49021099
342002	064	49011001	342003	055	49029001
342002	069	49011001	342003	059	49029001
342002	071	49019101	342003	061	48025106
342002	072	49019101	342003	062	48025106
342002	073	49019101	342003	063	48025106
342002	074	49019101	342003	069	48025106
342002	075	49019101	342003	071	49119101
342002	076	49030001	342003	072	49119101
342002	077	49019906	342003	073	49119101
342002	078	49019906	342003	079	49119999
342002	079	49019906	342003	081	48202001
342002	081	49019905	351100	001	29121201
342002	082	49119101	351100	002	29280003
342002	089	49019906	351100	003	29261001
342003	001	48201099	351100	004	28141001
342003	002	48201099	351100	004	28142001
342003	009	48201099	351100	005	29022001
342003	011	48193001	351100	006	27111401
342003	011	48194099	351100	007	29021101
342003	012	48192001	351100	008	29031101
342003	013	48195099	351100	011	29032101
342003	014	48219099	351100	012	29027001
342003	015	49119999	351100	013	29031501
342003	019	49119999	351100	014	38171001
342003	021	49119902	351100	015	29025001
342003	022	49119902	351100	016	29029099
342003	029	49119902	351100	017	29029099
342003	031	48201099	351100	018	29214904
342003	032	48202001	351100	021	27111401
342003	033	48201099	351100	022	29221910
342003	034	48201099	351100	023	29051101
342003	039	48201099	351100	024	28030002
342003	041	49111099	351100	025	29101001
342003	042	48201099	351100	026	29102001
342003	043	48201099	351100	027	29032301
342003	044	48171001	351100	028	39012001
342003	045	49119999	351100	031	39011001
342003	046	49021001	351100	032	27111401
342003	049	49119999	351100	033	27111401
342003	051	48201099	351100	034	27100010
342003	052	49100001	351100	035	29023001

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
351100	036	29024101	351211	038	29173701
351100	037	29024301	351211	041	29173701
351100	038	29024201	351211	042	29224926
351100	039	29029099	351211	043	29121101
351100	041	29269002	351211	044	29161401
351100	042	29029099	351211	045	38111101
351100	043	29029099	351211	046	29291004
351100	044	29029099	351212	001	28061001
351100	045	29159008	351212	002	28111101
351100	046	29051903	351212	003	28092001
351100	047	28061001	351212	004	28080001
351100	048	28061001	351212	005	28070001
351100	051	28112101	351212	009	28092099
351100	052	25030001	351212	011	28011001
351100	053	28043001	351212	021	28151201
351100	054	28044001	351212	031	25199001
351100	055	31022101	351212	032	28170001
351100	056	29031401	351212	041	28362001
351100	057	38249055	351212	042	28289099
351100	058	28041001	351212	043	28391101
351100	061	39093002	351212	044	29209001
351100	069	28100099	351212	045	28353101
351211	001	29152101	351212	071	28470001
351211	002	29173601	351212	072	28365001
351211	009	29152999	351213	001	28230001
351211	011	29152401	351213	021	32041201
351211	012	29173501	351213	022	32041599
351211	013	29171401	351213	023	32041904
351211	019	29152999	351213	024	32041301
351211	021	29051301	351213	025	32041402
351211	022	22089001	351213	026	32041101
351211	023	29051201	351213	031	32129001
351211	024	29051701	351213	041	32049001
351211	025	29051101	351213	051	28249099
351211	026	38249055	351213	062	32041699
351211	027	39053001	351213	063	32041901
351211	029	29051999	351213	071	32072001
351211	031	29153201	351213	072	32072001
351211	032	29141101	351213	073	32072001
351211	033	29161202	351213	079	32072001
351211	034	29161201	351214	001	28044001
351211	035	29161203	351214	002	28044001
351211	036	29161201	351214	009	28044001
351211	037	29337101	351214	011	28041001

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
351214	021	28043001	351222	013	38081002
351214	031	28042101	351222	014	38081002
351214	041	28112101	351222	015	38081002
351214	042	28112101	351222	016	38081002
351214	043	28112101	351222	019	38081002
351214	049	28112101	351222	021	38082001
351214	051	29034401	351222	022	38083001
351214	061	28030001	351222	029	38083099
351214	071	28112901	351222	032	31052001
351214	081	28139099	351222	033	38089099
351214	091	28062001	351231	001	39069002
351214	091	28070001	351231	002	39075001
351214	091	28080001	351231	003	39094003
351214	091	28091001	351231	004	38063002
351214	091	28092001	351231	005	39013001
351214	091	28092099	351231	006	39073001
351215	001	27081001	351231	007	39094001
351215	001	38061001	351231	008	39094099
351215	021	38051001	351231	011	39119004
351215	031	27060001	351231	012	39019001
351221	001	31023001	351231	012	39039002
351221	002	31022101	351231	013	39092001
351221	003	31021001	351231	014	39051999
351221	009	31022999	351231	015	39081005
351221	011	31031001	351231	016	39041001
351221	012	31031001	351231	017	39079901
351221	019	31031001	351231	018	39031999
351221	021	31043001	351231	021	39012001
351221	041	31052001	351231	022	39011001
351221	042	31052001	351231	023	39159001
351221	043	31052001	351231	024	39023001
351221	044	31052001	351231	025	39095001
351221	049	31052001	351231	026	39095001
351221	051	28092001	351231	027	39095001
351221	052	28080001	351231	028	39100001
351221	053	28070001	351231	031	39091001
351222	001	38081002	351231	041	29173201
351222	002	38081002	351231	042	29291004
351222	003	38081002	351232	001	40021199
351222	004	38081002	351232	001	40021901
351222	005	38081002	351232	002	40025901
351222	009	38081002	351232	003	40021199
351222	011	38081002	351232	003	40021901
351222	012	38081002	351232	004	40021101

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
351232	009	40021199	351300	081	55041001
351232	009	40021901	351300	082	55061001
351232	009	40022001	351300	091	39207101
351232	009	40025901	352100	001	39207101
351232	011	40024901	352100	001	39207101
351232	012	40024901	352100	001	39207101
351232	013	40024901	352100	001	39207101
351232	021	38121001	352100	001	39207101
351232	022	38121001	352100	001	39207101
351232	023	38121001	352100	001	39207101
351232	024	38121001	352100	001	39207101
351232	029	38121001	352100	001	39207101
351232	031	38130001	352100	002	39207101
351232	032	38130001	352100	002	39207101
351232	041	38123001	352100	002	39207101
351232	042	38123001	352100	002	39207101
351232	051	38123001	352100	002	39207101
351232	052	38123001	352100	002	39207101
351232	053	28030002	352100	002	39207101
351232	059	38123001	352100	002	39207101
351300	001	55041001	352100	002	39207101
351300	002	55041001	352100	002	39207101
351300	009	55041001	352100	002	39207101
351300	011	55049099	352100	002	39207101
351300	012	55049099	352100	002	39207101
351300	019	55049099	352100	002	39207101
351300	021	55012003	352100	002	39207101
351300	022	55012003	352100	002	39207101
351300	029	55012003	352100	002	39207101
351300	031	55012003	352100	002	39207101
351300	032	55012003	352100	002	39207101
351300	039	55012003	352100	002	39207101
351300	041	55033001	352100	002	39207101
351300	042	55033001	352100	002	39207101
351300	049	55033001	352100	002	39207101
351300	051	55061001	352100	002	39207101
351300	052	55061001	352100	002	39207101
351300	059	55061001	352100	002	39207101
351300	061	55062001	352100	002	39207101
351300	062	55062001	352100	002	39207101
351300	069	55062001	352100	002	39207101
351300	071	55034001	352100	002	39207101
351300	072	55034001	352100	002	39207101
351300	079	55034001	352100	002	39207101

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
352100	029	39207101	352210	021	32091099
352100	029	39207101	352210	022	32091099
352100	029	39207101	352210	029	32091099
352100	029	39207101	352210	031	32082001
352100	029	39207101	352210	032	32082001
352100	031	39207101	352210	033	32082001
352100	031	39207101	352210	039	32082001
352100	032	39207101	352210	041	32081001
352100	032	39207101	352210	049	32081001
352100	033	39207101	352210	051	32082001
352100	033	39207101	352210	052	32082001
352100	034	39207101	352210	053	32082001
352100	034	39207101	352210	059	32082001
352100	035	39207101	352210	061	35061001
352100	035	39207101	352210	061	35069101
352100	036	39207101	352210	061	35069901
352100	036	39207101	352210	062	32149001
352100	037	39207101	352210	063	32071001
352100	038	39207101	352210	064	32149001
352100	038	39207101	352210	065	32141001
352100	039	39207101	352210	066	38122001
352100	039	39207101	352210	067	38122001
352100	041	39207101	352210	068	32141001
352100	051	39207101	352210	071	38140001
352100	051	39207101	352210	072	32159001
352100	051	39207101	352221	001	33030001
352100	051	39207101	352221	002	33030001
352100	051	39207101	352221	003	33030001
352100	051	39207101	352221	009	33030001
352100	051	39207101	352221	011	33049999
352100	061	39207101	352221	019	33049999
352100	071	39207101	352221	031	33049101
352100	081	39207101	352221	032	33049999
352100	091	39207101	352221	033	33042001
352100	092	39207101	352221	034	33041001
352100	093	39207101	352221	035	33042001
352100	094	39207101	352221	036	33051001
352210	001	32081001	352221	037	33042001
352210	002	32081001	352221	038	33059099
352210	003	32081001	352221	041	33072001
352210	009	32081001	352221	042	33072001
352210	011	32072001	352221	049	33072001
352210	012	32072001	352221	051	33049999
352210	019	32072001	352221	052	33049999

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
352221	053	33071001	352222	082	34022099
352221	054	33043001	352222	089	34022099
352221	055	34011101	352222	091	15131999
352221	056	33043001	352222	092	38084001
352221	057	34012001	352222	093	33072001
352221	058	33049101	352222	094	29054501
352221	061	96032101	352222	095	23065001
352221	062	96032999	352222	096	33051001
352221	063	96151101	352231	001	35061001
352222	001	34022099	352231	002	35061001
352222	002	34022099	352231	003	35061001
352222	009	34022099	352231	004	35069104
352222	011	34011101	352231	005	35061001
352222	012	34011101	352231	006	35061001
352222	019	34011101	352231	011	35069103
352222	021	34022099	352231	012	35069103
352222	022	34022099	352231	021	35069999
352222	023	34022099	352231	022	35069999
352222	024	34022099	352231	023	35069999
352222	025	34022099	352231	024	35061002
352222	026	34022099	352231	031	38119099
352222	029	34022099	352231	032	38119099
352222	031	34022099	352231	041	32149001
352222	032	34022099	352231	042	32149001
352222	033	34022099	352231	049	32149001
352222	034	34022099	352231	051	38244001
352222	035	34022099	352232	001	32159001
352222	036	34022099	352232	002	32151101
352222	039	34022099	352232	002	32151901
352222	041	34022099	352232	003	32159001
352222	042	34022099	352232	004	32159001
352222	043	34022099	352232	005	32159001
352222	044	34022099	352232	009	32159001
352222	045	34022099	352232	011	32159001
352222	046	34022099	352232	012	32159001
352222	049	34022099	352232	013	32159001
352222	051	33061001	352232	014	32159001
352222	061	34022099	352232	019	32159001
352222	062	34022099	352232	021	32159001
352222	069	34022099	352232	022	32159001
352222	071	34022099	352232	023	32159001
352222	072	34022099	352232	024	32159001
352222	079	34022099	352232	029	32159001
352222	081	34022099	352232	031	32081099

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
352232	031	32082001	352234	016	36050001
352232	031	32089099	352234	021	36050001
352232	031	32091001	352234	022	36050001
352232	031	32099099	352234	023	36050001
352232	031	32100001	352234	029	36050001
352232	032	32081099	352234	031	36050001
352232	032	32082001	352234	031	36050001
352232	032	32089099	352234	032	36050001
352232	032	32091001	352234	032	36050001
352232	032	32099099	352234	033	36050001
352232	032	32100001	352234	033	36050001
352232	033	32081099	352234	034	36050001
352232	033	32082001	352234	034	36050001
352232	033	32089099	352234	039	36050001
352232	033	32091001	352234	039	36050001
352232	033	32099099	352234	041	36050001
352232	033	32100001	352234	041	36050001
352232	034	32081099	352234	041	36050001
352232	034	32082001	352234	042	36050001
352232	034	32089099	352234	051	36050001
352232	034	32091001	352234	052	36050001
352232	034	32099099	352234	053	36050001
352232	034	32100001	352234	054	36050001
352232	035	32081099	352234	061	36050001
352232	035	32082001	352234	061	36050001
352232	035	32089099	352234	062	36050001
352232	035	32091001	352234	063	36050001
352232	035	32099099	352234	071	36050001
352232	035	32100001	352234	072	36050001
352232	039	32081099	352237	001	33074999
352232	039	32082001	352237	002	33074999
352232	039	32089099	352237	003	33074999
352232	039	32091001	352237	009	33074999
352232	039	32099099	352237	011	34029099
352232	039	32100001	352237	012	34029099
352233	001	36050001	352237	013	34029099
352233	011	36050001	352237	019	34029099
352234	001	36050001	352237	021	38084001
352234	002	36050001	352237	022	38084001
352234	011	36050001	352237	029	38084001
352234	012	36050001	352237	031	33074999
352234	013	36050001	352237	032	33074999
352234	014	36050001	352237	039	33074999
352234	015	36050001	352237	041	34051001

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
352237	042	34051001	352238	033	15079099
352237	043	34051001	352238	039	15159099
352237	049	34051001	352238	041	15159099
352237	051	34052099	352238	051	27121001
352237	052	34052099	352238	052	27121001
352237	053	34052099	352238	059	27121001
352237	054	34052099	352238	061	20093099
352237	055	34052099	352238	062	23062001
352237	056	34052099	352238	063	23065001
352237	059	34052099	352238	064	23089099
352237	061	34052099	352238	069	23089099
352237	062	34052099	352240	001	33012999
352237	063	34052099	352240	002	27100001
352237	064	34052099	352240	003	27100001
352237	069	34052099	352240	009	27100001
352237	071	34022001	352240	011	38249099
352237	072	34022001	352240	012	38123001
352237	079	34022001	352240	013	38151199
352237	081	34022003	352240	013	38151201
352237	082	34022003	352240	013	38151999
352237	083	34022003	352240	014	38119099
352237	084	34022003	352240	015	38119099
352237	089	34022003	352240	016	38249099
352237	091	34059001	352240	017	38091001
352237	092	34054001	352240	017	38099101
352238	001	33011402	352240	017	38099201
352238	002	33011402	352240	018	38249099
352238	003	33011902	352240	019	38249099
352238	004	33011201	352240	021	21069099
352238	005	33011903	352240	022	21069099
352238	006	33011903	352240	023	21039099
352238	009	33011903	352240	029	21069099
352238	011	33012999	352240	031	38051001
352238	012	33012999	352240	032	38140001
352238	013	33012999	352240	033	38140001
352238	014	15131999	352240	034	38140001
352238	019	33012999	352240	035	32082099
352238	021	15081001	352240	039	38140001
352238	022	15153001	352240	041	22071001
352238	023	15151101	352240	041	22072001
352238	024	15071001	352240	042	34022005
352238	029	15159099	352240	043	33061001
352238	031	15153001	352240	044	27081001
352238	032	15151999	352240	045	38021001

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
352240	046	34029001	354003	011	38245099
352240	047	34029099	354003	012	32149001
352240	048	27121001	354003	013	32149001
352240	049	34029099	354003	019	68079099
352240	051	35061099	354003	021	48111099
352240	051	35069199	354003	022	48111099
352240	051	35069901	354003	023	68079099
352240	052	34041001	354003	024	68079099
352240	052	34042001	354003	029	68079099
352240	052	34049001	354003	031	68079099
352240	053	33072001	355001	001	40111001
352240	054	34022099	355001	002	40111001
352240	055	38081099	355001	003	40111001
352240	056	34052001	355001	004	40111001
354001	001	27040001	355001	005	40111001
354001	011	27071001	355001	006	40111001
354001	012	27060001	355001	009	40111001
354001	013	27079101	355001	011	40112001
354001	014	27131201	355001	012	40112001
354001	015	27050001	355001	013	40112001
354001	016	31022101	355001	014	40112001
354001	019	27079999	355001	015	40112001
354002	001	27100099	355001	016	40112001
354002	002	27100099	355001	019	40112001
354002	003	27100099	355001	021	40115001
354002	009	27100099	355001	022	40115001
354002	011	27100099	355001	023	40114001
354002	012	27100099	355001	024	40114001
354002	019	27100099	355001	025	40119101
354002	021	38112199	355001	026	40119101
354002	021	38112999	355001	028	40119199
354002	022	38112199	355001	029	40119199
354002	022	38112999	355001	031	40131001
354002	023	38112199	355001	032	40132001
354002	023	38112999	355001	033	40131001
354002	029	38119099	355001	034	40131001
354002	031	38111101	355001	039	40139099
354002	032	38200001	355001	041	40102101
354002	033	38190001	355001	041	40102201
354002	039	38249044	355001	041	40102301
354002	041	27100099	355001	041	40102499
354002	051	38249044	355001	041	40102901
354003	001	27149099	355001	042	40102101
354003	011	38160099	355001	042	40102201

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
355001	042	40102301	356001	022	39201099
355001	042	40102499	356001	029	39201099
355001	042	40102901	356001	031	39201099
355001	043	40101199	356001	032	39201099
355001	043	40101201	356001	039	39201099
355001	043	40101399	356001	041	39232901
355001	043	40101901	356001	042	39232901
355001	051	40129001	356001	043	39232901
355001	052	40169101	356001	049	39232901
355001	053	40169101	356002	001	39162099
355001	054	40111001	356002	002	39169099
355001	055	39100004	356002	003	39161001
355003	001	40169999	356002	004	39169099
355003	002	40159099	356002	009	39169099
355003	003	40169301	356002	011	39172399
355003	004	40169599	356002	012	39172999
355003	005	40151101	356002	013	39172199
355003	005	40151999	356002	014	39172201
355003	006	40159099	356002	019	39172999
355003	007	40169101	356002	021	39172399
355003	008	40091099	356002	022	39172999
355003	008	40092001	356002	023	39172199
355003	008	40093005	356002	024	39172201
355003	008	40094001	356002	029	39172999
355003	008	40095002	356002	031	39172399
355003	011	40169909	356002	032	39172999
355003	012	40159099	356002	033	39172199
355003	013	40159099	356002	034	39172201
355003	014	40169902	356002	039	39172999
355003	015	40169101	356002	041	39172399
355003	016	40169999	356002	042	39172999
355003	017	40169999	356002	043	39172199
355003	021	40169901	356002	044	39172201
355003	031	40169901	356002	049	39172999
355003	041	40149099	356002	051	39232101
355003	051	40169901	356002	051	39232901
355003	061	40169901	356002	052	39211101
356001	001	39232101	356002	052	39211201
356001	002	39232101	356002	052	39211301
356001	009	39232101	356002	052	39211401
356001	011	39232101	356002	052	39211901
356001	012	39232101	356003	001	39204101
356001	019	39232101	356003	002	39204201
356001	021	39201099	356003	009	39204101

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
356003	009	39204201	356005	024	39241001
356003	011	39181001	356005	025	39241001
356003	019	39181001	356005	026	39241001
356003	021	39181001	356005	027	39241001
356003	022	39181001	356005	029	39241001
356003	029	39181001	356005	031	39249099
356003	031	39181099	356005	032	39249099
356003	041	39269099	356005	033	39249099
356003	051	85233001	356005	034	39249099
356003	061	39269099	356005	035	39249099
356003	071	39263001	356005	039	39249099
356003	081	85239099	356005	041	39269099
356003	082	39269099	356005	042	39269099
356003	083	39172399	356005	043	39269099
356003	089	39269099	356005	044	39269099
356004	001	39233099	356005	049	39269099
356004	002	39233099	356005	051	96062101
356004	003	39233099	356005	061	39249099
356004	004	39233099	356005	062	39249099
356004	005	39233099	356005	063	39249099
356004	011	39233099	356005	064	39249099
356004	012	39233099	356005	065	39249099
356004	013	39233099	356005	069	39249099
356004	014	39233099	356005	071	39269099
356004	021	39233099	356006	001	39231001
356004	022	39231001	356006	002	39231001
356004	023	39261001	356006	003	39231001
356004	024	39235001	356006	003	39261001
356004	031	39269001	356006	004	39235001
356005	001	39241001	356006	009	39269099
356005	002	39241001	356006	011	39269099
356005	003	39241001	356006	012	39269099
356005	009	39241001	356006	013	39269099
356005	011	39241001	356006	014	39269099
356005	012	39241001	356006	015	39269099
356005	013	39241001	356006	016	39269099
356005	014	39241001	356006	017	39269099
356005	015	39241001	356006	018	39269099
356005	016	39241001	356006	019	39269099
356005	017	39241001	356006	021	39269099
356005	019	39241001	356006	031	39269099
356005	021	39241001	356006	041	39269099
356005	022	39241001	356006	051	39269099
356005	023	39241001	356006	061	39269099

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
356006	071	39269099	356008	001	39269099
356007	001	94012001	356008	001	39269099
356007	002	39249099	356008	001	39269099
356007	003	39231001	356008	001	39269099
356007	004	39231001	356008	001	39269099
356007	005	39269099	356008	001	39269099
356007	006	39249099	356008	001	39269099
356007	007	39211101	356008	001	39269099
356007	007	39211201	356008	001	39269099
356007	007	39211301	356008	001	39269099
356007	007	39211401	356008	001	39269099
356007	007	39211901	356008	002	39269099
356007	008	89039201	356008	002	39269099
356007	011	89020001	356008	002	39269099
356007	012	39249099	356008	002	39269099
356007	013	39249099	356008	002	39269099
356007	014	39249099	356008	002	39269099
356007	015	39252001	356008	002	39269099
356007	016	39249099	356008	002	39269099
356007	017	39251001	356008	002	39269099
356007	018	39172199	356008	002	39269099
356007	018	39172201	356008	002	39269099
356007	018	39172399	356008	002	39269099
356007	018	39172901	356008	002	39269099
356007	018	39173101	356008	002	39269099
356007	018	39173201	356008	002	39269099
356007	018	39173399	356008	002	39269099
356007	018	39173901	356008	002	39269099
356007	019	39269099	356008	002	39269099
356007	021	39269099	356008	002	39269099
356007	031	39269099	356008	002	39269099
356007	041	39269099	356008	011	39269099
356007	051	39269099	356008	012	39269099
356007	059	39269099	356008	021	39269099
356007	071	39269099	356008	021	39269099
356008	001	39269099	356008	022	39269099
356008	001	39269099	356008	023	39269099
356008	001	39269099	356008	023	39269099
356008	001	39269099	356008	031	39269099
356008	001	39269099	356008	032	39269099
356008	001	39269099	356008	041	39269099
356008	001	39269099	356008	041	39269099
356008	001	39269099	356010	001	64021999
356008	001	39269099	356010	001	64022001

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
356010	001	64023099	356012	021	39269099
356010	001	64029101	356012	022	39269099
356010	001	64029901	356012	023	39269099
356010	002	64021999	356012	024	39269099
356010	002	64022001	356012	025	39269099
356010	002	64023099	356012	026	39269099
356010	002	64029101	356012	027	39269099
356010	002	64029901	356012	029	39269099
356010	003	64021999	356012	031	39269099
356010	003	64022001	361201	001	69109001
356010	003	64023099	361201	002	69109001
356010	003	64029101	361201	003	69109001
356010	003	64029901	361201	004	69109001
356010	011	64029901	361201	009	69109001
356010	012	64029901	361201	011	69109001
356010	021	64062001	361201	012	69109001
356010	022	64062001	361201	013	69109001
356010	023	64062001	361201	014	69109001
356010	029	64062001	361201	019	69109001
356011	001	95039099	361201	021	69109001
356011	002	95037001	361201	022	69109001
356011	003	95021001	361201	029	69109001
356011	004	95039005	361201	031	69109001
356011	005	95039005	361201	032	69109001
356011	011	95039099	361201	039	69109001
356011	012	95031001	361201	041	69101001
356011	013	95039099	361201	041	69109001
356011	014	95033099	361201	042	69101001
356011	014	95032001	361201	042	69109001
356011	014	95035099	361201	043	69101001
356011	014	95036001	361201	043	69109001
356011	014	95037001	361201	049	69109001
356011	015	95039099	361201	051	74182001
356011	016	95039099	361201	052	74182001
356011	019	95039099	361201	059	74182001
356012	001	39269099	361202	001	69010001
356012	002	39269099	361202	002	69010001
356012	003	39269099	361202	003	69010001
356012	004	39269099	361202	009	69010001
356012	009	39269099	361202	011	69010001
356012	011	95029999	361202	012	69010001
356012	012	95029999	361202	013	69010001
356012	013	95029999	361202	019	69010001
356012	019	95029999	361202	021	69010001

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
361202	022	69010001	362011	002	70052901
361202	023	69010001	362011	011	70053001
361202	029	69010001	362011	012	70053001
361202	031	69120001	362011	013	70060099
361202	032	69120001	362011	014	70060099
361202	033	69120001	362011	021	70072101
361202	034	69120001	362011	021	70071102
361202	039	69120001	362011	022	70072101
361202	041	69120001	362011	022	70071102
361202	049	69120001	362011	023	70071901
361203	001	69041001	362011	024	70071901
361203	002	69041001	362011	031	70071901
361203	003	69041001	362013	001	70071901
361203	004	69041001	362013	002	70071901
361203	005	69041001	362013	011	70072101
361203	006	69041001	362013	011	70071102
361203	009	69041001	362013	012	70072101
361203	011	69089001	362013	012	70071102
361203	012	69089001	362013	013	70071901
361203	013	69089001	362013	021	70072101
361203	019	69089001	362013	029	70072101
361203	021	69051001	362013	031	70193201
361203	022	69051001	362013	032	70199006
361203	029	69051001	362013	041	70193999
361203	031	69060001	362013	042	70191101
361203	032	69060001	362013	043	70191201
361203	039	69060001	362013	044	70193999
361204	001	69022001	362013	045	70193999
361204	002	69021001	362013	046	70193999
361204	003	69021001	362013	049	70193999
361204	009	69029099	362021	001	70109401
361204	011	69029099	362021	001	70109301
361204	012	69029099	362021	001	70109201
361204	013	69029099	362021	002	70109201
361204	019	69029099	362021	002	70109101
361204	021	38160003	362021	011	70109201
361204	022	38160003	362021	011	70109101
361204	029	38160003	362021	021	70109401
361204	031	38160002	362021	021	70109301
361204	032	38160007	362021	022	70109201
361204	039	38160099	362021	023	70109201
362011	001	70052101	362021	023	70109101
362011	001	70052901	362021	031	70109401
362011	002	70052101	362021	031	70109301

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
362021	031	70109201	362023	006	70132999
362021	032	70109201	362023	007	70132999
362021	033	70109101	362023	011	70139999
362021	041	70109201	362023	012	70139999
362021	042	70109201	362023	013	70139999
362021	042	70109301	362023	014	70139999
362021	043	70109201	362023	015	70139999
362021	044	70109101	362023	019	70139999
362021	051	70109101	369111	001	25232101
362021	061	70101099	369111	002	25232101
362021	062	70101099	369111	009	25232999
362021	069	70101099	369111	011	25231001
362022	001	70139999	369111	021	25239099
362022	002	70133904	369112	001	25221001
362022	009	70139999	369112	011	25222001
362022	011	70171004	369112	012	25223001
362022	012	90183101	369112	019	25221001
362022	013	70171004	369112	021	38160007
362022	014	70171004	369112	022	25221001
362022	015	70171004	369112	029	25221001
362022	019	70101099	369112	031	25182001
362022	031	70111003	369112	039	25181001
362022	032	70120001	369112	041	25171001
362022	033	70112004	369112	042	25171001
362022	034	70151001	369112	043	25171001
362022	035	70111004	369112	049	25171001
362022	036	70111099	369121	001	38245001
362022	039	70111099	369121	002	38245001
362022	041	70139999	369121	003	38245001
362022	042	70139999	369121	004	38245001
362022	049	70139999	369121	005	38245001
362022	051	70133201	369121	006	38245001
362022	052	70133201	369121	007	38160003
362022	053	70133201	369121	008	38245001
362022	054	70132901	369121	009	38245001
362022	055	70132901	369121	011	68101101
362023	001	701091	369121	021	68101101
362023	001	701092	369121	031	25171001
362023	001	701093	369121	032	25171001
362023	001	701094	369122	001	68101101
362023	002	70133999	369122	002	68101101
362023	003	70133999	369122	003	68101101
362023	4	70133201	369122	004	68101101
362023	005	70133201	369122	005	68101101

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
369122	011	68111001	369124	002	68111001
369122	011	68112099	369124	002	68112099
369122	019	68111001	369124	003	68112099
369122	019	68112099	369124	004	68119099
369122	021	68109101	369124	005	68113001
369122	022	68109101	369124	009	68113099
369122	023	68109101	369124	011	68126001
369122	029	68109101	369124	012	68129099
369122	031	68109101	369124	013	68122001
369122	041	68109101	369124	013	68123001
369122	051	68109999	369124	014	68127001
369122	052	68109999	369124	015	68124001
369122	053	68113001	369124	019	68139099
369122	059	68109999	369133	001	68061001
369122	061	68119099	369133	002	68061001
369122	062	68119099	369133	009	68061001
369122	069	68119099	369133	011	68062001
369122	071	38245001	369133	012	68062001
369123	001	68109901	369133	013	68062001
369123	002	68109901	369133	019	68062001
369123	003	68109901	371001	001	72011001
369123	004	68109901	371001	001	72012001
369123	005	68109901	371001	001	72015001
369123	009	68109901	371001	002	72011001
369123	011	68109901	371001	002	72012001
369123	012	68109901	371001	002	72015001
369123	013	68109901	371001	011	72031001
369123	014	68109901	371001	012	73259901
369123	015	68109901	371001	021	72071101
369123	019	68109901	371001	022	72071201
369123	021	68112099	371001	031	72071999
369123	022	68112099	371006	001	72071999
369123	023	68112099	371006	001	72071999
369123	024	68112099	371006	001	72071999
369123	025	68112099	371006	001	72071999
369123	026	68112099	371006	001	72071999
369123	027	68112099	371006	001	72071999
369123	029	68112099	371006	001	72071999
369123	031	68109101	371006	001	72071999
369123	032	68109101	371006	001	72071999
369123	039	68109101	371006	001	72071999
369123	041	38245001	371006	001	72071999
369123	051	68101101	371006	001	72071999
369124	001	68113099	371006	002	72071999

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
371006	041	72071999	371006	052	72071999
371006	041	72071999	371006	052	72071999
371006	041	72071999	371006	052	72071999
371006	042	72071999	371006	052	72071999
371006	042	72071999	371006	052	72071999
371006	042	72071999	371006	052	72071999
371006	042	72071999	371006	052	72071999
371006	042	72071999	371006	052	72071999
371006	042	72071999	371006	052	72071999
371006	042	72071999	371006	052	72071999
371006	042	72071999	371006	052	72071999
371006	042	72071999	371006	061	73042999
371006	042	72071999	371006	062	73042101
371006	042	72071999	371006	063	73042999
371006	042	72071999	371006	069	73042999
371006	043	72071999	371006	071	73042999
371006	043	72071999	371007	001	73041099
371006	043	72071999	371007	002	73041099
371006	043	72071999	371007	009	73041099
371006	043	72071999	371007	011	73043199
371006	043	72071999	371007	011	73043901
371006	043	72071999	371007	012	73043199
371006	043	72071999	371007	012	73043901
371006	043	72071999	371007	019	73043199
371006	043	72071999	371007	019	73043901
371006	043	72071999	371007	021	73042999
371006	043	72071999	371007	022	73042101
371006	049	72071999	371007	023	73042999
371006	049	72071999	371007	029	73042999
371006	049	72071999	371007	031	73042999
371006	049	72071999	371007	031	73042999
371006	049	72071999	371007	041	73042999
371006	049	72071999	371007	041	73042999
371006	049	72071999	371007	051	73269001
371006	049	72071999	372001	001	81100001
371006	049	72071999	372001	002	81100001
371006	049	72071999	372001	003	81100001
371006	049	72071999	372001	011	78011001
371006	049	72071999	372001	012	78019101
371006	051	72071999	372001	013	78019999
371006	051	72071999	372001	014	78019999
371006	051	72071999	372001	015	78019999
371006	051	72071999	372001	019	78060099
371006	052	72071999	372001	021	79011101

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
372001	022	79012001	372005	004	76071101
372001	029	79070099	372005	004	76071901
372001	031	81060001	372005	004	76072001
372001	032	81060001	372005	005	76042101
372001	039	81060001	372005	005	76041001
372001	041	81071001	372005	005	76042999
372001	041	81079099	372005	006	76081099
372001	042	71081101	372005	006	76082001
372001	042	71081299	372005	009	76109001
372001	042	71081301	372005	011	76031001
372001	043	71061001	372005	011	76032001
372001	043	71069101	372005	012	76012099
372001	043	71069201	372005	021	74199101
372001	044	28049001	372005	022	74152999
372001	061	28429099	372007	001	74082999
372001	062	28372099	372007	002	74082101
372001	063	28429099	372007	002	74082201
372001	064	28332601	372007	002	74082999
372003	001	74031101	372007	003	80030001
372003	001	74031201	372007	004	74082101
372003	001	74031301	372007	005	71081301
372003	001	74031999	372007	006	71069201
372003	002	74020001	372007	007	78030001
372003	009	74031999	372007	008	79040001
372003	011	74020001	372007	011	74072999
372003	021	74032301	372007	012	74071099
372003	022	74032201	372007	012	74072101
372003	023	74032101	372007	012	74072299
372003	029	74032999	372007	012	74072901
372003	031	28070001	372007	013	80070099
372003	032	75011001	372007	014	74050001
372003	033	75040001	372007	015	71081301
372003	034	28049001	372007	016	71069201
372003	041	74040002	372007	017	78030001
372005	001	76051199	372007	018	79040001
372005	001	76051999	372007	021	74072999
372005	001	76052199	372007	022	74071099
372005	001	76052901	372007	022	74072101
372005	002	76061199	372007	022	74072299
372005	002	76061201	372007	022	74072901
372005	002	76069101	372007	023	80030001
372005	002	76069199	372007	024	74072101
372005	003	76041001	372007	025	71081301
372005	003	76042999	372007	026	71069201

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
372007	027	78030001	381202	006	38109001
372007	028	79040001	381202	011	38109001
372007	031	38109001	381202	012	38109001
381100	001	38109001	381202	013	38109001
381100	002	38109001	381202	021	38109001
381100	011	38109001	381202	022	38109001
381100	012	38109001	381202	023	38109001
381100	019	38109001	381202	024	38109001
381100	021	38109001	381202	031	38109001
381100	021	38109001	381202	032	38109001
381100	021	38109001	381202	033	38109001
381100	022	38109001	381202	034	38109001
381100	022	38109001	381202	035	38109001
381100	023	38109001	381202	041	38109001
381100	023	38109001	381202	042	38109001
381100	024	38109001	381202	051	38109001
381100	024	38109001	381203	001	38109001
381100	025	38109001	381203	001	38109001
381100	026	38109001	381203	002	38109001
381100	027	38109001	381203	009	38109001
381100	031	38109001	381203	011	38109001
381201	001	38109001	381203	012	38109001
381201	002	38109001	381203	012	38109001
381201	011	38109001	381203	013	38109001
381201	012	38109001	381203	014	38109001
381201	013	38109001	381203	015	38109001
381201	014	38109001	381203	016	38109001
381201	015	38109001	381203	021	38109001
381201	016	38109001	381203	022	38109001
381201	017	38109001	381203	023	38109001
381201	018	38109001	381203	024	38109001
381201	021	38109001	381203	025	38109001
381201	021	38109001	381203	031	38109001
381201	031	38109001	381203	041	38109001
381201	041	38109001	381203	042	38109001
381201	051	38109001	381203	043	38109001
381201	052	38109001	381203	044	38109001
381201	053	38109001	381203	044	38109001
381201	059	38109001	381203	045	38109001
381202	001	38109001	381300	001	94032099
381202	002	38109001	381300	002	94031001
381202	003	38109001	381300	003	94032099
381202	004	38109001	381300	004	94032099
381202	005	38109001	381300	005	94032099

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
381300	006	94032099	381401	034	82041201
381300	007	94032099	381401	034	82042001
381300	008	94031001	381401	035	82041199
381300	011	94032099	381401	035	82041201
381300	012	94032099	381401	035	82042001
381300	013	94032099	381401	036	82041199
381300	014	94032099	381401	036	82041201
381300	015	94032099	381401	036	82042001
381300	016	94032099	381401	037	82041199
381300	019	94032099	381401	037	82041201
381300	021	94032099	381401	037	82042001
381300	031	84179001	381401	038	82041199
381300	032	84179001	381401	038	82041201
381300	033	84509001	381401	038	82042001
381300	034	84185001	381401	041	82052001
381300	041	87168099	381401	042	82013099
381300	042	73211199	381401	043	82032001
381300	043	84182101	381401	044	82032001
381300	043	84182201	381401	051	82074001
381300	043	84182999	381401	053	82041199
381401	001	84321001	381401	053	82041201
381401	002	82019001	381401	053	82042001
381401	003	82014001	381401	061	87168099
381401	004	82019002	381401	062	82055919
381401	005	82014001	381401	063	82052001
381401	006	82019001	381401	071	82055999
381401	007	82014001	381401	081	82071301
381401	008	82013001	381401	082	82055999
381401	011	82013001	381401	083	82055999
381401	012	82015001	381401	089	82055999
381401	019	82019099	381404	001	82055999
381401	021	82029103	381404	001	82055999
381401	022	82051003	381404	002	82055999
381401	023	82079099	381404	003	82055999
381401	024	82031001	381404	003	82055999
381401	025	82079099	381404	004	82055999
381401	026	82031001	381404	011	82055999
381401	027	82029103	381404	011	82055999
381401	028	82021001	381404	011	82055999
381401	031	82032001	381404	012	82055999
381401	032	82054099	381404	012	82055999
381401	033	82033001	381404	012	82055999
381401	033	82034001	381404	013	82055999
381401	034	82041199	381404	013	82055999

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
381404	013	82055999	381405	022	73181601
381404	014	82055999	381405	023	73181601
381404	014	82055999	381405	024	73181601
381404	014	82055999	381405	029	73181601
381404	019	82055999	381405	031	73182399
381404	019	82055999	381405	032	73182399
381404	019	82055999	381405	033	73182399
381404	021	82055999	381405	034	73182399
381404	022	82055999	381405	035	73182399
381404	022	82055999	381405	039	73182399
381404	022	82055999	381405	041	73182201
381404	023	82055999	381405	042	73182201
381404	023	82055999	381405	043	73182201
381404	024	82055999	381405	044	73182201
381404	025	82055999	381405	049	73182201
381404	025	82055999	381405	051	83081001
381404	025	82055999	381405	052	74151001
381404	025	82055999	381405	053	83081001
381404	025	82055999	381405	054	83081001
381404	025	82055999	381405	055	83081001
381404	026	82055999	381405	059	83081001
381404	026	82055999	381407	001	76129099
381404	026	82055999	381407	002	76129099
381404	031	82055999	381407	003	76129099
381404	032	82055999	381407	004	76129099
381404	032	82055999	381407	005	76129099
381404	032	82055999	381407	006	76129099
381404	033	82055999	381407	007	76129099
381404	033	82055999	381407	011	76129099
381404	033	82055999	381407	012	76129099
381404	039	82055999	381407	021	76129099
381404	039	82055999	381407	031	76110001
381404	039	82055999	381407	032	76110001
381405	001	73181101	381407	033	76110001
381405	002	73181101	381407	033	76110001
381405	003	73181101	381407	033	76110001
381405	004	73181101	381407	039	76110001
381405	009	73181101	381408	001	70102001
381405	011	73181101	381408	002	76151999
381405	012	73181101	381408	003	80040001
381405	013	73181101	381408	011	73269099
381405	014	73181101	381408	012	73269099
381405	019	73181101	381408	019	73269099
381405	021	73181601	381408	021	73239201

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
381408	029	73269099	381410	002	84191101
381408	031	76129099	381410	003	84191101
381408	032	76129099	381410	004	84191101
381408	033	76129099	381410	005	84191101
381408	039	76129099	381410	011	84191901
381408	041	73211199	381410	012	84191901
381408	042	84182101	381410	013	84191901
381408	042	84182201	381410	021	73218101
381408	042	84182999	381410	022	73218101
381409	001	84182999	381410	029	73218101
381409	002	84182999	381410	031	73218301
381409	003	84182999	381410	032	73218101
381409	004	84182999	381410	033	73218201
381409	011	84182999	381410	041	85162901
381409	012	84182999	381410	051	73239999
381409	013	84182999	381410	061	85162101
381409	014	84182999	381410	062	76110001
381409	015	84182999	381410	071	85169099
381409	016	84182999	381412	001	85169099
381409	021	84182999	381412	001	85169099
381409	022	84182999	381412	001	85169099
381409	022	84182999	381412	001	85169099
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381409	024	84182999	381412	001	85169099
381409	025	84182999	381412	001	85169099
381409	026	84182999	381412	001	85169099
381409	027	84182999	381412	002	85169099
381409	031	84182999	381412	002	85169099
381409	032	84182999	381412	002	85169099
381409	032	84182999	381412	002	85169099
381409	033	84182999	381412	002	85169099
381409	034	84182999	381412	002	85169099
381409	035	84182999	381412	002	85169099
381409	036	84182999	381412	002	85169099
381409	041	84182999	381412	002	85169099
381409	041	84182999	381412	002	85169099
381409	042	84182999	381412	002	85169099
381409	042	84182999	381412	002	85169099
381409	051	84182999	381412	002	85169099
381409	061	84182999	381412	002	85169099
381409	071	84182999	381412	002	85169099
381409	071	84182999	381412	003	85169099
381409	071	84182999	381412	003	85169099
381410	001	84191101	381412	003	85169099

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
381412	011	85169099	382102	011	85169099
381412	012	85169099	382102	011	85169099
381412	012	85169099	382102	012	85169099
381412	013	85169099	382102	013	85169099
381412	014	85169099	382102	014	85169099
381412	015	85169099	382102	015	85169099
381412	016	85169099	382102	016	85169099
381412	016	85169099	382102	017	85169099
381412	014	85169099	382102	018	85169099
381412	021	85169099	382102	021	85169099
381412	031	85169099	382102	022	85169099
382101	001	85169099	382102	023	85169099
382101	002	85169099	382102	024	85169099
382101	003	85169099	382102	024	85169099
382101	004	85169099	382102	025	85169099
382101	011	85169099	382102	025	85169099
382101	012	85169099	382102	031	85169099
382101	012	85169099	382102	032	85169099
382101	012	85169099	382102	033	85169099
382101	013	85169099	382102	034	85169099
382101	014	85169099	382102	035	85169099
382101	014	85169099	382102	041	85169099
382101	014	85169099	382102	042	85169099
382101	014	85169099	382102	043	85169099
382101	021	85169099	382102	043	85169099
382101	022	85169099	382102	044	85169099
382101	023	85169099	382102	044	85169099
382101	024	85169099	382102	049	85169099
382101	025	85169099	382102	049	85169099
382101	026	85169099	382102	051	85169099
382101	027	85169099	382102	052	85169099
382101	028	85169099	382102	053	85169099
382101	031	85169099	382102	054	85169099
382101	031	85169099	382102	055	85169099
382102	001	85169099	382102	056	85169099
382102	001	85169099	382102	057	85169099
382102	002	85169099	382102	058	85169099
382102	002	85169099	382102	061	85169099
382102	003	85169099	382102	071	85169099
382102	003	85169099	382102	071	85169099
382102	004	85169099	382102	072	85169099
382102	005	85169099	382102	072	85169099
382102	006	85169099	382102	073	85169099
382102	011	85169099	382102	074	85169099

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
382102	075	85169099	382104	021	85169099
382102	076	85169099	382104	022	85169099
382103	001	85169099	382104	023	85169099
382103	002	85169099	382104	024	85169099
382103	003	85169099	382104	025	85169099
382103	003	85169099	382104	026	85169099
382103	003	85169099	382104	027	85169099
382103	004	85169099	382104	028	85169099
382103	011	85169099	382104	031	85169099
382103	012	85169099	382104	032	85169099
382103	019	85169099	382104	033	85169099
382103	021	85169099	382104	034	85169099
382103	022	85169099	382104	035	85169099
382103	022	85169099	382104	036	85169099
382103	023	85169099	382104	037	85169099
382103	023	85169099	382104	038	85169099
382103	024	85169099	382104	041	85169099
382103	025	85169099	382104	042	85169099
382103	026	85169099	382104	043	85169099
382103	027	85169099	382104	044	85169099
382103	028	85169099	382104	045	85169099
382103	028	85169099	382104	046	85169099
382103	031	85169099	382104	047	85169099
382103	032	85169099	382104	048	85169099
382103	041	85169099	382104	049	85169099
382103	042	85169099	382104	051	85169099
382103	043	85169099	382104	052	85169099
382103	051	85169099	382104	053	85169099
382104	001	85169099	382104	054	85169099
382104	002	85169099	382104	055	85169099
382104	003	85169099	382104	056	85169099
382104	004	85169099	382104	057	85169099
382104	005	85169099	382104	061	85169099
382104	006	85169099	382104	062	85169099
382104	007	85169099	382104	063	85169099
382104	008	85169099	382104	064	85169099
382104	011	85169099	382104	065	85169099
382104	012	85169099	382104	071	85169099
382104	013	85169099	382106	001	85169099
382104	014	85169099	382106	001	85169099
382104	015	85169099	382106	001	85169099
382104	016	85169099	382106	011	85169099
382104	017	85169099	382106	021	85169099
382104	018	85169099	382106	021	85169099

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
382106	021	85169099	382202	073	85169099
382106	021	85169099	382202	073	85169099
382106	021	85169099	382202	074	85169099
382106	021	85169099	382202	074	85169099
382106	021	85169099	382202	075	85169099
382106	021	85169099	382202	075	85169099
382106	021	85169099	382202	079	85169099
382106	021	85169099	382202	079	85169099
382106	021	85169099	382202	081	85169099
382106	021	85169099	382202	081	85169099
382106	021	85169099	382203	001	85169099
382106	021	85169099	382203	002	85169099
382106	021	85169099	382203	002	85169099
382106	021	85169099	382203	011	85169099
382106	021	85169099	382203	012	85169099
382106	021	85169099	382203	013	85169099
382106	021	85169099	382203	019	85169099
382106	021	85169099	382203	021	85169099
382106	021	85169099	382203	022	85169099
382106	021	85169099	382203	029	85169099
382106	021	85169099	382203	031	85169099
382106	031	85169099	382203	032	85169099
382106	041	85169099	382203	033	85169099
382106	051	85169099	382203	033	85169099
382202	001	85169099	382203	033	85169099
382202	011	85169099	382203	033	85169099
382202	021	85169099	382203	034	85169099
382202	021	85169099	382203	034	85169099
382202	021	85169099	382203	035	85169099
382202	021	85169099	382203	036	85169099
382202	031	85169099	382203	037	85169099
382202	031	85169099	382203	037	85169099
382202	031	85169099	382203	041	85169099
382202	031	85169099	382203	051	85169099
382202	031	85169099	382203	051	85169099
382202	031	85169099	382203	051	85169099
382202	041	85169099	382203	051	85169099
382202	051	85169099	382203	051	85169099
382202	052	85169099	382203	051	85169099
382202	071	85169099	382203	051	85169099
382202	071	85169099	382203	051	85169099
382202	072	85169099	382203	052	85169099
382202	072	85169099	382203	053	85169099

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
382203	055	85169099	382206	011	84158101
382205	001	85169099	382206	011	84158101
382205	002	85169099	382206	021	84158101
382205	003	85169099	382206	022	84158101
382205	011	85169099	382206	023	84158101
382205	012	85169099	382206	029	84158101
382205	013	85169099	382206	031	84158101
382205	021	85169099	382206	032	84158101
382205	021	85169099	382206	039	84158101
382205	022	85169099	382206	041	84158101
382205	022	85169099	382206	041	84158101
382205	023	85169099	382206	041	84158101
382205	023	85169099	382206	042	84158101
382205	031	85169099	382206	043	84158101
382205	031	85169099	382206	044	84158101
382205	032	85169099	382206	046	84158101
382205	032	85169099	382206	046	84158101
382205	033	85169099	382206	049	84158101
382205	033	85169099	382206	051	84158101
382205	041	85169099	382206	051	84158101
382205	042	85169099	382206	051	84158101
382205	043	85169099	382206	051	84158101
382205	051	85169099	382206	051	84158101
382205	052	85169099	382206	052	84158101
382205	053	85169099	382206	052	84158101
382205	061	85169099	382206	052	84158101
382205	062	85169099	382206	052	84158101
382205	063	85169099	382206	052	84158101
382205	064	85169099	382206	059	84158101
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382205	065	85169099	382206	059	84158101
382205	071	85169099	382206	059	84158101
382205	072	85169099	382206	059	84158101
382205	073	85169099	382206	061	84158101
382205	081	85169099	382206	062	84158101
382205	081	85169099	382206	069	84158101
382206	001	84151001	382206	071	84158101
382206	002	84158101	382206	071	84158101
382206	003	84152001	382206	071	84158101
382206	004	84152001	382206	072	84158101
382206	005	84158101	382206	072	84158101
382206	011	84158101	382206	072	84158101
382206	011	84158101	382206	073	84158101
382206	011	84158101	382206	073	84158101

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
382206	073	84158101	382207	041	84213999
382206	079	84158101	382207	041	84212902
382206	079	84158101	382207	041	84212301
382206	079	84158101	382207	042	84212199
382206	081	84158101	382207	042	84212201
382206	082	84158101	382207	042	84213999
382206	082	84158101	382207	042	84212902
382206	083	84158101	382207	042	84212301
382206	084	84158101	382207	049	84212199
382206	084	84158101	382207	049	84212201
382207	001	84212199	382207	049	84213999
382207	002	84212199	382207	049	84212902
382207	003	84212199	382207	049	84212301
382207	009	84212199	382207	051	84212199
382207	011	84212301	382207	051	84212201
382207	012	84212301	382207	051	84213999
382207	013	84212301	382207	051	84212902
382207	014	84212301	382207	051	84212301
382207	019	84212301	382207	052	84212199
382207	021	84213999	382207	052	84212201
382207	022	84213999	382207	052	84213999
382207	029	84213999	382207	052	84212902
382207	031	84212199	382207	052	84212301
382207	031	84212201	382207	059	84212199
382207	031	84213999	382207	059	84212201
382207	031	84212301	382207	059	84213999
382207	031	84212901	382207	059	84212902
382207	032	84212199	382207	059	84212301
382207	032	84212201	382207	061	84219901
382207	032	84213999	382207	062	84219901
382207	032	84212301	382207	063	84219901
382207	032	84212901	382207	064	84219901
382207	033	84212199	382207	065	84219901
382207	033	84212201	382207	066	84219901
382207	033	84213999	382207	067	84219901
382207	033	84212301	382207	068	48232001
382207	033	84212901	382207	071	84811001
382207	039	84212199	382207	072	84219901
382207	039	84212201	382207	073	84812009
382207	039	84213999	382207	079	84219901
382207	039	84212301	382301	001	84691201
382207	039	84212901	382301	001	84692001
382207	041	84212199	382301	002	84691201
382207	041	84212201	382301	002	84692001

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
382301	003	84693001	382302	072	87052099
382301	011	84701001	382302	079	87052099
382301	012	84702101	382302	091	84701001
382301	012	84702901	382302	092	84702101
382301	021	84705001	382302	093	84691201
382301	022	84721099	382302	093	84692001
382301	031	84732999	382302	094	84691201
382301	032	84732101	382302	094	84692001
382301	033	84731001	382302	095	84716001
382301	041	39269021	382302	096	85282108
382301	042	39269021	383101	001	85042101
382301	049	39269021	383101	002	85042101
382302	001	84713001	383101	002	85042201
382302	002	84713001	383101	003	85042201
382302	011	84714901	383101	004	85042201
382302	012	84714901	383101	005	85042301
382302	013	84714901	383101	011	85043103
382302	014	84714901	383101	011	85043201
382302	015	84714901	383101	011	85043301
382302	019	84714901	383101	012	85043301
382302	021	84716001	383101	019	85043301
382302	022	84716001	383101	019	85044001
382302	023	84716001	383101	021	85042301
382302	031	84716003	383101	022	85042301
382302	032	84716003	383101	031	85013201
382302	033	84716003	383101	031	85013201
382302	034	84716003	383101	032	85013201
382302	035	84716003	383101	033	85013201
382302	036	84716003	383101	034	85013201
382302	039	84716003	383101	035	85013301
382302	041	84716003	383101	035	85013401
382302	042	84716003	383101	036	85013401
382302	043	84716003	383101	041	85014099
382302	049	84716003	383101	042	85014099
382302	051	85175001	383101	043	85014099
382302	052	85175001	383101	044	85014099
382302	059	85175001	383101	045	85014099
382302	061	84717001	383101	051	85014099
382302	062	85211001	383101	061	85013101
382302	063	84717001	383101	061	85013201
382302	064	84717001	383101	062	85013301
382302	065	84717001	383101	062	85013401
382302	069	84717001	383101	071	850211
382302	071	87052099	383101	071	850212

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
383101	071	850213	383103	012	85119099
383101	071	850220	383103	013	85119099
383101	071	850231	383103	019	85119099
383101	071	850239	383103	021	85118003
383101	081	85359020	383103	022	85119001
383101	082	85359020	383103	023	87089999
383101	083	85359020	383103	024	85118003
383101	084	85359020	383103	025	85118003
383101	085	85371001	383103	026	85322902
383101	086	85372001	383103	027	85322902
383101	091	85359007	383103	028	85122002
383101	092	85359007	383103	031	87089999
383101	093	85359007	383103	032	85119001
383101	094	85359007	383103	033	87089999
383101	095	85359007	383103	039	87089999
383101	096	85359007	383103	041	87089999
383101	097	85359007	383107	001	84798910
383102	001	85153101	383107	002	84798910
383102	002	85153101	383107	011	85061001
383102	003	85153101	383107	011	85063001
383102	004	85153101	383107	011	85064001
383102	005	85153101	383107	011	85065001
383102	006	85153101	383107	011	85066001
383102	011	85153101	383107	011	85068001
383102	012	85153101	383107	012	85061001
383102	013	85153101	383107	012	85063001
383102	021	85153101	383107	012	85064001
383102	031	85153101	383107	012	85065001
383102	032	85153101	383107	012	85066001
383102	033	85153101	383107	012	85068001
383102	041	85152901	383107	013	85061001
383102	042	85152901	383107	013	85063001
383102	043	85152901	383107	013	85064001
383102	051	85152901	383107	013	85065001
383102	052	85152901	383107	013	85066001
383102	053	85152901	383107	013	85068001
383102	061	85152901	383107	021	85061001
383102	071	84682001	383107	021	85063001
383102	081	85159001	383107	021	85064001
383102	091	84689001	383107	021	85065001
383103	001	85115099	383107	021	85066001
383103	002	85115099	383107	021	85068001
383103	003	85114003	383107	029	85061001
383103	011	85119099	383107	029	85063001

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
383107	029	85064001	383109	024	85079099
383107	029	85065001	383109	025	85079099
383107	029	85066001	383109	026	85079099
383107	029	85068001	383109	027	85079099
383107	031	85079099	383109	028	85079099
383107	032	85079099	383109	031	85079099
383107	039	85079099	383109	032	85079099
383107	041	85079099	383109	032	85079099
383107	042	85131099	383109	032	85079099
383107	043	85044003	383109	032	85079099
383107	049	85079099	383109	032	85079099
383108	001	85079099	383109	032	85079099
383108	002	85079099	383109	041	85079099
383108	011	85079099	383110	001	85079099
383108	012	85079099	383110	002	85079099
383108	019	85079099	383110	003	85079099
383108	021	85079099	383110	003	85079099
383108	022	85079099	383110	011	85079099
383108	029	85079099	383110	012	85079099
383108	031	85079099	383110	013	85079099
383108	032	85079099	383110	013	85079099
383108	033	85079099	383110	021	85079099
383108	034	85079099	383110	022	85079099
383108	035	85079099	383110	023	85079099
383108	039	85079099	383110	031	85079099
383108	041	85079099	383110	032	85079099
383109	001	85079099	383110	033	85079099
383109	011	85079099	383110	041	85079099
383109	012	85079099	383110	042	85079099
383109	012	85079099	383110	043	85079099
383109	012	85079099	383110	044	85079099
383109	013	85079099	383110	051	85079099
383109	014	85079099	383110	052	85079099
383109	014	85079099	383110	053	85079099
383109	014	85079099	383110	054	85079099
383109	014	85079099	383110	061	85079099
383109	015	85079099	383110	062	85079099
383109	015	85079099	383110	063	85079099
383109	015	85079099	383110	064	85079099
383109	021	85079099	383110	071	85079099
383109	022	85079099	383110	081	85079099
383109	022	85079099	383110	082	85079099
383109	022	85079099	383110	083	85079099
383109	023	85079099	383110	084	85079099

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
383201	001	85079099	383202	012	85079099
383201	002	85079099	383202	012	85079099
383201	003	85079099	383202	012	85079099
383201	004	85079099	383202	021	85079099
383201	005	85079099	383202	021	85079099
383201	006	85079099	383202	021	85079099
383201	009	85079099	383202	021	85079099
383201	011	85079099	383202	021	85079099
383201	012	85079099	383202	021	85079099
383201	013	85079099	383202	021	85079099
383201	014	85079099	383202	021	85079099
383201	015	85079099	383202	022	85079099
383201	021	85079099	383202	023	85079099
383201	022	85079099	383202	024	85079099
383201	023	85079099	383202	025	85079099
383201	029	85079099	383202	026	85079099
383201	031	85079099	383202	027	85079099
383201	032	85079099	383202	028	85079099
383201	033	85079099	383202	028	85079099
383201	034	85079099	383202	028	85079099
383201	034	85079099	383202	028	85079099
383201	035	85079099	383202	028	85079099
383201	036	85079099	383202	028	85079099
383201	037	85079099	383202	031	85079099
383201	041	85079099	383202	031	85079099
383201	042	85079099	383202	031	85079099
383201	043	85079099	383202	031	85079099
383201	044	85079099	383202	032	85079099
383201	045	85079099	383202	032	85079099
383201	046	85079099	383202	041	85079099
383201	049	85079099	383202	042	85079099
383201	051	85079099	383202	043	85079099
383201	052	85079099	383202	043	85079099
383201	059	85079099	383202	043	85079099
383201	071	85079099	383202	044	85079099
383202	001	85079099	383202	045	85079099
383202	002	85079099	383202	046	85079099
383202	003	85079099	383202	046	85079099
383202	009	85079099	383202	046	85079099
383202	011	85079099	383202	046	85079099
383202	012	85079099	383202	061	85079099
383202	012	85079099	383204	001	85079099
383202	012	85079099	383204	001	85079099
383202	012	85079099	383204	002	85079099

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
383204	002	85079099	383206	001	85079099
383204	011	85079099	383206	002	85079099
383204	011	85079099	383206	003	85079099
383204	011	85079099	383206	003	85079099
383204	011	85079099	383206	003	85079099
383204	012	85079099	383206	011	85079099
383204	012	85079099	383206	012	85079099
383204	013	85079099	383206	021	85079099
383204	013	85079099	383206	022	85079099
383204	014	85079099	383206	031	85079099
383204	014	85079099	383206	031	85079099
383204	014	85079099	383206	031	85079099
383204	021	85079099	383206	031	85079099
383204	022	85079099	383206	031	85079099
383204	023	85079099	383206	031	85079099
383204	023	85079099	383206	031	85079099
383204	023	85079099	383206	031	85079099
383204	024	85079099	383206	032	85079099
383204	025	85079099	383206	033	85079099
383204	025	85079099	383206	034	85079099
383204	031	85079099	383206	034	85079099
383204	031	85079099	383206	034	85079099
383204	032	85079099	383206	034	85079099
383204	033	85079099	383206	035	85079099
383204	034	85079099	383206	035	85079099
383204	035	85079099	383206	035	85079099
383204	035	85079099	383206	035	85079099
383204	041	85079099	383206	041	85079099
383204	041	85079099	383206	041	85079099
383204	041	85079099	383206	041	85079099
383205	001	85079099	383206	041	85079099
383205	002	85079099	383206	041	85079099
383205	011	85079099	383206	041	85079099
383205	011	85079099	383206	041	85079099
383205	012	85079099	383206	041	85079099
383205	012	85079099	383206	042	85079099
383205	021	85079099	383206	043	85079099
383205	022	85079099	383206	044	85079099
383205	031	85079099	383206	044	85079099
383205	032	85079099	383206	044	85079099
383205	041	85079099	383206	045	85079099
383205	042	85079099	383206	046	85079099
383205	051	85079099	383206	047	85079099
383205	051	85079099	383206	047	85079099

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
383206	047	85079099	383302	001	84182101
383206	047	85079099	383302	001	84182201
383206	047	85079099	383302	001	84182999
383206	051	85079099	383302	002	84182101
383206	052	85079099	383302	002	84182201
383206	053	85079099	383302	002	84182999
383206	053	85079099	383302	003	84182101
383301	001	73211199	383302	003	84182201
383301	002	73211199	383302	003	84182999
383301	003	73211199	383302	011	84183099
383301	004	73211199	383302	011	84184001
383301	009	73211199	383302	019	84185099
383301	011	73211199	383302	021	85091001
383301	012	73211199	383302	022	84221101
383301	013	73211199	383302	023	84501999
383301	014	73211199	383302	023	84502001
383301	019	73211199	383302	031	84189999
383301	021	73211201	383302	041	73211101
383301	022	73211201	383302	042	84212901
383301	029	73211201	383302	051	84189999
383301	031	85166001	383303	001	84501999
383301	032	85166001	383303	001	84502001
383301	039	85166001	383303	002	84501999
383301	041	73211301	383303	002	84502001
383301	051	85166001	383303	003	84501999
383301	052	73211101	383303	003	84502001
383301	053	85165001	383303	004	84501999
383301	061	84146001	383303	004	84502001
383301	062	84146001	383303	011	84501999
383301	063	84146001	383303	011	84502001
383301	064	84146001	383303	012	84501999
383301	065	84146001	383303	012	84502001
383301	071	73239101	383303	019	84501999
383301	072	73239101	383303	019	84502001
383301	073	73239101	383303	021	85098099
383301	074	73239101	383303	022	84221101
383301	079	73239101	383303	031	84512199
383301	081	84146001	383303	031	84512901
383301	082	94034001	383303	051	84509001
383301	083	84219901	383303	061	85161001
383301	084	73241001	383304	001	85166001
383301	085	94034001	383304	002	85091001
383301	086	85166001	383304	003	85094003
383301	087	76169910	383304	004	84198101

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
383304	005	85094002	384110	023	85169099
383304	006	85094001	384110	023	85169099
383304	007	85165001	384110	023	85169099
383304	008	85098001	384110	023	85169099
383304	011	85164001	384110	023	85169099
383304	012	84212901	384110	023	85169099
383304	013	85163101	384110	023	85169099
383304	014	85167201	384110	024	85169099
383304	015	84145101	384110	024	85169099
383304	021	84762101	384110	024	85169099
383304	022	85162999	384110	024	85169099
383304	023	84159099	384110	024	85169099
383304	031	85169099	384110	024	85169099
384110	001	85169099	384110	024	85169099
384110	001	85169099	384110	031	85169099
384110	001	85169099	384110	032	85169099
384110	001	85169099	384110	033	85169099
384110	001	85169099	384110	034	85169099
384110	002	85169099	384110	035	85169099
384110	002	85169099	384110	036	85169099
384110	002	85169099	384110	037	85169099
384110	002	85169099	384110	041	85169099
384110	003	85169099	384110	051	85169099
384110	003	85169099	384110	061	85169099
384110	003	85169099	384121	001	85169099
384110	003	85169099	384121	002	85169099
384110	011	85169099	384121	011	85169099
384110	011	85169099	384121	012	85169099
384110	012	85169099	384121	019	85169099
384110	012	85169099	384121	021	85169099
384110	021	85169099	384121	022	85169099
384110	021	85169099	384121	029	85169099
384110	021	85169099	384121	031	85169099
384110	021	85169099	384121	032	85169099
384110	021	85169099	384121	033	85169099
384110	021	85169099	384121	039	85169099
384110	021	85169099	384121	041	85169099
384110	022	85169099	384121	042	85169099
384110	022	85169099	384121	051	85169099
384110	022	85169099	384121	052	85169099
384110	022	85169099	384121	053	85169099
384110	022	85169099	384121	054	85169099
384110	022	85169099	384121	055	85169099
384110	022	85169099	384121	056	85169099

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
384121	059	85169099	384123	038	85169099
384121	061	85169099	384123	041	85169099
384121	062	85169099	384123	051	85169099
384121	063	85169099	384123	052	85169099
384121	064	85169099	384123	053	85169099
384122	001	85169099	384124	001	85169099
384122	001	85169099	384124	002	85169099
384122	001	85169099	384124	003	85169099
384122	001	85169099	384124	004	85169099
384122	002	85169099	384124	005	85169099
384122	003	85169099	384124	009	85169099
384122	011	85169099	384124	011	85169099
384122	012	85169099	384124	012	85169099
384122	013	85169099	384124	012	85169099
384122	021	85169099	384124	021	85169099
384122	022	85169099	384124	022	85169099
384122	023	85169099	384124	022	85169099
384122	024	85169099	384124	023	85169099
384122	025	85169099	384124	024	85169099
384122	026	85169099	384124	031	85169099
384122	027	85169099	384124	041	85169099
384122	028	85169099	384125	001	85169099
384122	031	85169099	384125	001	85169099
384122	032	85169099	384125	002	85169099
384122	033	85169099	384125	002	85169099
384122	034	85169099	384125	003	85169099
384122	035	85169099	384125	003	85169099
384122	041	85169099	384125	004	85169099
384122	042	85169099	384125	004	85169099
384123	001	85169099	384125	011	85169099
384123	002	85169099	384125	012	85169099
384123	003	85169099	384125	013	85169099
384123	011	85169099	384125	014	85169099
384123	019	85169099	384125	015	85169099
384123	021	85169099	384125	016	85169099
384123	022	85169099	384125	017	85169099
384123	029	85169099	384125	018	85169099
384123	031	85169099	384125	021	85169099
384123	032	85169099	384125	022	85169099
384123	033	85169099	384125	023	85169099
384123	034	85169099	384125	024	85169099
384123	035	85169099	384125	025	85169099
384123	036	85169099	384125	031	85169099
384123	037	85169099	384125	041	85169099

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
384126	001	85169099	384201	009	89020001
384126	002	85169099	384201	011	89020099
384126	003	85169099	384201	021	89012001
384126	004	85169099	384201	022	89012001
384126	005	85169099	384201	023	89012001
384126	006	85169099	384201	029	89012001
384126	007	85169099	384201	031	89059099
384126	008	85169099	384201	032	89011001
384126	008	85169099	384201	033	89040001
384126	011	85169099	384201	034	89011001
384126	012	85169099	384201	039	89059099
384126	013	85169099	384201	041	89039201
384126	014	85169099	384201	042	89020002
384126	015	85169099	384201	049	89039201
384126	019	85169099	384201	051	89039201
384126	021	85169099	384201	061	84799002
384126	022	85169099	384201	062	84072101
384126	023	85169099	384201	062	84072901
384126	024	85169099	384201	071	84799002
384126	025	85169099	384202	001	86061001
384126	025	85169099	384202	002	86050001
384126	026	85169099	384202	003	86061001
384126	029	85169099	384202	004	86061001
384126	031	85169099	384202	005	86061001
384126	032	85169099	384202	006	86011001
384126	032	85169099	384202	006	86012001
384126	033	85169099	384202	006	86021001
384126	034	85169099	384202	006	86029099
384126	035	85169099	384202	009	86062001
384126	036	85169099	384202	009	86063001
384126	037	85169099	384202	009	86069101
384126	038	85169099	384202	009	86069201
384126	041	85169099	384202	009	86069999
384126	042	85169099	384202	011	86050001
384126	043	85169099	384202	012	86050001
384126	043	85169099	384202	021	86079999
384126	043	85169099	384202	031	86073001
384126	044	85169099	384202	032	86079101
384126	044	85169099	384202	039	86079101
384126	044	85169099	384202	041	86079101
384201	001	89020001	384202	042	86079101
384201	002	89020001	384203	001	87111001
384201	003	89020001	384203	002	87120001
384201	004	89020001	384203	003	87120001

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
384203	004	87120001	385001	002	90183101
384203	009	87120001	385001	003	90183202
384203	011	87111001	385001	004	90189007
384203	011	87112001	385001	005	90183903
384203	012	87112001	385001	006	90183901
384203	012	87113001	385001	007	90189099
384203	013	87113001	385001	008	90189099
384203	013	87114001	385001	011	90189019
384203	014	87115001	385001	012	90189099
384203	014	87119001	385001	013	90189007
384203	019	87119001	385001	014	90183101
384203	021	87120003	385001	015	90183101
384203	022	87120003	385001	016	90189007
384203	029	87120003	385001	017	90189010
384203	031	87150001	385001	018	90189010
384203	032	87150001	385001	021	90189010
384204	001	84099101	385001	022	90183904
384204	002	84099101	385001	023	90189015
384204	011	84099101	385001	024	90183202
384204	021	87149501	385001	025	90183202
384204	022	87149101	385001	026	90251101
384204	023	87149999	385001	027	90189002
384204	024	87149999	385001	028	90189099
384204	025	87149999	385001	029	90189002
384204	026	87149101	385001	031	90189002
384204	027	87149999	385001	041	90189002
384204	028	87149601	385001	051	90189002
384204	031	87149999	385001	061	90181906
384204	032	87149999	385001	062	90181906
384204	039	87149999	385001	063	90219099
384204	041	87141901	385001	064	90219099
384204	042	87141901	385001	065	90219099
384204	051	87141101	385001	066	90219099
384204	052	87141901	385001	067	90219099
384204	053	87141901	385001	068	90219099
384204	054	87141901	385001	069	90219099
384204	055	87141901	385001	071	90229099
384204	056	87141901	385001	081	94029099
384204	057	87141901	385001	082	94029099
384204	058	87141901	385001	083	94029099
384204	061	87141901	385001	084	94029099
384204	069	87141901	385001	085	94029099
384204	071	87120001	385001	086	94029099
385001	001	90183101	385001	087	94029099

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
385001	088	94029099	385004	009	90178099
385001	089	94029099	385004	011	90303904
385001	091	90189014	385004	012	90303999
385001	092	84198999	385004	013	90303901
385001	093	84198907	385004	019	90303999
385001	094	84211999	385004	021	90258001
385001	095	90189099	385004	022	90258001
385001	096	84198999	385004	023	90258002
385001	096	90189099	385004	024	90258099
385002	001	90184199	385004	025	90258099
385002	001	90184901	385004	029	90258099
385002	002	90184199	385004	031	90318007
385002	002	90184901	385004	032	90318099
385002	011	94031099	385004	033	90318006
385002	012	94031099	385004	034	90152001
385002	013	94031099	385004	039	90318099
385002	014	94031099	385004	041	90251904
385002	015	94031099	385004	042	90251904
385002	016	94031099	385004	043	90251101
385002	017	94021099	385004	044	90321099
385002	018	94031099	385004	049	90251904
385002	021	94031099	385004	051	84239001
385002	022	94031099	385004	061	90258001
385002	029	94031099	385004	062	90141001
385002	031	90189007	385004	063	90258099
385002	032	90189007	385004	064	90262001
385002	033	90189001	385004	065	90258099
385002	034	90183101	385004	066	90258099
385002	035	90189007	385004	067	90154001
385002	039	90189007	385004	069	90258099
385002	041	90212101	385004	071	90261003
385002	042	90212199	385004	072	90268001
385002	043	90212101	385004	081	90268001
385002	049	90212199	385004	082	90268001
385002	051	30064099	385004	083	90268001
385002	052	30064099	385004	084	90261003
385002	053	30064099	385004	085	90268001
385002	054	30064099	385004	089	90268099
385002	059	30064099	385004	091	90259001
385004	001	90173001	385005	001	90031101
385004	002	90171002	385005	002	90031901
385004	003	90173099	385005	003	90031901
385004	004	90173099	385005	009	90031901
385004	005	90178099	385005	011	90014001

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
385005	012	90014001	385006	011	90065901
385005	013	90014001	385006	021	90071101
385005	019	90014001	385006	021	90071901
385005	021	90015001	385006	031	90072001
385005	022	90015001	385006	041	90069199
385005	023	90015001	385006	041	90069999
385005	029	90015001	385006	051	90079101
385005	031	90013002	385006	061	90079201
385005	032	90013002	385006	071	85299099
385005	033	90013099	390001	001	71131999
385005	039	90013099	390001	002	71131999
385005	041	90013099	390001	003	71131999
385005	042	90041001	390001	004	71131999
385005	043	90041001	390001	005	71131999
385005	049	90049099	390001	006	71131999
385005	051	90021999	390001	007	71131999
385005	052	90021999	390001	008	71131999
385005	053	90021999	390001	011	71131999
385005	054	90021101	390001	012	71131999
385005	055	90021999	390001	013	71131999
385005	056	90021999	390001	019	71131999
385005	057	90021999	390001	021	71131101
385005	059	90021999	390001	022	71131101
385005	061	90041001	390001	023	71131101
385005	062	90041001	390001	024	71131101
385005	063	90041001	390001	025	71131101
385005	069	90041001	390001	026	71131101
385005	071	90121001	390001	027	71131101
385005	072	90112099	390001	028	71131101
385005	079	90121001	390001	031	71131101
385005	081	90275099	390001	032	71131101
385005	082	90051001	390001	033	71131101
385005	083	90022001	390001	039	71131101
385005	084	90014002	390001	041	71131999
385005	085	90138099	390001	042	71131999
385005	086	90151001	390001	043	71131999
385005	089	90138099	390001	044	71131999
385005	091	90059001	390001	045	71131999
385006	001	90065101	390001	049	71131999
385006	001	90065299	390001	051	71131101
385006	001	90065399	390001	052	71131101
385006	011	90065101	390001	053	71131101
385006	011	90065299	390001	054	71131101
385006	011	90065399	390001	055	71131101

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code	CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
390001	061	71141101	390001	097	71179001
390001	062	71141101	390005	001	96081001
390001	063	71141101	390005	002	96084002
390001	064	71141101	390005	003	96091001
390001	065	71141101	390005	004	96091001
390001	066	71141101	390005	005	96083901
390001	067	71141101	390005	006	96082001
390001	068	71141101	390005	007	96082001
390001	069	71141101	390005	011	90171002
390001	071	71162001	390005	012	90171002
390001	072	71162001	390005	013	40169201
390001	073	71162001	390005	014	90178099
390001	081	71171101	390005	015	82141001
390001	081	71171999	390005	016	82141001
390001	081	71179001	390005	021	39269021
390001	082	71171101	390005	022	83059001
390001	082	71171999	390005	023	84659402
390001	082	71179001	390005	024	48091001
390001	083	71171101	390005	025	84729099
390001	083	71171999	390005	029	84729099
390001	083	71179001	390005	031	97011001
390001	084	71171101	390005	032	96091001
390001	084	71171999	390005	033	96033001
390001	084	71179001	390005	041	96100001
390001	085	71171101	390005	042	96100001
390001	085	71171999	390005	043	96100001
390001	085	71179001	390005	049	96100001
390001	091	71171101	390005	051	96092001
390001	091	71171999	390005	052	96086001
390001	091	71179001	390005	053	96086001
390001	092	71171101	390005	061	96131001
390001	092	71171999	390005	061	96132001
390001	092	71179001	390005	061	96133001
390001	093	71171101	390006	001	95021001
390001	093	71171999	390006	002	95021001
390001	093	71179001	390006	003	95021001
390001	094	71171101	390006	004	95021001
390001	094	71171999	390006	009	95021001
390001	094	71179001	390006	011	95010001
390001	095	71171101	390006	012	95039099
390001	095	71171999	390006	013	95029999
390001	095	71179001	390006	014	95039099
390001	097	71171101	390006	015	95021001
390001	097	71171999	390006	016	95037001

CMAP94 Class Code	CMAP94 Product Code	HS-6 Code
390006	017	95037001
390006	018	95037001
390006	021	95032001
390006	022	95039099
390006	029	95039099
390006	031	95039099
390006	032	95021001
390006	033	95032001
390006	034	95010001
390006	035	95039099
390006	036	95029999
390006	039	95039099
390006	041	95010001
390006	042	95039099
390006	043	95031001
390006	044	95035001
390006	045	95041001
390006	049	95039099
390006	051	95039099

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