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EFFECTS OF COVERAGE UNDER MEDICAID AND MEDICARE ON CONTINUITY, ACCESS, QUALITY, AND COST OF CARE

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DEDICATION

To my parents and grandma, for your unconditional love and support.

To all the people who have provided me with guidance, encouragement and inspiration throughout my academic training.

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ABSTRACT

Medicaid and Medicare are the two largest public health insurance programs in the US, providing coverage to millions of Americans, including people with low income, with disabilities, and of age over 65. For those who are eligible, transitioning from Medicaid to dual Medicare-Medicaid coverage at age 65 may lead to changes in health services use and costs to the healthcare system. More research is needed on the effects of this critical transition, especially as Medicaid expansion and restructuring Medicare benefits are both under heated debate. In Chapter 1, we provide context about both programs, summarize relevant evidence on this topic, and identify the questions of how different coverage status and care settings might affect continuity, access, quality, and cost of care. We also describe the significance of our studies and potential policy implications.

In Chapter 2, we use national Medicaid and Medicare claims from 2011-2012 to investigate changes in health services utilization and costs for Medicaid beneficiaries who aged into Medicare using a regression discontinuity design. We found that Medicare enrollment at age 65 is associated with abrupt increases in the rates of hospital admissions and primary care visits. Average hospital length of stay increased transiently in the month immediately before the transition, but returned to the pre-transition level as soon as Medicare became the primary payer. These discontinuities could be attributed to patients' anticipation of more generous coverage, greater provider access under Medicare, and the resulting pent-up demand, as well as potential strategic recording of enrollment and service dates by hospitals. Our findings suggest that improved access under dual enrollment relative to Medicaid-only enrollment may cause delays in care near the transition.

As coverage and utilization increase, the availability of health care providers to meet the needs of new patients and the patients' choice of providers remain unclear. In Chapter 3, we focus on primary care visits and hospital admissions and assess continuity of care by examining the number of unique providers, average provider caseload, and percentage of patients served by the same provider before and after the transition. Compared to the number of unique primary care providers (PCPs) serving the cohort with Medicaid only, the number almost doubled after the same cohort transitioned to dual enrollment. Meanwhile, each PCP saw more patients. For hospital admissions, among those who were admitted both before and after, we observe more unique hospitals in the 6 months post-transition, but each hospital admitted fewer patients. Switching after the transition was fairly common: 45% for PCPs and 51% for hospitals. These statistics are in line with our hypothesis that having dual coverage is associated with wider access to inpatient care and primary care providers, which potentially reflects unmet need under Medicaid coverage.

As an increasing number of near-elderly individuals age into Medicare from their previous coverage, including Medicaid, some may continue to seek primary care based on their established relationships with providers. An important safety net primary care setting is federally qualified health centers (FQHCs), specifically designated to care for low-income and underserved populations, many of whom are enrolled in Medicaid. In Chapter 4, we use national Medicare and Medicaid claims data from 2016 to compare primary care, non-primary care, and total annual cost of care for dual enrollees who primarily use FQHCs versus those who use other settings for primary care. We found that for both the aged (≥65) and disabled (<65) group, FQHCs users experienced higher primary care cost, lower non-primary care cost, and lower total cost. The robustness of the FQHC effect suggests that, from the perspective of total cost, the

practice style of FQHCs may offer a cost-efficient setting, likely by reducing non-primary care cost. Nevertheless, further research is needed to confirm that the overall quality of care provided by FQHCs to duals is at least equivalent to more expensive care settings.

CHAPTER 1

INTRODUCTION AND MOTIVATION

Medicaid and Medicare are the two largest public health insurance programs in the US. Medicaid is jointly funded by the federal and state governments, serving low-income children, parents, pregnant women, and those with disabilities, while Medicare is a federal program that provides health insurance mostly for those aged 65 and older. According to the Centers for Medicare and Medicaid Services, national health expenditures increased by 3.9% to $3.5 trillion in 2017, accounting for 17.9% of GDP. Medicare and Medicaid spending accounted for 20 and 17 percent of total national health expenditures, respectively. Because of higher projected growth for Medicare enrollment, the annual spending growth in Medicare is expected to be faster than that of Medicaid and private insurance.

Transitioning from Medicaid-only to Medicare-only or to Medicare-Medicaid dual coverage at age 65 leads to changes in health insurance coverage, in the use of medical services, and potentially in the overall costs to the health care system. Studies have shown that Medicare initiation was associated with an abrupt increase in health services use at age 65 for the overall population[1-3], but findings on the effect of Medicare coverage is mixed for the previously uninsured[4-6]. For the Medicaid-insured, the current literature is only limited to special subpopulations.[7] Although a positive association between having insurance coverage and health status has been well established, more research is needed in evaluating the impact of Medicare enrollment for the general near-elderly Medicaid population, especially in an era when both Medicaid and Medicare expansions are under heated debate. Understanding whether gaining Medicare coverage is beneficial for the near-elderly Medicaid population may inform

policymakers regarding state actions on the Medicaid expansion decision as well as approaches to expanding Medicare coverage.

Meanwhile, having health insurance coverage is not equivalent to having access to healthcare. As coverage and utilization increase, the availability of health care providers to meet the needs of newly insured patients is questionable. It has been reported that almost 90% of general physicians accept new patients with private insurance, while less than 75% accept those with public coverage.[8] Finding a provider who accepts Medicaid or Medicare may be especially difficult for some regions in the country. On the one hand, access to providers that accept Medicaid patients is generally more limited than that for Medicare, but on the other hand, many state Medicaid programs provide a broader coverage of services than Medicare does. It remains unclear which of these two competing forces wins out, but we can gain insights into the interplay of these policies by observing the changes in the number of providers seen by Medicaid patients for different care needs before and after they obtain Medicare coverage.

As an increasing number of near-elderly individuals age into the Medicare program from their previous coverage, including Medicaid, some of them may continue to seek primary care in settings where they already have established relationships. An important safety net primary care setting is federally qualified health centers (FQHCs), specifically organized to care for low-income and medically underserved populations. According to data reported by the Health Resources and Services Administration, 49.64% of the patients in 2017 served by the Health Center Program were Medicaid/CHIP enrollees, 9.40% were Medicare enrollees, and 3.82% were dually eligible.[9] The duals are a distinct and important patient group in FQHCs, as they are particularly vulnerable and tend to be costly. In previous work by Mukamel et al. (2016), compared to patients who received a low percentage of their primary care in FQHCs, those

receiving most of their primary care in FQHCs experienced higher costs for primary care, lower costs for non-primary care, and lower total costs overall. While this initial analysis of Medicare expenditure provides important insights on differences between FQHC and non-FQHC Medicare patients, using Medicaid claims data in addition to Medicare to analyze health services use and costs incurred for FQHC patients will improve it in significant ways. First, total Medicare and Medicaid costs can be estimated for dually eligible beneficiaries, a key population for which analysis of Medicare data alone is limited. Second, by examining Medicaid claims, we can include long-term care cost as a subcategory of non-primary care cost, which may be affected by the setting and quality of primary care. Third, we have more recent data than previous studies and a national sample.

This dissertation uses a multi-year (2011-2012 and 2016), national dataset of Medicaid and Medicare enrollment and claims to provide insights into the effects of coverage under these two large public health insurance programs on continuity, access, quality, and cost of care.

In Chapter 2, we examine the impact of Medicare enrollment for the near-elderly Medicaid population before and after reaching age 65 on health services utilization and costs. Types of health services analyzed include hospital admissions, potentially preventable admissions, emergency room visits, and primary care visits. As secondary analyses, we also look at total Medicaid and Medicare costs. In Chapter 3, we characterize the change in choice of provider by beneficiaries for the same cohort of Medicaid patients transitioning to Medicare as examined in Chapter 2. In Chapter 4, we compare primary, non-primary, and total cost of care incurred for dual enrollees who primarily use FQHCs versus other settings for primary care.

For both Medicare and Medicaid, as the number of beneficiaries and the amount of spending continue to increase, these two programs will remain critical subjects of national

attention and policy debate. We believe that findings from these studies will contribute to the existing literature on public health insurance for the near-elderly and elderly population and help inform policymaking to expand access and provide cost-effective care for the most vulnerable populations of the nation.

CHAPTER 2

THE IMPACT OF MEDICARE ENROLLMENT FOR NEAR-ELDERLY MEDICAID BENEFICIARIES ON HEALTH SERVICES UTILIZATION AND COSTS OF CARE

ABSTRACT

Transitioning from Medicaid-only to dual Medicare-Medicaid coverage at age 65 may lead to changes in the use of health services and costs to the healthcare system. More research is needed on the effects of this transition, especially as Medicaid expansion and restructuring Medicare benefits are both under heated debate. We use national Medicaid and Medicare claims to investigate changes in health services utilization and costs for Medicaid beneficiaries who aged into Medicare from 2011-2012 using a regression discontinuity design (RDD). To test robustness, we examine hospital admissions that were due to access-insensitive "marker conditions" and test effects on beneficiaries who were duals prior to age 65. Estimates from a sharp RDD with a 6-month bandwidth show that enrolling in Medicare at age 65 is associated with a 0.012 percentage point increase ($p=0.007$) in daily rate of hospital admissions, a 0.727 percentage point increase ($p<0.001$) in daily primary care visits, and no statistically significant changes in terms of potentially preventable admissions or total cost to Medicaid and Medicare on inpatient services. We observe discontinuities in several key outcomes at the transition, which could be attributed to patients' anticipation of more generous coverage, greater provider access and resulting pent-up demand, or potential strategic recording of enrollment and services dates by hospital administration. Improved access under Medicare relative to Medicaid may cause delays in care near the transition. Additional research should investigate the health consequences of these behaviors over the longer run.

BACKGROUND

Medicare plays a key role in providing health and financial security to people aged 65 or older, as well as those younger than 65 with certain disabilities, end-stage renal disease, or amyotrophic lateral sclerosis, regardless of income. Medicare has four basic forms of coverage: Part A pays for hospitalization costs; Part B pays for physician services, lab and x-ray services, durable medical equipment, outpatient and other services; Part C refers to Medicare Advantage Plans offered by private companies approved by Medicare; and Part D assists with the cost of prescription drugs. US citizens or permanent residents are entitled to premium-free Part A at age 65 if they or their spouse receive or are eligible to receive Social Security benefits or railroad retirement benefits or have paid payroll taxes for 10 or more years. People under age 65 can be eligible for Medicare after a 2-year waiting period once they start to receive Social Security Disability Insurance (SSDI) payments. For people receiving benefits for at least 4 months from Social Security or the Railroad Retirement Board, enrollment in Parts A and B automatically starts on the first day of the month of turning 65, or first day of the prior month if birthday is on the first day of the month. Other eligible individuals need to enroll to obtain Part A and/or Part B, during or after a 7-month Initial Enrollment Period which begins 3 months before the month of turning 65 and ends 3 months after. Those who have not worked long enough can only sign up during a valid enrollment period, have to pay a monthly Part A premium of up to $499, on top of a Part A deductible of $1,556, coinsurance per day of $389 for 61-90 inpatient days and of $778 or more for 91 days and beyond, in 2022. Part B charges most enrollees a monthly standard premium of $170.10 in 2022. After meeting a Part B deductible of $233, enrollees pay a 20% coinsurance for most doctor services, outpatient therapy, and durable medical equipment.[10] Because of the non-trivial amount of out-of-pocket costs for Medicare beneficiaries, people with

limited income and resource seek help from state Medicare Savings Programs which pay Medicare premiums, deductibles, coinsurance, and copayments.

Medicaid eligibility criteria for seniors are complicated, but it covers additional services beyond those provided under Medicare, including nursing facility care beyond the 100-day limit on skilled nursing facility care that Medicare covers, prescription drugs, eyeglasses, and hearing aids. Although the ACA's Medicaid expansion up to 138% of FPL excluded seniors, the Medicaid program provided additional eligibility pathways, and states have variation in their financial eligibility criteria and adoption of different options.[11] There are currently four pathways through which seniors are eligible for Medicaid: 1) the aged, blind, disabled pathway (Supplemental Security Income (SSI) beneficiaries, also a subset of the categorically needy), 2) the medically needy pathway, 3) buy-in programs for working people with disabilities, and 4) long-term care through the special income rule. Before the ACA, in addition to the income and asset thresholds, Medicaid eligibility was mostly limited to certain categories of individuals such as children, pregnant women, low-income parents, the disabled, and seniors. In states that have adopted the ACA Medicaid expansion, nearly all adults with incomes up to 138% of FPL ($1,396 per month for an individual in 2018) are eligible for coverage. However, in non-expansion states, people still have to fit into one of the traditional categories to qualify for Medicaid coverage. As of 2018, the national median annual income limit for individuals for the age and disability pathways was 74% of FPL, with an asset limit of $2000 for an individual.[11] The medically needy option enables states to extend Medicaid coverage to individuals who meet the categorically needy pathway eligibility requirements but exceed the income thresholds. Individuals can become eligible for medically needy Medicaid coverage by incurring medical expenses so that their income falls below a state-established medically needy income limit

("spending down"). As of 2018, 32 states had a Medicaid medically needy program in place that cover seniors, which imposes a median monthly income limit for individual of $488, or 48% of FPL, with an asset limit of $2000.[6] The Medicaid buy-in program for working people with disabilities allows those whose income and/or assets exceed the limits for other eligibility pathways to "buy in" to Medicaid coverage (with applicable premiums in 34 states), providing disabled individuals the opportunity to work and access needed care without making a choice between working and qualifying for Medicaid. This pathway was adopted in 45 states as of 2018 and requires much higher limits, with a national median monthly income limit of $2530, or 250% of FPL, and an asset limit of $10,000 for an individual in 2018.[6] For long-term services and supports (LTSS), 43 states as of 2018 allowed people whose functional needs require an institutional level of care or home and community based services (HCBS) to qualify for Medicaid with incomes up to 300% of the SSI level ($2,199 per month for an individual in 2015), known as the "special income rule."[6] If a senior over the age of 65 meets the eligibility requirements for any of the above pathways, Medicaid provides affordable coverage (with limited premiums and cost sharing in some cases), which includes a range of medical and long-term care services, many of which are not covered or only available in limited amounts through Medicare. Services covered by both programs are paid for by Medicare first, and Medicaid fills in the difference up to the state's payment limit.

There were changes in the income requirements for different state Medicaid programs even before Medicaid expansion took place in 2014, which complicates the population sizes and characteristics of the near-elderly Medicaid population over time across states. At the same time, because of benefit enhancements, the difference between how much patients pay for a service at age 64 and how much they pay for the same service at age 65 has also changed over the years,

and no previous work has investigated whether the utilization patterns have changed as a result of this trend.

Individuals who enrolled in Medicaid under the ACA Adult eligibility group differs in significant ways from those covered by traditional Medicaid, which causes transition issues when the ACA Adult group approaches Medicare eligibility. What is challenging for the near-elderly population among this "adult group" is that their expansion-associated Medicaid eligibility ends when they reach 65. If their income and assets are low enough, while enrolling in Medicare, they can transition from expansion-associated Medicaid to traditional Medicaid (for the categorically needy) or a Medicare Savings Program after being evaluated by their state Medicaid agency. Because traditional Medicaid imposes more stringent income and asset rules than those for the "adult group" (typically using a 75% of FPL income rule compared to the 138% of FPL), it could happen in expansion states that people newly eligible for Medicare no longer qualify for any Medicaid coverage after re-evaluation. At this point, they will face Part B premiums and high out-of-pocket health care costs, unless they quality for one of the Medicare Savings Programs. The administrative efforts required at the transition point would likely increase barriers to coverage and lead to coverage losses among eligible individuals. Financial assistance from traditional Medicaid to dual-eligibles or from Medicare Savings Programs to Medicare-only beneficiaries can be the difference between accessing or forgoing needed care.

A large body of evidence shows that Medicaid beneficiaries have better access to care than the *uninsured* and are less likely to delay or go without needed care because of costs.[12] Recent studies continue to support earlier findings that state Medicaid expansions to the newly eligible adult group are associated with improved access to care, improved self-reported health, and reduced mortality among adults.[13] Nevertheless, access to providers that accept Medicaid

patients is generally more limited than that for Medicare. Low Medicaid reimbursement rates have long been associated with lower physician participation in Medicaid, especially among primary care providers.[14-16] A study analyzing results from a 2011 survey and focus-group sessions with Washington State primary care physicians reported low Medicaid payment rates as a serious problem that limited their willingness to accept Medicaid patients, which was well below those for Medicare patients and privately insured patients, and also well below the physicians' costs of caring for Medicaid patients in their practice.[17] The author concluded that many factors add to the costs to physicians of serving the Medicaid population, including administrative burden, complexity of Medicaid patients' conditions, and limited referrals to specialists and behavior health. A brief by Zuckerman and Goin reported that the national average Medicaid-to-Medicare reimbursement rates ratio for primary care services fell from 66% in 2008 to 59% in 2012.[18] To help ensure sufficient access among Medicaid beneficiaries, the ratio was then increased to at least 100% in 2013 and 2014 following a provision under the ACA. However, this payment increase did not significantly change physician participation in Medicaid or Medicaid service volume.[19] Decker (2013) summarizes acceptance of new Medicaid patients (a commonly used indicator of access to care[20]) in 2011-12, reporting a non-acceptance rate of nearly 1/3, which was higher for primary care than for other specialties. Also, physicians in some states were significantly less likely than the national average to accept new Medicaid patients.[21]

According to estimates by Kaiser Family Foundation based on data from fiscal year 2013 MSIS (the Medical Statistical Information System, used by CMS to produce Medicaid program characteristics and utilization information for states), the aged dual-eligibles as a share of total aged Medicaid enrollees ranged from 60% in Wisconsin to 100% in Mississippi and South Carolina, with a national average of 92%.[22] These estimates show that the majority of Medicaid

beneficiaries over the age of 65 do obtain Medicare coverage, while the small percentage of people left might be ineligible for premium-free Part A based on insufficient work history. In previous literature, analysts have observed a significant increase in utilization of various types of health services upon Medicare enrollment for the previously uninsured.[1-3] For the near-elderly with Medicaid coverage, the direction of the change in health services use after transitioning to Medicare-only or dual coverage would depend on many factors, including the relative generosity of coverage, provider availability and quality of care provided. Moreover, the acquisition of dual coverage requires beneficiaries to navigate both insurance programs, which is a potential barrier to access to care.

Ensuring the continuity of care for the near-elderly population is particularly important because they face a large burden of chronic diseases, and forced insurance transition is very likely to disrupt their disease management. People ages 55-64 are at high risks of experiencing major health problems and incurring substantial medical costs. Delaying or forgoing needed care poses dangerous threats to their health which may result in even higher expenses at a later time. As safety-net providers receiving grants under Section 330 of the Public Health Service Act, federally qualified health centers (FQHCs) provide important access to primary care services for low-income patients, serving the medically underserved and offering affordable and high-quality care. As many uninsured people are expected to gain Medicaid coverage through Medicaid expansion under the ACA, some of them may seek care in FQHCs for lower out-of-pocket costs. Among these patients, the number of those who will age into Medicare will keep growing under current demographic trends. Individuals who have received care in FQHCs before gaining Medicare coverage may wish to continue seeking care in the same health centers, in consideration of continuity of care, physician familiarity, and geographic proximity. To inform

future decisions on funding for FQHCs, it is especially important to compare those who primarily use FQHCs versus other care settings on their utilization patterns, health outcomes and costs, as well as whether they keep visiting the same providers after the insurance transition and how it helps with ensuring continuity of care.

Looking to the future, both Medicaid and Medicare face a number of critical challenges in providing accessible, quality and affordable care to an aging population, while maintaining the financial security of these two programs for future generations. In fiscal year 2018, 10 states reported at least one Medicaid eligibility standard expansion (e.g., home and community-based services waivers), and 6 states implemented at least one eligibility standard restrictions (e.g., work requirements).[23] Policymakers have also proposed various changes to Medicare policies, including restructuring Medicare benefits and cost sharing, raising the eligibility age, and allowing people under age 65 to buy in to Medicare. President Biden proposed lowering the age of Medicare eligibility to 60 during the presidential campaign; it is not clear how this policy would affect the 14.5% (3 million) who have Medicaid coverage. As these possible changes are being considered and discussed, it is important to provide evidence on the accessibility, quality and costs of these two insurance programs, which may inform the potential effect of the proposed reforms on health care spending, as well as on access to affordable coverage and high-quality care for the vulnerable near-elderly population.

METHODS

We used national datasets of Medicaid and Medicare FFS claims linked together from 2011 to 2012 to examine changes in health services use and costs for Medicaid beneficiaries who aged into Medicare between February 2011 and December 2012 (both included). We restricted

the study population to those beneficiaries with full Medicaid benefits who became dual enrollees because they had turned 65, maintained full Medicaid and Medicare coverage (at least Part A) through December 2012, and had no date of death recorded in the Master Beneficiary Summary File (MBSF) - Base or in the Medicare Provider Analysis and Review (MedPAR) File, 2011-2012. Our study excluded beneficiaries who had multiple enrollment records from different states, could not be linked between Medicaid and Medicare enrollment information, had a Medicare Advantage plan (i.e., HMO) for any month during the two years, started Medicare coverage before 2011, or whose original reason for Medicare entitlement was disability or end-stage renal disease.

Because Medicare enrollment is primarily determined based on whether age exceeds 65, we used a regression discontinuity design (RDD) to identify the causal effect of Medicare enrollment at age 65. This method has been commonly used in empirical research on effects of policy changes, which often arise from administrative decisions.[24] Assuming enrollment into Medicare at 65 cannot be manipulated, whether someone near the "cutoff" falls above or below is essentially random. Thus, RDD mimics a randomized experiment and balances both observed and unobserved differences between those who just obtained Medicare coverage when they turned 65 and those who did not. Any discontinuity in utilization and cost at the month of transitioning from Medicaid-only to dual coverage can be attributed to the treatment effect of Medicare enrollment near the transition.

Key Variables

Treatment variable:

Using the MBSF Base, we narrowed down our sample population to beneficiaries who became eligible for Medicare coverage (COVSTART) in any of the months between February 2011 and December 2012 (both ends included as post-transition months). For the main analysis using sharp RDD, we define treatment as the first occurrence of Medicare enrollment due to age as indicated by the Medicare status code monthly variables (MDCR_STUS_CD_01-12) with a value of 10 – aged without end-stage renal disease. This variable is coded from age, original and current reason for entitlement, as well as the ESRD indicator contained in the enrollment data base.

If there had been imperfect compliance, which means the cutoff may not exactly determine assignment to treatment but creates a discontinuity in the probability of receiving treatment, using a Fuzzy RDD approach would give an estimate of the Local Average Treatment Effect (LATE). For units close to c, we could use age as an instrument for Medicare enrollment and use Two-Stage Least Squares (2SLS) to estimate this effect for compliers (those who enroll in Medicare upon turning 65). However, in Medicare enrollment data files, there is a clear indicator of the exact coverage start date for each person, and non-compliers (those who do not enroll in Medicare upon turning 65) would not exist in the data. Thus, a sharp RDD approach is possible and is the approach we adopt.

Based on the monthly Medicare-Medicaid dual eligibility code (DUAL_01-12), we restricted our transition population to those who obtained Medicare coverage while keeping full Medicaid coverage (value = 02, 04, or 08). In order to estimate the effect of Medicare initiation holding constant the level of Medicaid benefits, we only considered “full duals” after age 65.

Running variable (forcing variable):

For our main analysis, we define the running variable as time in months relative to the month of transitioning to Medicare, which ranges from -24 to 24. For regression analyses, we used a 6-month bandwidth pre/post the transition as a starting point.

Dependent variables:

We constructed daily and monthly health care utilization and cost outcomes as count and proportion of beneficiaries for binary outcomes, or average amount for continuous outcomes such as length of stay and Medicare + Medicaid total costs, using the following key variables and algorithms:

	Variable in MAX (IP, OT)	Variable in Medicare FFS (MedPAR, OP, Carrier)
Dates of admission/service	ADMSN_DT (IP) SRVC_BGN_DT (IP, OT) SRVC_END_DT (IP, OT) TYPE_CLM_CD = "1", "A"	ADMSN_DT (MedPAR) DSCHRG_DT (MedPAR) CLM_FROM_DT (OP, Carrier) CLM_THRU_DT (OP, Carrier)
Hospitalization	MAX_TOS = 01, 24, 25, 39 (IP)	CLM_TYPE = 60 (MedPAR)
Potentially preventable admission	Prevention Quality Indicators defined by Agency for Healthcare Research and Quality[25] (2010 version)	
Marker admission (Admission due to "marker conditions" as initially defined by Billings et al[26]:)	Condition and ICD-9-CM Code(s)[1]	Notes
	Appendicitis with appendectomy [540, 541, 542]	With principal procedure of 47.0 or 47.1
	Acute myocardial infarction [410]	Only cases with LOS > 5 days or disposition of death
	Gastrointestinal Obstruction [560]	
	Fracture hip/femur [820]	Age 45+ only
Emergency room visit[27,28]	UB_92_REV_CD_GP_1-23 = 450, 451, 452, 459, 981[2] (IP); UB_92_REV_CD = 450-459, 981 or PRCDR_CD = 99281-285, 99288 or PLC_OF_SRVC_CD = 23 (OT)	REV_CNTR = 0450-0459 (Emergency room) or 0981 (Professional fees-emergency room) (OP) ER_CHRG_AMT > 0 (MedPAR)

[1] Where only three digits are listed, all diagnoses at the 4th and 5th digit should be included. All diagnoses refer to principal diagnosis, unless otherwise specified.

[2] Note: Some states use other state-specific reimbursement method for ED visits so that very few or no ED visits will be identified with the UB-92 revenue codes commonly used to bill for ED services in most states.

Primary care utilization – preferred (follows HRSA's Medicare claims criteria for selection of primary care visits)	MAX OT File [a AND (b OR c &d) AND e] OR (f & g & h & i): a) Provider Taxonomy Code in the list for *non-individual* PCPs (FQHC or RHC) b) Place of Service: FQHC or RHC c) MSIS Type of Program: RHC or FQHC d) Type of Service: Clinic e) UB-92 Revenue Code for Clinics *OR* f) Provider Taxonomy Code in the list for *individual* PCPs g) Place of Service: Office, Outpatient Hospital, FQHC or RHC h) Type of Service: Physicians, Outpatient hospital, Nurse Midwife, or Nurse Practitioner services i) Procedure codes for E&M	Medicare OP File (a *AND* b *AND* c): a) Provider Number in the range for FQHC or RHC b) Type of Facility/Service for Clinic-FQHC or Clinic-Rural Health c) Revenue Center Code for Clinics Medicare Carrier File (a *AND* b *AND* c): a) Any primary care provider specialty as above, adding 70-multispecialty clinic or group practice b) Place of Service in Office, Outpatient Hospital, FQHC or RHC c) Procedure codes for E&M
Primary care utilization – broad (follows Mukamel's definition)	MAX OT File: A claim is considered to be for primary care service based on (either a OR b): a) Adapted UCI Method: place of service, type of service, and provider taxonomy code combined *OR* b) Adapted Gurewich qualifying FQHC-type claim Method (also same as HRSA's PC definition for Carrier File - Procedures[29]): procedure codes for E&M (Evaluation and Management): 99201 – 99205 99211 – 99215 99381 – 99387 99391 – 99397 HCPCS T1015 (FQHC all-inclusive)	Medicare OP File (a *AND* b *AND* c, same as above): a) Provider Number in the range for FQHC or Rural Health Center b) Type of Facility/Service for Clinic-FQHC or Clinic-Rural Health c) Revenue Center Code for Clinics Medicare Carrier File: A provider is considered to be a primary care provider if • For physicians, they had a specialty of 01-general practice, 08-family practice, 11-internal medicine, 37-pediatrics, or 38-geriatrics; *OR* • For nonphysicians, they had a specialty of 50-nurse practitioner, 89-certified clinical nurse specialist, 97-physician assistant; *AND* The provider had at least one claim with an E&M code[3] (same list as on the left + G0402 Welcome to Medicare visit). If at least one claim for a provider met this criterion, all claims for the provider were assumed to be primary care claims.
Total cost	MDCD_PYMT_AMT	PMT_AMT

[3] CPT codes in Mukamel 2016: in the office (99201- 99215), in a nursing facility (99304-99340), or in the patient's home (99341- 99350). Mukamel's E/M CPT codes for Medicare is broader. To make our analyses on the MAX and Medicare claims comparable, we chose not to include CPT codes for services in a nursing facility or patient's home.

Model Specifications

Main analysis (with polynomial fit of order 2 as an example):

$$y = \beta_0 + \beta_1 PostTrans + \beta_2 MonthsFromTrans + \beta_3 MonthsFromTrans^2 + \beta_4 MonthsFromTrans * PostTrans + \beta_5 MonthsFromTrans^2 * PostTrans + \varepsilon,$$

y: outcome of interest
β_1: average treatment effect at the month of transition
$MonthsFromTrans$: months relative to the transition (forcing/running variable)
$PostTrans$: treatment indicator $= \begin{cases} 0 \; if \; MonthsFromTrans < 0 \\ 1 \; if \; MonthsFromTrans \geq 0 \end{cases}$
ε: error term

For robustness checks, we tested the assumption that any observed changes in outcomes around the time of transition would most likely be associated with the change in coverage status by examining admissions due to "marker conditions" as defined by Billings et al.[26] Because these conditions require urgent care and are generally believed to be access-insensitive, we would expect minimal variability in rates of marker admissions around the transition in coverage status. In addition, we conducted falsification tests using a cohort of Medicaid beneficiaries who also turned 65 between 2011-2012 but became dually eligible prior to 2011 because of disability. For both inpatient and outpatient services, the utilization patterns shortly before and after their 65th birthday shouldn't change. Other sensitivity analyses involved alterations in defining the outcome measures (e.g. primary care services) given a lack of consensus in the literature and differences in data structure of Medicaid and Medicare claims, and alterations in model specifications. Results from these robustness checks/sensitivity analyses are included in the Appendix.

Limitations

The biggest methodological challenge of this study is to smoothly measure outcomes across the two different datasets. Medicare is a national program administered by the federal government, so a uniform set of coding rules applies across the entire country. Medicaid is jointly funded by the federal and state governments, but each state manages its own program and is allowed to set its own eligibility criteria, covered services, and billing rules. The Medicaid data we have from 2011-2012 are in the Medicaid Analytic eXtract (MAX) file format, which were collected by each state's Medicaid agency and then converted into a national standard by CMS. Despite efforts to standardize the data, there is considerable variation between states in terms of completeness and accuracy of data fields. For example, there are inconsistencies in the use of coding systems for procedures by care setting. In Medicare claims, inpatient care is coded using ICD-9 procedure codes, physician/supplier and durable medical equipment data are coded using CPT/HCPCS codes, and hospital outpatient care is coded as a mix of CPT and revenue center (hospital billing center) codes. In MAX claims, ICD-9 codes are almost always used for IP procedures, while CPT/HCPCS codes are commonly used for OT services, but many states use state-specific codes for certain types of services. Outpatient hospital services and professional provider services are recorded in separate files (OP and Carrier) in Medicare claims, but they are all contained in the OT file in MAX. As a result of known and unknown differences in data structure, availability and quality between Medicare and Medicaid claims, any observed change at the transition could either reflect a legitimate change in utilization, an irreconcilable difference in how the outcome is measured, or partially both. Nevertheless, we have made every possible attempt to use analogous algorithms to identify outcomes in Medicare and Medicaid claims and performed various sensitivity analyses and robustness checks to test the validity of our findings.

To some extent, the quality of different variables varies because different types of care may be subject to different payment rules. If reimbursement rates are very low, some components of treatments provided may not be included in bills, and therefore not in the claims data. These possible sources of missingness lead to difficulties in capturing disease burden in claims data, making it hard to interpret whether differences in utilization reflect differences in access. To determine the reliability of a given data field, we consider the information to have better quality if the information impacts payment. However, because we look at utilization patterns for the same cohort of beneficiaries within a small time window, it is reasonable to assume no change in health status/disease burden for our study. This is an advantage of the regression discontinuity design.

Another limitation relates to the size of the population experiencing the transition from Medicaid to Medicare. Requiring individuals to be continuously enrolled in FFS Medicaid before age 65 and continuously enrolled in both programs with full benefits after 65 means anyone who experienced "churning" in Medicaid or joined managed care plans would drop out. For some small states, or for states that are predominantly managed care for Medicaid, the sample size of the transition population could be extremely small. To address this concern, we pool beneficiaries from all states and only conduct nationwide analyses. As a result of our fairly restrictive inclusion criteria, the results of our study may not be generalizable to Medicaid or dually eligible beneficiaries who are not continuously enrolled or have managed care plans.

There are also concerns regarding changes in confounding variables simultaneous with the change in insurance coverage. The common perspective that 65 is a traditional age of retirement raises a concern that the change in employment status and income level, two important enabling factors, might be contemporaneous with the transition from Medicaid to

Medicare beneficiaries for a large fraction of people. It could be argued that retired people may have less income to pay for health services, but more time available for more frequent visits to medical care providers. We would not be able to distinguish the true effect of Medicare initiation from changes in health services use due to retirement, if we cannot ascertain the starting point of retirement in claims data and adjust for it. However, according to data reported by the Social Security Administration, by far the most popular age for people to claim their Social Security is 62, which accounts for 34.3% of all Social Security recipients. Despite the prospects of receiving larger payments if willing to wait, 57% of people take their benefits before reaching full retirement age. Moreover, because only a small fraction of people would retire in exactly the month they turn 65, this is perhaps less of a concern. From results using two survey data sources reported in Card, Dobkin, and Maestas (2008), the estimated jumps in outcomes related to employment status are small and statistically insignificant.

RESULTS

Population Characteristics

Characteristics of beneficiaries who experienced the transition from Medicaid to dual enrollment are shown in Table 2.1. There were 53,912 beneficiaries in the full cohort, which we used to analyze inpatient services; after restricting to the 20% sampled Medicare beneficiaries who had both Parts A and B for all months under Medicare and FFS Medicaid for all months observed, the sample size was reduced to 3,973, which we used to analyze outpatient services and cost outcomes. By construction, all beneficiaries had roughly 12 months of observation both pre- and post-transition. Their mean age at the month of transition is exactly 65, as expected. About 60% of the transition population were female, and 51% were White (61% in the most

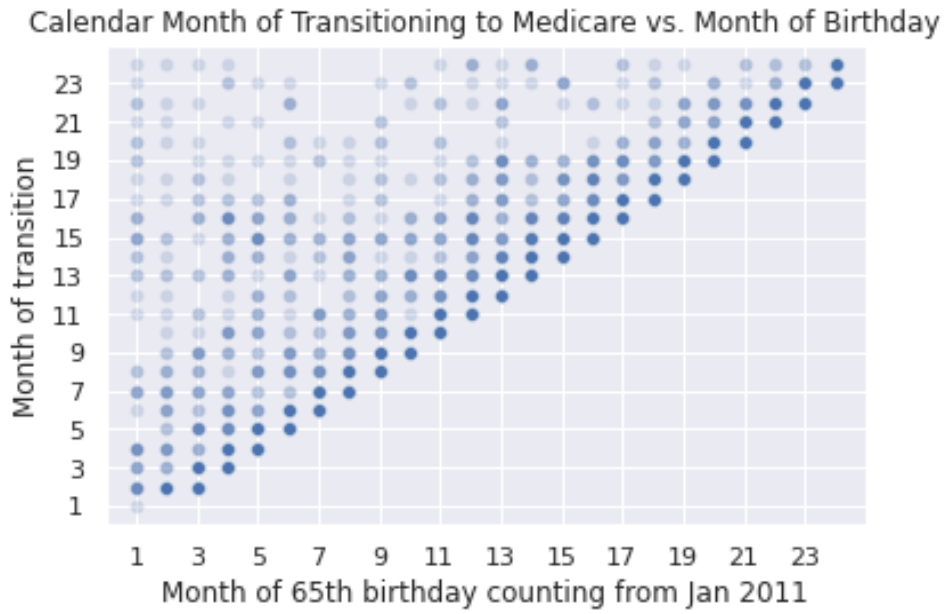
restricted sample). Only about 38% of the full cohort had FFS Medicaid for all months observed, and in fact, they had an average of 13 months enrolled in FFS Medicaid out of the 24 months, with almost 6 months before and 7.5 months after. Almost all beneficiaries (97%) in the full cohort had both Part A and Part B under Medicare for all months post-transition.

TABLE 2. 1 Characteristics of beneficiaries who transitioned from Medicaid to dual enrollment due to age in 2011-2012

	Full Cohort (n=53,912)	20% Sample Cohort (n=10,996)	20% Sample Cohort with both Parts A and B for all months under Medicare, FFS Medicaid for all months (n=3,973)
Number of months observed pre-transition, mean (SD)	12.6 (6.5)	12.6 (6.4)	11.2 (6.2)
Number of months observed post-transition, mean (SD)	11.4 (6.5)	11.4 (6.4)	12.8 (6.2)
Age at transition, mean (SD)	65.0 (0.1)	65.0 (0.1)	65.0 (0.1)
Female, n (%)	32,132 (59.6)	6,599 (60.0)	2,381 (59.9)
Race/ethnicity (RTI), n (%)			
Non-Hispanic White	27,722 (51.4)	5,597 (50.9)	2,403 (60.5)
Black	11,635 (21.6)	2,399 (21.8)	757 (19.1)
Hispanic	9,403 (17.4)	1,904 (17.3)	506 (12.7)
Asian/Pacific Islander	3,667 (6.8)	778 (7.1)	176 (4.4)
American Indian/Alaska Native	710 (1.3)	152 (1.4)	80 (2.0)
Other	239 (0.4)	56 (0.5)	19 (0.5)
Unknown	536 (1.0)	110 (1.0)	32 (0.8)
FFS Medicaid for all months observed, n (%)	20,449 (37.9)	4,124 (37.5)	3,973 (100.0)
Total number of FFS Medicaid months, mean (SD)	13.2 (10.2)	13.1 (10.2)	24.0 (0.0)
Number of FFS Medicaid months pre-transition, mean (SD)	5.7 (6.8)	5.7 (6.8)	11.2 (6.2)
Number of FFS Medicaid months post-transition, mean (SD)	7.5 (7.5)	7.4 (7.5)	12.8 (6.2)
Medicare Parts A and B for all months post-transition, n (%)	52,144 (96.7)	10,619 (96.6)	3,973 (100.0)
Total number of Medicare Parts A and B, mean (SD)	11.2 (6.6)	11.2 (6.5)	12.8 (6.2)

We examined the months when beneficiaries entered Medicare versus the months when they turned 65 and found that among beneficiaries who were born on the first of a month, 96.7% started Medicare the month before, as instructed by Medicare eligibility rule; 41 beneficiaries did not start Medicare the month before. For those who were not born on the first of a month, 98.8% started Medicare in their birthday month. Overall, 98.7% of beneficiaries correctly started Medicare in the month they were supposed to, based on birthday. As shown in Figure 2.1, for a great majority of the cohort indicated by the darker shade of the overlapped dots centered around the y=x line, the month of transition is either the month of the 65^{th} birthday or the month before. All dots away from the diagonal are in fact represented by only very few data points. Essentially, the 98.7% of beneficiaries are "compliers" - individuals whose coverage status changes as their age moves from just before 65 to just after 65. This high percentage of compliers obviated the concern that individuals with a stake in getting Medicare coverage might try to manipulate, or healthier individuals might delay their enrollment, such that observations on either side of the cutoff may not be comparable. It is therefore reasonable to use the date of Medicare enrollment in the MBSF file to determine treatment status.

FIGURE 2. 1 Calendar month of transitioning to Medicare versus month of the 65th birthday



All-Cause Hospital Admissions

We identified hospital admission claims from the 2011-2012 MAX IP and MedPAR files for our full cohort of beneficiaries who transitioned from Medicaid to dual enrollee due to age (n=53,912), after dropping those who had a date of death in the 2011-2012 MBSF or MedPAR files (n=686). The MAX IP and MedPAR do not contain any denied stays. MAX IP claims were restricted to those with MAX type of service being "inpatient hospital" (99.96%) and type of claim being "a current fee-for-service claim for medical services" (72.2%). MedPAR claims were restricted to those with NCH claim type being "inpatient claim" (84.8%). Emergency room (ER) visits were identified in MAX IP with UB-92 revenue codes in the range for ER (44.9%), and in MedPAR with a positive ER charge amount (65.5%). These claims indicate that the patient was admitted to the hospital through the ER, and we set them aside to be combined with ER visits identified in the outpatient data for separate analysis. There were a small percentage of

observation stays identified using the MedPAR Observation Switch based on revenue center code 0762 (5.1%) and analogously in MAX IP (1.9%) that we dropped. For the missing admission dates in MAX IP (0.7%), we filled them with the beginning date of service for the claim. We further dropped small numbers of claims with admission dates outside of 2011-2012, or with same admission dates for the same beneficiary (same-day admissions that were dropped had later ending dates of service, but payment amounts were kept and rolled up to the single claim left). Our final sample consists of 11,313 hospitalizations from MAX IP and 6,602 hospitalizations from MedPAR, out of which 2,835 admissions had a MAX IP claim that fell on the same day, which were likely supplemental payments made by Medicaid after Medicare had paid first. Among this transition cohort, 8,986 (16.7%) beneficiaries had at least one record of hospitalization in MAX IP or MedPAR.

Descriptive Graphs

FIGURE 2.2a Proportion of beneficiaries with hospital admissions within 6 months before and after the transition from Medicaid to dual enrollment

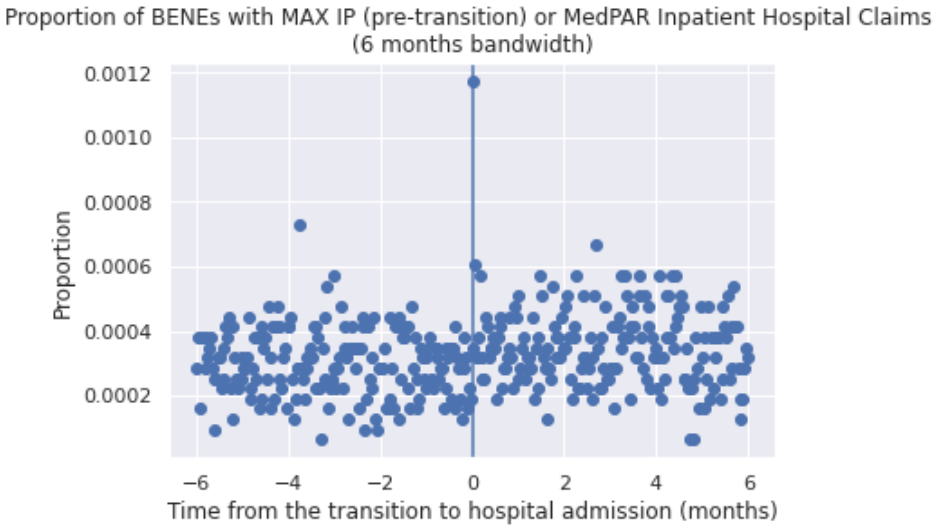
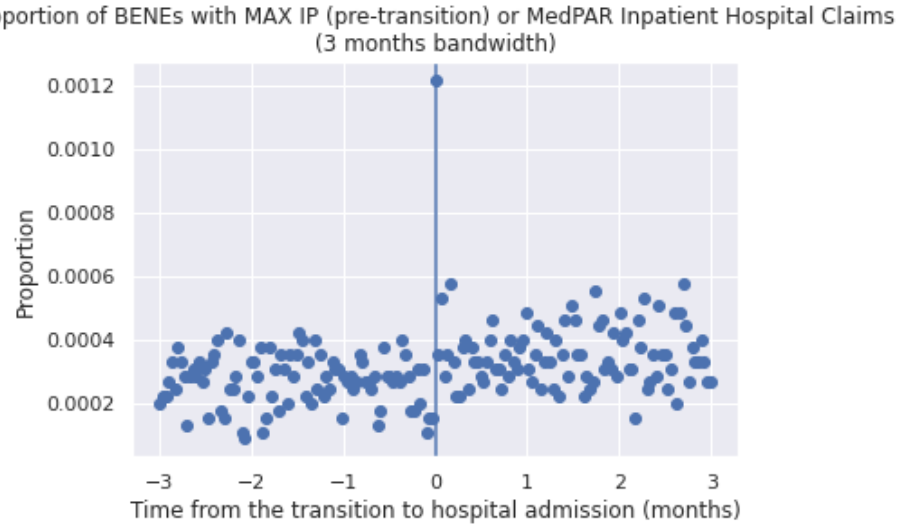


FIGURE 2.2b Proportion of beneficiaries with hospital admissions within 3 months (for sensitivity analyses) before and after the transition from Medicaid to dual enrollment



Regression Discontinuity Estimation

We plot binned sample means to trace out the underlying regression functions. Figure 2.3 and the rest of the figures in this chapter were constructed using local sample means (depicted as dots) over nonoverlapping bins partitioning a restricted support of the x-axis, with two smooth polynomial regression curves, for control and treatment units separately. These sample means provide an approximation of the population regression functions, and a visualization of the dispersion of the data, which could help detect other potential discontinuities away from the cutoff (as a form of a falsification test).

The primary outcome, daily percentage of beneficiaries with hospital admission, was modeled using a linear regression as outlined in the Model Specifications section. The secondary outcome, daily count of beneficiaries with hospital admission, was modeled using negative binomial regressions. Poisson models and negative binomial models are commonly used for

count outcomes. Results from likelihood ratio tests suggest an over-dispersion parameter of non-zero, so the negative binomial model is more appropriate than the Poisson model.

On an unadjusted basis, there were 0.006 percent more beneficiaries with hospital admissions after the transition. Our baseline model with a 6-month bandwidth and polynomial order of 2 estimated that the average treatment effect of Medicare enrollment was an increase of 0.012 percent ($p=0.007$) in hospital admission rate. This translates to 120 more admitted to the hospital per 1 million beneficiaries who experience the transition from Medicaid to dual enrollment. When modeling the change in count of admissions, the baseline model estimated an increase of about 4 admissions among this cohort of 31,482 beneficiaries who transitioned between July 2011 and July 2012. Despite differences in magnitude of effect, the increase in hospital admissions at the transition was consistently significant across different model specifications (Table 2.2).

FIGURE 2. 3 Percentage of beneficiaries with all-cause hospital admissions within 6 months before and after the transition from Medicaid to dual enrollment

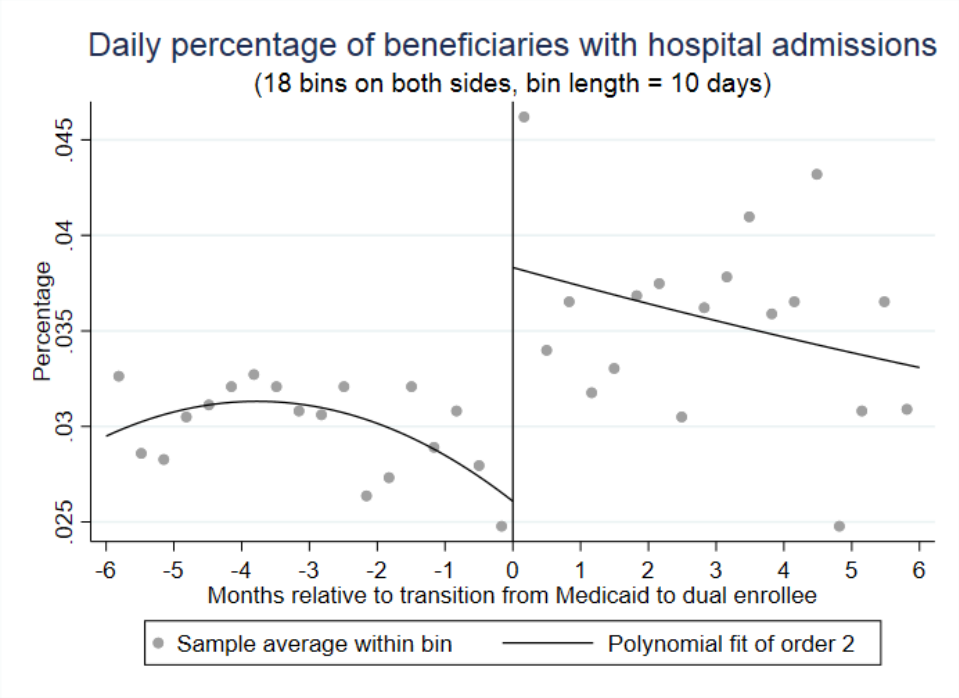


TABLE 2. 2 Hospital admissions before and after the transition from Medicaid to dual enrollment

				Adjusted difference			
	Pre-transition	Post-transition	Unadjusted difference	Baseline Model	Alternative Model 1	Alternative Model 2	Alternative Model 3
Specifications							
Bandwidth (months)				6	6	3	3
Polynomial order				2	3	2	3
Outcomes							
Daily percentage of cohort with hospital admissions	0.030	0.036	0.006	0.012 (p=0.007)	0.019 (p=0.014)	0.019 (p=0.011)	0.032 (p=0.024)
Daily count of cohort with hospital admissions*	9.445	11.208	1.763	3.946 (p=0.001)	5.983 (p<0.001)	5.763 (p<0.001)	9.965 (p<0.001)

*Adjusted difference presented is the average marginal effect of the transition.

Length of Stay

We examined length of stay of all hospital admissions for the same cohort of beneficiaries who transitioned from Medicaid to dual enrollment between July 2011 and July 2012 and thus have at least 6 months of observation before and after the transition. Figure 2.4 shows mean length of stay based on the admission date. Interestingly, the fitted quadratic curves show a surge in average length of stay right before the month of transition, which immediately drops down to pre-transition level after the transition. After examining the Medicare Claims Processing Manual, we noted that all software designed to process the claims actually uses the discharge date to analyze the bill. Therefore, it could be inferred that one possible explanation for this observation is that hospitals may keep admitted patients for a prolonged time until their stay can be covered by Medicare, with a higher reimbursement rate than Medicaid. As a result, hospital stays appeared to be prominently longer, as far as about 18 days in the 10 days right before the transition, just so that the discharge date extends past the Medicare enrollment date.

In regression analyses using the same RD approach, even though we observe a significant decrease in average length of stay for about 6 to 8 days at the transition (Table 2.3), this may not necessarily indicate a meaningful shortening of hospital stays. The observed difference might be largely driven by the outlier admissions within the last month in the pre-transition period.

We also plotted daily mean length of stay based on the discharge date and present it in the Appendix. In comparison with daily means based on admission dates, there were no exceptionally high data points that fell immediately before the transition when the x-axis was time from hospital discharge to the transition. The average level and variation in daily means remained relatively stable in the pre- and post-transition periods. However, we noted that in contrast to the reliable admission dates in both Medicaid and Medicare claims, the variable used

in the pre-transition period from Medicaid inpatient claims, ending date of service, may or may not be the discharge date. If the latest date of service related to some hospital stay was earlier than the unobservable actual discharge date, we would not be able to capture the true trend, if there was any.

FIGURE 2. 4 Mean length of stay for hospital admissions within 6 months before and after the transition from Medicaid to dual enrollment

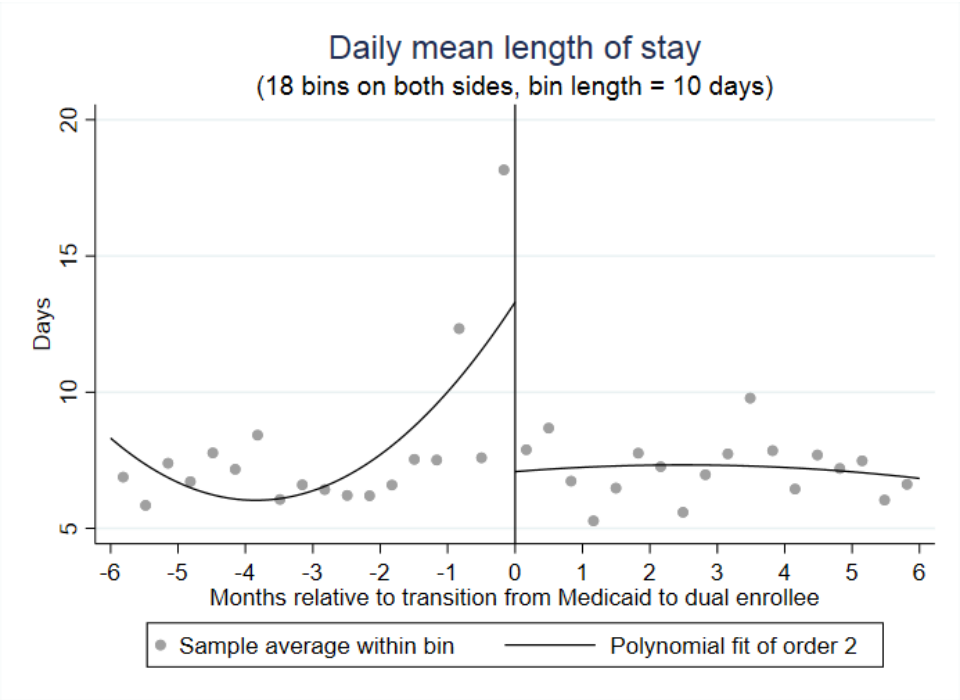


TABLE 2. 3 Length of stay for hospital admissions before and after the transition from Medicaid to dual enrollment

				Adjusted difference			
	Pre-transition	Post-transition	Unadjusted difference	Baseline Model	Alternative Model 1	Alternative Model 2	Alternative Model 3
Specifications							
Bandwidth (months)				6	6	3	3
Polynomial order				2	3	2	3
Outcome							
Average length of stay	7.845	7.200	-0.645	-6.221 (p<0.001)	-7.826 (p=0.001)	-7.485 (p=0.005)	-8.160 (p=0.021)

Potentially Preventable Hospital Admissions

Based on Prevention Quality Indicators (PQIs) defined by the Agency for Healthcare Research and Quality, we investigated the effect of Medicare enrollment for near-elderly Medicaid beneficiaries on hospital admissions that are potentially preventable. More details and results are presented in the Appendix.

Emergency Room Visits

From Medicare claims, we identified emergency room visits based on ResDAC guidance.[28] ER visits in Medicare are defined as hospital outpatient or inpatient claims with revenue center codes 0450–0459 (ER), 0981 (professional fees-ER) or MedPAR claims with an emergency room charge > $0. For Medicaid claims, because some facility and professional provider claims are in one file, we used a union of facility definition (based on revenue center or place of service) and provider definition (based on HCPCS codes) to fully capture ER claims in the MAX files. They could have a MAX place of service of ER in the OT file, UB-92 revenue codes indicating ER use in the IP or OT file, or ER procedure codes on physician claims in the OT file. According to ResDAC guidance, one can assume ER patients found in the inpatient data were admitted to the hospital, but cannot assume those found in the outpatient data were not admitted. Payments for one ER visit could be in either the Medicare OP or MedPAR, but not in both. Similarly for Medicaid, ER visits resulting in admission may not be in the OT file; instead, the payments may be found in the IP file.

Taking everything into account, our analyses identified an average of 0.084% of the cohort or a count of 26 beneficiaries who visited the ER per day before the transition, and an average of 0.107% or 34 beneficiaries with ER visits per day after the transition. The trend in ER

visits shows a gradual increase in ER visits around the month of the transition, which continued to rise in the first 2 months post-transition (Figure 2.5). We did not find Medicare initiation to have a significant effect on ER visits that is robust across all alternative models (Table 2.4).

FIGURE 2. 5 Percentage of beneficiaries with emergency room visits within 6 months before and after the transition from Medicaid to dual enrollment

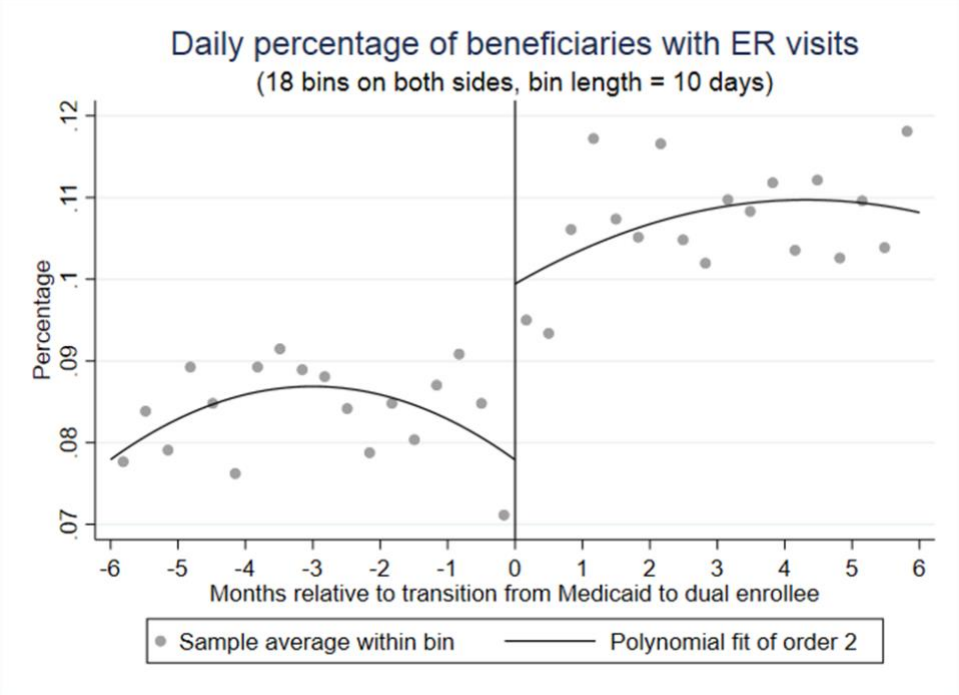


TABLE 2. 4 Emergency room visits before and after the transition from Medicaid to dual enrollment

				Adjusted difference			
	Pre-transition	Post-transition	Unadjusted difference	Baseline Model	Alternative Model 1	Alternative Model 2	Alternative Model 3
Specifications							
Bandwidth (months)				6	6	3	3
Polynomial order				2	3	2	3
Outcomes							
Daily percentage of cohort with ER visits	0.084	0.107	0.023	0.022 (p=0.111)	3.841 (p=0.112)	0.011 (p=0.047)	0.021 (p=0.015)
Daily count of cohort with ER visits*	26.418	33.710	7.293	7.287 (p<0.001)	4.453 (p= 0.061)	4.039 (p=0.107)	7.700 (p=0.025)

*Adjusted difference presented is the average marginal effect of the transition.

Primary Care Utilization

We reviewed the literature on primary care use in claims data and experimented with various definitions of primary care with our Medicaid and Medicare claims. Our preferred definition of primary care visits was based on a set of fairly restrictive criteria first established by Goodman et al. (2003) using Medicare claims, further refined by HRSA and widely used in the literature. As described in detail in the Key Variables section, we included ambulatory visits at offices, hospital outpatient departments, rural health clinics, and federally qualified health centers, rendered by physician and non-physician primary care providers, with Procedure codes for Evaluation and Management. For MAX claims, we mimicked these criteria as closely as possible using data fields available, to selected both facility claims and professional provider claims analogous to what constitute primary care encounters in Medicare OP and Carrier claims. From the 3973 transitioning beneficiaries who were selected in the 20% Medicare sample who had FFS Medicaid for all months and both Medicare Part A and Part B after the transition, our final analytic dataset included 2496 beneficiaries who transitioned between July 2011 and July 2012, to allow for at least 6 months of observation before and after the transition.

Figure 2.6 shows the trend in daily percentage of beneficiaries who had a primary care visit within 6 months before and after Medicare enrollment. Prior to the transition, about 0.5% of Medicaid beneficiaries had primary care visits on a daily basis; receiving Medicare coverage abruptly increased the percentage to about 1.3%, which remained fairly stable within 6 months post-transition. In adjusted analyses, there was an increase of about 0.7% (7 per thousand) or a count of 19 more beneficiaries with primary care visits at the time of transition, and this effect was robust across alterations in model specifications at the $p = 0.001$ level (Table 2.5).

FIGURE 2. 6 Percentage of beneficiaries with primary care visits within 6 months before and after the transition from Medicaid to dual enrollment

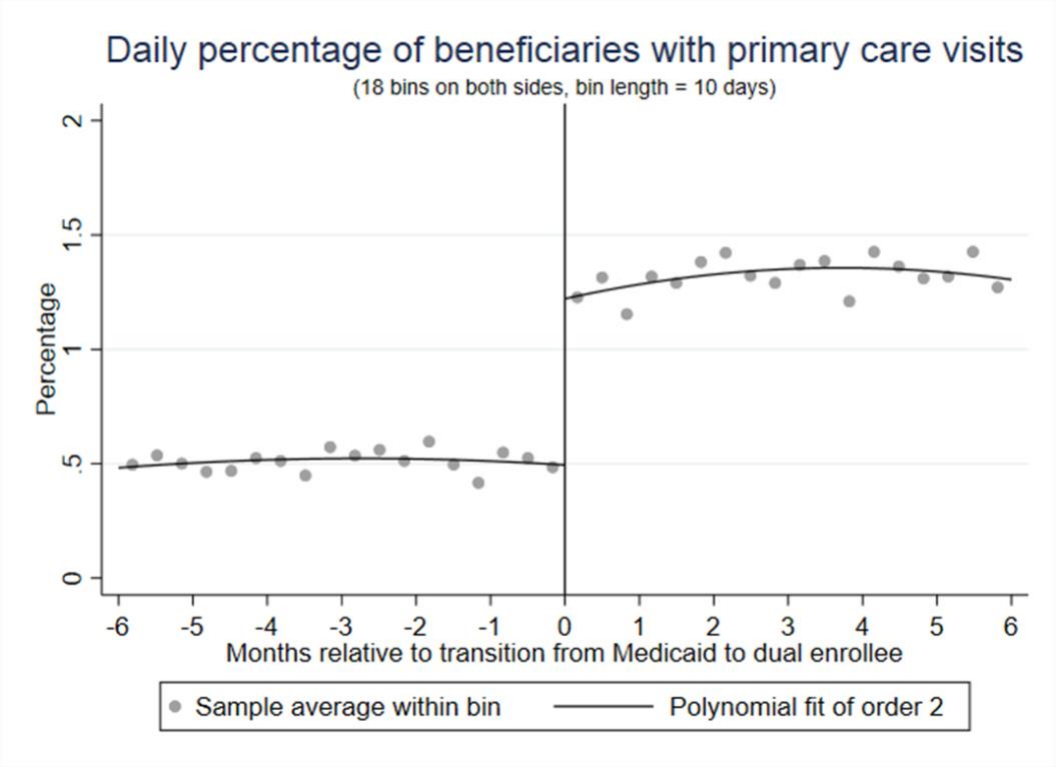


TABLE 2. 5 Primary care visits before and after the transition from Medicaid to dual enrollment

				Adjusted difference			
	Pre-transition	Post-transition	Unadjusted difference	Baseline Model	Alternative Model 1	Alternative Model 2	Alternative Model 3
Specifications							
Bandwidth (months)				6	6	3	3
Polynomial order				2	3	2	3
Outcomes							
Daily percentage of cohort with primary care visits	0.511	1.322	0.810	0.727 (p<0.001)	0.744 (p<0.001)	0.691 (p<0.001)	0.730 (p<0.001)
Daily count of cohort with primary care visits*	12.764	32.989	20.225	19.218 (p<0.001)	20.227 (p<0.001)	18.607 (p<0.001)	18.654 (p<0.001)

*Adjusted difference presented is the average marginal effect of the transition.

DISCUSSION

To our knowledge, we have conducted the first study to estimate the impact of transitioning from Medicaid-only to dual coverage on health services use and spending using claims data from a national sample of continuously enrolled beneficiaries. We used a unique regression discontinuity design to provide causal estimates of changes at the cutoff when Medicaid beneficiaries obtain Medicare coverage at age 65. This allowed us to control for any unobserved differences in the characteristics of beneficiaries in the pre- and post-transition periods, and to attribute any changes in outcome to Medicare enrollment. We found significant discontinuities in several key outcomes at the transition, in particular, hospital admissions and primary care visits. Notably, there is no evidence of a reduction in utilization in any service category that we examined. Average length of stay for hospital admissions experienced a transient increase in the month immediately before the transition, but returned to the pre-transition level as soon as Medicare became the primary payer. Other significant increases we observed were all sustained until at least 6 months after the transition. Additional research is needed to assess the long-term effect following the transition from Medicaid-only to dual coverage.

Findings from this study add to the existing evidence on the effects of Medicare enrollment at age 65. Studies in the past have examined individuals who were previously uninsured or covered by private insurance, which account for the majority of the near-elderly population. These studies have shown that, after gaining Medicare coverage, previously uninsured adults substantially increased their use of clinical services, and those with cardiovascular disease or diabetes had 1.2 times greater biennial odds of hospitalization, and 51% higher total medical expenditures than did previously insured adults.[30,31] Among a national

cohort of privately insured individuals who switched to Medicare at age 65, it was found that spending decreased by 32.4%, and that there was no change in the volume of services.[32] However, research has been lacking on what happens to near-elderly Medicaid beneficiaries as they age into Medicare. This particularly vulnerable population constitutes about 14.5% of the US population aged 60-64[33], which represents a larger proportion than the uninsured and differs from the uninsured and the privately insured population on many measures, including race/ethnicity, income level, health status, and health care seeking behaviors.

Using a restricted cohort of Medicaid beneficiaries who transitioned to dual enrollment due to age, we observed a pre-transition average daily rate of 300 hospitalizations per million such individuals, and an adjusted difference of 120 more per million daily due to Medicare enrollment at age 65. According to another study examining Medicare beneficiaries aged 65 or older (with a mean age of 74.7) who enrolled in fee-for-service for at least 1 month, the total number of hospitalizations per 100,000 person-years was 26,930 in 2013.[34] This translates to about 738 hospitalizations per million person-days, only 6 times as many as our adjusted effect of 120 more per million. This comparison with the background hospitalization rate suggests that the magnitude of our estimated Medicare effect on hospitalization rate is significant, especially as it pertains to an especially vulnerable population.

There are several potential explanations for the observed increases in hospital admissions and primary care visits. First, the trend in increased utilization after Medicare initiation is consistent with the common understanding that compared to Medicaid benefits, dual coverage would improve the generosity of physician reimbursements and covered services, which expands access to care. In anticipation of this expanded access and potentially better quality of care, patients may choose to wait until Medicare coverage starts if their care needs are not urgent. This

theory of pent-up demand may explain the findings in primary care visits and admissions for elective procedures. Second, there could be potential strategic recording of enrollment, admission and service beginning dates by hospital administrative staff. It has been reported that hospitals retroactively enroll admitted patients into Medicare, which pays facilities at higher rates relative to Medicaid. As a consequence, more admissions appeared to occur after Medicare coverage started. Although only seen in two of the alternative model specifications, the rise in ER visits under dual coverage might be harder to interpret, because surveys have shown that Medicaid patients are much more likely than Medicare patients to visit the ER.[35] Higher rates of ER use among Medicaid patients are usually associated with limited access to primary care providers and worse health status. It could be argued that the increase in ER visits we observed could be attributable to switching to a new primary payer which possibly disrupted access, and the uptick is only temporary. Furthermore, there is also a possibility that more primary care leads to higher likelihood of identifying severe conditions, which results in immediate hospitalizations and/or ER visits. Nevertheless, we might expect the better primary care access under dual coverage to take effect and reduce avoidable hospitalizations and ER visits over a longer period.

Despite limitations as discussed in the Methods section, our findings have important policy implications. First, the increase in health service utilization as people transition from Medicaid-only to dual enrollment supports the expectation that having Medicare as the primary payer improves access to care. Second, it provides insights into the potential impact of changing the age of Medicare eligibility proposed by policymakers. Lowering the eligibility age to 60 may reduce some delays in care-seeking that could be more costly later on, but it would also likely increase rates of hospital admissions and primary care visits for a younger age group, leading to higher government spending on health care. However, it is highly possible that early enrollment

in Medicare would only have a short-term impact, and greater access to primary care at a younger age could be beneficial to both the patients and the entire healthcare system beyond the few years after the transition. Additional research should further investigate service utilization patterns, health consequences and patient satisfaction on transitioning from Medicaid-only to dual coverage in the long run.

CHAPTER 3

THE IMPACT OF MEDICARE ENROLLMENT FOR NEAR-ELDERLY MEDICAID BENEFICIARIES ON CHOICE OF PROVIDER

ABSTRACT

Our previous study found that transitioning from Medicaid to dual Medicare-Medicaid enrollment at age 65 leads to increases in rates of hospital admissions and primary care visits. As coverage expands and utilization grows, the availability of health care providers to meet the needs of new Medicare patients and the patients' choice of providers remain unclear. Continuity of care is especially critical for patients with multiple chronic diseases, who usually require complicated care coordination. Using primary care and hospital admission claims for continuously enrolled fee-for-service Medicaid beneficiaries who transitioned to dual enrollment at age 65 between 2011 and 2012, we assessed continuity of care by examining the number of unique providers, average provider caseload, and percentage of patients served by the same provider 6 months before and after the transition. Compared to the number of unique primary care providers (PCPs) serving the cohort with Medicaid only, the number almost doubled after the same cohort transitioned to dual status and had at least one more primary care visit. Meanwhile, each PCP saw more patients after the transition. For hospital admissions, among those who were admitted both before and after, we observe more unique hospitals post-transition, but each hospital admitted fewer patients. Switching providers after the transition was fairly common: 45% for PCPs and 51% for hospitals. These numbers are in line with our hypothesis that having dual coverage is associated with wider access to inpatient care and primary care providers, which may reflect unmet need under Medicaid coverage.

BACKGROUND

Continuity of care is a cornerstone of primary care practice, and is especially critical for patients with multiple chronic diseases, who usually require a complicated system of care coordination and are more likely to experience fragmented care.[36] Administrative claims have been used to describe continuity patterns and evaluate care coordination programs.[37,38] Researchers have developed a number of techniques to identify and evaluate a patient's primary care provider.[39,40]

Chapter 2 of this dissertation focused on health services utilization as an indicator of access to and quality of care. However, as coverage and utilization increase, the availability of health care providers to meet the needs of newly insured patients is questionable. It has been previously reported that almost 90% of general physicians accept new patients with private insurance, while less than 75% accept those with public coverage.[8] Finding a provider who accepts Medicaid or Medicare may be especially difficult for some regions in the country. According to Medicare Payment Advisory Commission's Report to the Congress, Medicare seniors have more trouble finding a new doctor when looking for a primary care physician compared with a specialist. Among the small share of Medicare seniors (7%) who said that they looked for a new primary care physician in 2013, 28% reported a problem finding one.[41] Comparing Medicaid with Medicare acceptance, physicians were even less likely to accept new Medicaid patients (74.3%) than those with Medicare (87.8%), which has been consistent across specialties and over time.[42] Given the relatively higher physician acceptance rate among new patients with Medicare compared to those with Medicaid, we would expect beneficiaries to see more physicians as a wider range of selection becomes available with Medicare coverage.

In this study, we provide descriptive statistics to characterize short-term switching behavior when Medicaid beneficiaries obtains Medicare coverage at age 65 and become dually eligible. We discuss how this could reflect both a change in the supply of primary care and inpatient care providers and a change in patient action in the face of more choices.

METHODS

We used a national dataset of Medicaid and Medicare FFS claims linked together from 2011 to 2012 to examine changes in providers that served Medicaid beneficiaries who aged into Medicare between February 2011 and December 2012 (both included). As in Chapter 2, we restricted the study population to beneficiaries with full Medicaid benefits who transitioned to dual enrollment status because they had turned 65, maintained full Medicaid and Medicare coverage (at least Part A) through December 2012, and had no date of death recorded in MBSF - Base or MedPAR, 2011-2012. Our study excluded beneficiaries who had multiple enrollment records from different states, who could not be linked between Medicaid and Medicare enrollment information, who had a Medicare Advantage plan (i.e., HMO) for any month during the two years, who started Medicare coverage before 2011, and whose original reason for Medicare entitlement was disability or end-stage renal disease.

For primary care claims, we examined: 1) the number of unique individual providers, 2) the average provider caseload, and 3) percentage of patients served by the same PCP pre/post-transition. For comparability between Medicaid and Medicare claims, we had to rely on NPIs as opposed to state-assigned identification numbers. We use NPIs from MAX OT claims when the taxonomy code is in a confirmed list of PCP types (same as in Chapter 2), and use performing physician NPIs in the Medicare Carrier Line File. Unique providers are identified as unique

individual NPIs on MAX OT or Medicare Carrier claims observed in the 6-month pre- and post-transition periods. Average provider caseload is calculated as the number of primary care claims divided by the number of unique individual NPIs. The third outcome was assessed among patients who had at least one primary care claim with non-missing individual NPIs both pre- and post-transition (N=538). For the main analysis, patients served by the same PCP was determined based on whether the patient's preferred PCP, defined as the NPI responsible for the highest total payment amount aggregated from the patient's primary care claims, remained the same pre- and post-transition. Ties were broken based on the earliest service beginning date or claim from date in the pre- and post-transition period separately. For secondary analysis, to characterize the switching behavior using a moving reference, for each visit, patient served by the same PCP was determined based on whether the subsequent claim had the same individual NPI as the patient's last-seen PCP.

Similarly, for inpatient hospital claims, we examined: 1) the number of unique institutional providers, 2) the average hospital caseload, and 3) percentage of patients served by the same hospital pre/post-transition.

RESULTS

Primary Care Providers

For the sample of 1435 Medicaid beneficiaries who transitioned to dual enrollment due to age, maintained full benefits on FFS, and had at least 6 months of observations before and after, we identified 2286 primary care claims in the 6 months pre-transition, and 4610 primary care claims post-transition. There were 940 unique PCPs serving Medicaid beneficiaries in the pre-transition period, and 1784 unique PCPs serving dual enrollees in the post-transition period,

representing an 89.8% increase. In terms of average provider caseload, the mean number of primary care claims per PCP was 2.43 for Medicaid enrollees, and 2.58 for dual enrollees. These correspond to 0.75 patients per PCP pre-transition, and 1.35 patients per PCP post-transition, representing an 80% increase (Table 3.1).

TABLE 3. 1 Change in primary care providers within 6 months before and after the transition from Medicaid to dual enrollment

	Pre-transition	Post-transition	Unadjusted difference
Unique providers	940	1784	844 (89.8% ↑)
Average provider caseload	0.75	1.35	0.60 (80.0% ↑)
Switching to new PCP	reference	45.2%	

There were 538 transitioning beneficiaries who had professional primary care claims both in the 6-month pre-transition and post-transition periods, with a total of 4022 claims (1848 pre-transition and 2174 post-transition). The number of primary care claims per patient ranged from 2 to 40, and most patients had around 3 to 7 claims. Because our sample size is small, for the pre- and post-transition period separately, we attributed each patient to the PCP with the most Medicaid and Medicare total spending, which is a modified version of the usual provider of care, a common metric of continuity of care.[43] We found that 45.2% of the beneficiaries switched to a different PCP after they transitioned to dual enrollment (Table 3.1). In secondary analysis conducted among primary care claims starting from the second encounter for each beneficiary, when the last-seen PCP was used as the reference, 34.96% of the services were furnished by a new PCP, with 33.28% pre-transition and 35.97% post-transition. To further characterize the trend in switching rates and look for any discontinuities at the cutoff, we plot the daily

proportions against the number of months relative to the transition in Figure 3.1, and binned average proportions with fitted quadratic curves in Figure 3.2. Within our observation period of 6 months before and after the transition, there was no clear evidence of a significant change in the proportion of primary care provided by a new PCP near the transition in coverage, other than a weak downward trend possibly driven by extreme observations to the far left. This suggests that although switching to another PCP after gaining Medicare coverage is fairly common, the switching rate did not significantly increase as a result of the transition, which would have occurred close to the transition month.

FIGURE 3. 1 Proportion of primary care performed by a new provider within 6 months before and after the transition from Medicaid to dual enrollment

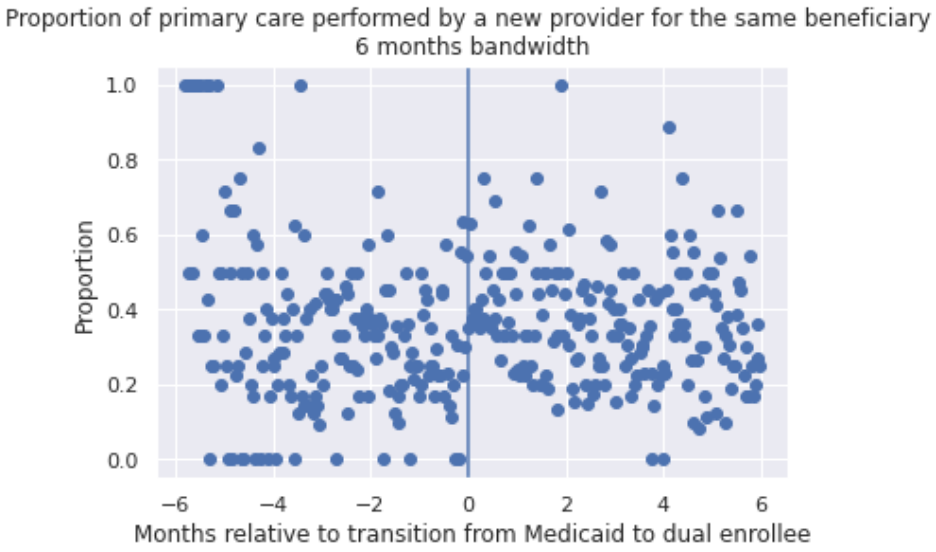
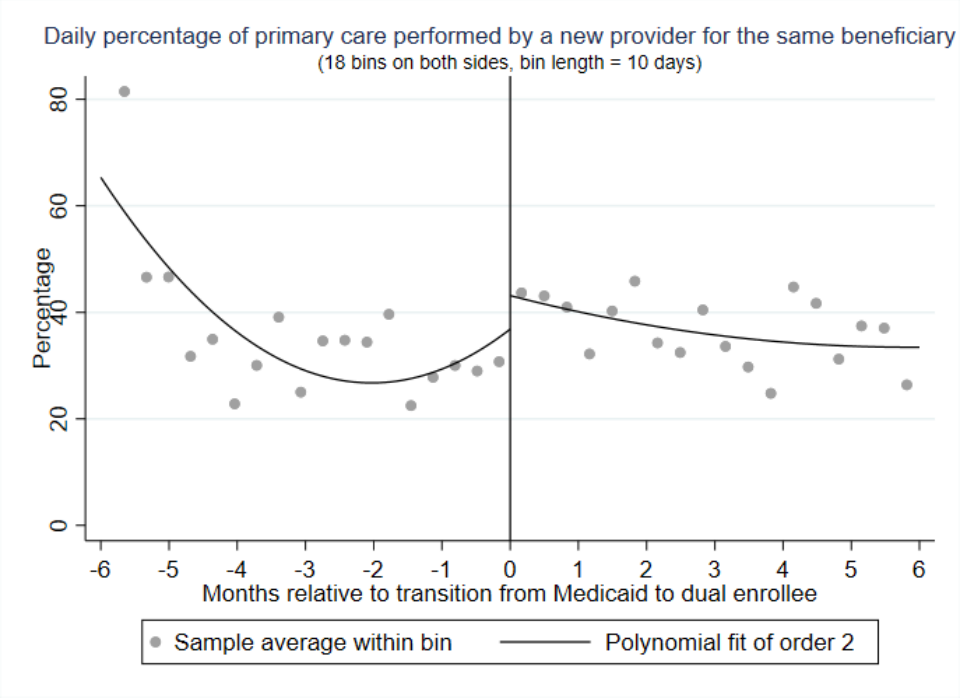


FIGURE 3. 2 Percentage of primary care performed by a new provider within 6 months before and after the transition from Medicaid to dual enrollment



Inpatient Hospital Providers

For the same sample of 31482 Medicaid beneficiaries who transitioned to dual enrollees due to age, maintained full benefits on either managed care or FFS, and had at least 6 months of observations before and after, we identified 1689 hospital admission claims in the 6 months pre-transition, and 2085 hospital admission claims post-transition. Based on institution/organization NPI, there were 812 unique hospitals serving Medicaid beneficiaries in the pre-transition period, and 1244 unique hospitals serving dual enrollees in the post-transition period, representing a 53.2% increase. On average, the number of admissions occurred in each hospital was 2.08 among Medicaid enrollees, and 1.68 for dual enrollees, representing a 19.2% decrease (Table 3.2).

TABLE 3. 2 Change in hospitals for inpatient care within 6 months before and after the transition from Medicaid to dual enrollment

	Pre-transition	Post-transition	Unadjusted difference
Unique providers	812	1244	432 (53.2% ↑)
Average provider caseload	2.08	1.68	-0.40 (19.2% ↓)
Switching to new hospital	reference	50.9%	

There were 237 transitioning beneficiaries who had hospital admissions both in the 6-month pre-transition and post-transition periods, with a total of 758 hospitalizations (399 pre-transition and 359 post-transition). Number of admissions per patient ranged from 2 to 20, and 49% of the patients had only two admissions. Compared to the previous hospital each patient was admitted to, 50.9% of the subsequent admission was to a different hospital (Table 3.2). In secondary analysis, we plot the daily proportions against the number of months relative to the transition in Figure 3.3, and binned average proportions with fitted quadratic curves in Figure 3.4. Because of the sparseness of the hospitalization data, we observe no clear pattern of switching hospitals near the transition in coverage, and we are not able to attribute any observed difference between the pre/post-transition periods to the effect of dual enrollment.

FIGURE 3. 3 Proportion of admissions occurred in a new hospital within 6 months before and after the transition from Medicaid to dual enrollment

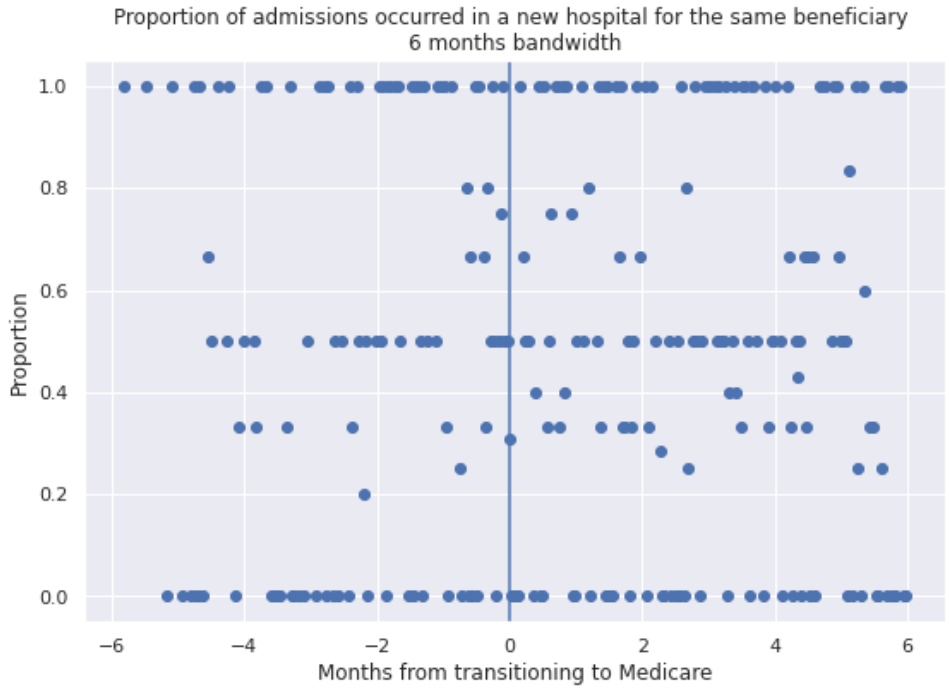
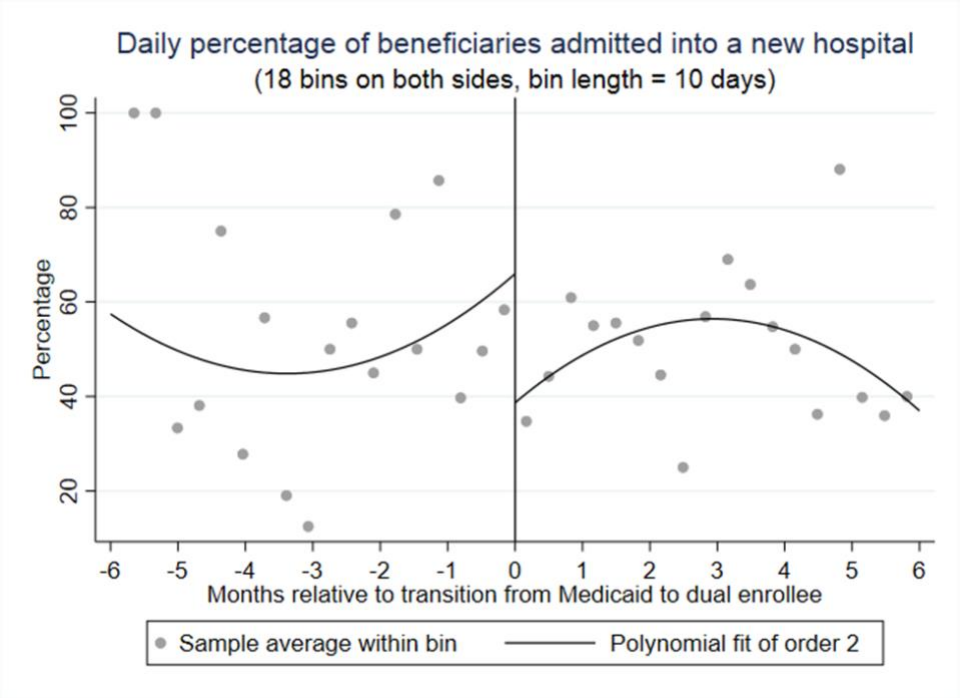


FIGURE 3. 4 Percentage of admissions occurred in a new hospital within 6 months before and after the transition from Medicaid to dual enrollment



DISCUSSION

From a small sample of continuously enrolled near elderly FFS Medicaid beneficiaries, we observed a nearly 90% increase in the number of PCPs serving this cohort upon obtaining dual coverage. At the same time, the average number of patients per PCP increased by 80%. These numbers support our hypothesis that transitioning to dual enrollment leads to wider access to PCPs, which is likely not solely driven by an increase in the total volume of visits. Furthermore, PCPs on average provide services to more patients who have dual coverage relative to the same group when they have Medicaid only. With an increase in provider options, 45% of the patients switched to a new PCP after transitioning to dual coverage. The enhanced access to primary care in the post-transition period might reflect unmet needs prior to the transition. However, when we tested for any discontinuity in the percentage of primary care services provided by a new PCP close to the month of transition, we found no evidence of significant change. This suggests that the effect of increased access to primary care due to dual coverage was not instantaneous. With Medicare taking over as the primary payer, it takes time for patients to research the primary care providers who accept new Medicare patients, identify their preferred provider, and make an initial appointment for their "Welcome to Medicare" visit, as long as it is within the first 12 months of Part B enrollment. Moreover, it is also possible that this finding is a reflection of more team care of group practices, because seeing other PCPs from the same facility would appear as a switch in our analysis. It is important to note that our analyses were based on a very small sample of continuously enrolled FFS patients who had encounters within a short timeframe both before and after the transition, which is rare in practice, and thus our findings may not be generalizable to the overall Medicaid and dually eligible populations.

Primary care of high quality is critical for maintaining a coordinated care delivery system. A large body of evidence shows that primary care helps prevent sickness and death, and is associated with more equitable distributions of health in populations.[44] The quality of primary care services can be assessed according to four main features: first-contact access for each need; long-term, person-focused care; comprehensive care for most health needs; and coordinated care when it must be sought elsewhere.[44] In particular, long-term person-focused care emphasizes the continuity of using a primary source of care over time. Familiarity with the living condition and medical history of a patient makes it more likely for the practitioner to identify additional health problems and increases efficiency by saving time and costs in consultations, lab tests, and other expensive specialty care. Switching to a new PCP could be disruptive to the continuity of care already established, causing unnecessary delays in the short term, but on the other hand, having a new PCP that better suits the patient's needs would improve outcomes in the long run.

For the 45% of primary care users in our cohort, the reason behind switching to a new PCP after dual enrollment might be multifold. First, patients might have been proactively seeking a new provider because they were not satisfied with the quality of services or any aspect of care provided by their PCP under Medicaid, and greater access under Medicare made this change possible. Based on data from the Kaiser Family Foundation/Commonwealth Fund 2015 National Survey of Primary Care Providers, 93% of the PCPs accepted Medicare (among which 72% accepted new patients), but only 67% accepted Medicaid patients.[45] A longitudinal study of adult patients of all ages highlighted the importance of relationship quality (communication, interpersonal treatment, physician's knowledge of the patient, patient trust) on voluntary disenrollment from a PCP.[46] Second, the patient might have developed a medical condition that required a second opinion, which turned into a long-term relationship, or at least appeared as the

new PCP based on how we define it in the data. Third, although not likely to be concurrent with the change in coverage status, a study on PCP-patient relationship durations revealed that leaving/retiring/dying of doctors were common reasons for changing PCPs, in addition to insurance-related reasons.[47]

It has been shown that long-term physician-patient relationships foster less costly and less intensive care.[48,49] Findings from this study raise concerns about the impact of changing the primary payer on continuity and quality of care for the near-elderly population, as well as instability in the PCP workforce. Prior research has identified many factors affecting physician decisions to participate in Medicaid. While low Medicaid payment rates are usually considered the primary reason for low participation, increasing payment did not always lead to increased participation due to reimbursement delays.[50] On the other hand, Medicaid expansion has been associated with an increase in appointment availability.[51] In an effort to provide more options to Medicaid beneficiaries so that they would not have to switch PCPs and delay care until Medicare coverage takes effect, more research is needed to support any particular strategy, at the state level. For some states, reducing payment delays and other administrative burdens may be more effective in improving access than increasing Medicaid rates. Each state will need to assess where to target limited resources based on the characteristics and needs of their Medicaid population.

CHAPTER 4

COST OF CARE FOR DUAL ENROLLEES WHO PRIMARILY USE FQHCS VS OTHER SETTINGS FOR PRIMARY CARE

ABSTRACT

Federally Qualified Health Centers (FQHCs) are community-based health care providers that receive federal funds to provide primary care services to underserved and vulnerable populations, regardless of their ability to pay. The dually eligible population is a distinct and important patient group in FQHCs, as they are particularly vulnerable and have disproportionately high costs. They receive both Medicare and Medicaid benefits because of age or disability and low income. In this study, we use fee-for-service Medicare and Medicaid claims data from 2016 to compare primary care, non-primary care, and total annual cost of care for dual enrollees who primarily use FQHCs versus those who use other settings for primary care. Using generalized linear models with a Gamma distribution and a log link, after adjusting for patient demographics, coverage lengths, health status, and geographical access to primary care resources, we found that for both the aged (≥65) and younger disabled (<65) group, FQHCs users experienced higher primary care cost, lower non-primary care cost, and lower total cost. These cost patterns are consistent with findings among Medicare-only beneficiaries from a selected subset of states in a previous study. The robustness of the FQHC effect suggests that, from the perspective of total cost, the practice style of FQHCs offer a cost-efficient setting, likely by reducing non-primary care cost. Further research is needed to confirm that the overall quality of care provided by FQHCs to duals is at least equivalent to more expensive care settings.

BACKGROUND

The Health Center Program funded by the Health Resources and Services Administration's (HRSA) Bureau of Primary Health Care (BPHC) serves as a cornerstone of the ambulatory care safety net in the US. Federally Qualified Health Centers (FQHCs) are community-based health care providers that receive funds from the Health Center Program to provide primary care services to underserved and vulnerable populations, regardless of their ability to pay.

The Program has grown over time due to bipartisan health policy initiatives and is expected to play an increasingly significant role in the coming years. In 2020, nearly 1,400 FQHCs with over 13,500 service delivery sites were operating in all US states, territories, and the District of Columbia, providing services to nearly 29 million patients, which has almost tripled the number of patients served since 2000.[52] The FQHC patient population includes 1 in 3 people living in poverty, 1 in 5 who are uninsured, 1 in 5 rural residents, and nearly 3 million adults of age 65 or above. FQHCs have been at the forefront of many of the nation's efforts to address public health priorities, such as combating the opioid crisis, ending the HIV epidemic, and responding to COVID-19. Studies have shown that FQHCs provide care that results in lower rates of office visits, ER visits and hospitalizations, and across all services provided, Medicaid enrollees in FQHCs had 24% lower total spending compared to other primary care settings.[53,54]

According to data reported by HRSA, 46.87% of the patients in 2020 served by FQHCs were Medicaid/CHIP enrollees, 10.40% were Medicare enrollees, and 3.92% were dually eligible.[9] As an increasing number of near-elderly individuals age into the Medicare program from their previous coverage, including Medicaid, some of them may continue to seek care in FQHCs.

The dually eligible population is a distinct and important patient group in FQHCs, as they are particularly vulnerable and tend to be costly. They receive both Medicare and Medicaid benefits because of age or disability and low income. To qualify as a dual-eligible, they have to meet the federal qualifications for Medicare which generally requires age of 65 or older, as well as the state-specific qualifications for Medicaid. The eligibility criteria for Medicaid vary substantially across states, but mandatory eligibility groups like low-income, aged, blind and disabled individuals must be covered. Duals are a vulnerable population because they are substantially more likely than other Medicare beneficiaries to have lower incomes (annual income below $10,000), less than high school education, fair/poor health, disability, and social isolation.[55] They are also more likely to be a racial or ethnic minority and to receive care in poor neighborhoods.[56]

When dually eligible beneficiaries visit a provider or facility that takes both forms of insurance, Medicare will be the primary payer and Medicaid may cover Medicare premiums and cost sharing depending on which Medicare Savings Programs they are enrolled in. Although each state has the flexibility to determine the scope of services of their Medicaid program, they generally cover services not covered or only partially covered by Medicare, such as nursing facility care beyond the 100-day limit or skilled nursing facility care covered by Medicare, eyeglasses, hearing aids, and home care services, among others. Despite considerable efforts in integrating care for the duals, the design of the two programs poses challenges, and separate funding streams create barriers to care coordination, which in turn incurs higher costs and poor health outcomes. Dually eligible beneficiaries constitute a disproportionate share of national health spending, accounting for 34% of Medicare expenditure while representing 20% of Medicare enrollees, and 32% of Medicaid expenditure while representing 15% of Medicaid

enrollees in 2013 (most recent year from data book jointly produced by MACPAC and MedPAC).[57]

While dual-eligibles tend to be more expensive, it is of great importance to identify programs and policies that reduce costs without compromising quality of care. One area of interest might be in the source of primary care. In previous work by Mukamel et al. (2016), compared to Medicare patients who received a low percentage of their primary care in HCs, those receiving most of their primary care in FQHCs experienced higher costs for primary care, lower costs for non-primary care, and lower total costs overall.[58] While this initial analysis of Medicare expenditure provides important insights on differences between FQHC and non-FQHC Medicare patients, the study of more recent Medicare and Medicaid claims data allows us to significantly improve and augment our understanding of the intersection of public insurance and FQHCs. First, total Medicare and Medicaid costs can be estimated for dually eligible beneficiaries, a key population at the focus of increased policy attention, for which analysis of Medicare data alone is limited. Second, by examining Medicaid claims, we can include costs on long-term care services, which is used by about half of the duals and likely affected by the quality of primary care they receive. Third, we have more recent data from all states to provide important insights at the national level.

METHODS

Data Source

We used fee-for-service Medicare and Medicaid T-MSIS Analytic File (TAF) enrollment and claims data from 2016, the latest year of data available at the time we submitted a data use agreement request for this study. Our analysis started with beneficiaries who were dually eligible

for 12 months in 2016 according to the Medicare Master Beneficiary Summary File (MBSF). Beneficiaries included in this analysis were required to have full Medicaid benefits, no Medicare Advantage coverage, and be entitled to Medicare benefits not due to end stage renal disease (ESRD). Because the Medicare Carrier file, which includes claims submitted by professional providers, is only available as a 20% sample, we had to exclude beneficiaries who were not included in the 20% sample. The beneficiaries were categorized into the aged or disabled group based on whether they qualify for Medicare as aged (65 or older) without ESRD or under 65 and disabled without ESRD for all 12 months of 2016. A very small number of aged beneficiaries with a birthday after February 1st but who had Medicare coverage since January were excluded because this is not consistent with the general rule. Claims from the Medicare OP and Carrier files were extracted for this initial cohort of aged and disabled duals, and those with no primary care encounters (defined in the **Variables** section) were excluded. We linked our data with the primary care service areas (PCSAs) as established by Goodman et al.[29] and updated in 2013, and dropped beneficiaries whose zip code could not be linked to a PCSA with at least one FQHC. Defined through utilization data and representing geographic approximations of primary care market areas, the assumption behind PCSAs is that beneficiaries residing within them have similar access to primary care resources and utilization patterns. In addition, we used the Chronic Conditions segment and the Other Chronic or Potentially Disabling Conditions segment of the MBSF to identify the presence of any of these conditions[59] for the cohort (in the form of number of flags present) as a proxy for health status.

We linked this initial sample of dually eligible beneficiaries from MBSF with the Medicaid TAF Demographic and Eligibility (DE) File through an identifier crosswalk. Those without a matched identifier in TAF DE (0.2%) and those with multiple matched identifiers from

multiple states (1.6%) were excluded. We then excluded beneficiaries who had missing eligibility data (0.03%), which means they only had dummy records in the DE file that represent unique beneficiary identifiers appearing on claims but for which states did not submit any eligibility information. Importantly, because the quality of managed care encounter data vary considerably by state and payments cannot be tied to services, we excluded beneficiaries who were enrolled in traditional managed care plans for any month of the year (62.5%). Furthermore, to avoid having nursing home residents who would not likely have equal access to FQHCs and have very distinctive patterns of care-seeking and costs, we dropped beneficiaries who had more than 100 days of nursing care paid for, in whole or in part, by Medicaid (4.4%).

With this cohort of beneficiaries, we identified primary care claims in the TAF OT File by matching to the primary care claims from Medicare OP and Carrier files on National Provider Identifier (NPI) and beginning date of service/claim. Because Medicare would be the primary payer on any primary care service, it can be assumed that claims beginning on the same day for the same provider that are paid for by Medicaid would represent supplemental payments for the same set of primary care services. This methodology is more conservative than attempting to identify primary care claims in Medicaid TAF with a completely different algorithm (due to disparate data structure) from what has been well established in Medicare claims. Next, we extracted non-primary care claims from MedPAR and TAF IP File, TAF LTC File, and the remaining claims from Medicare OP, Carrier and Medicaid TAF OT Files. For all Medicaid TAF claims, we dropped fixed payment claims, and we only included fee-for-service claims and supplemental payments (above capitation fee or above negotiated rate, e.g., FQHC additional reimbursement). The non-primary care claims were categorized into inpatient, long term care, outpatient, and emergency room (ER) claims.

Our outcomes of interest, annual costs, included payments by Medicare or Medicaid to the provider (not including beneficiary out-of-pocket expenses or payments from other payers), and were aggregated separately for primary care and non-primary care services at the beneficiary level. Total annual cost represents the sum of total payments from Medicare and Medicaid on primary care and non-primary care services as listed previously. Lastly, we excluded beneficiaries with a non-positive total primary care cost (1.2%) which is the key outcome of interest, and those with a negative non-primary care cost (0.01%). We observed that all negative payment claims represent "gross credit/gross credit adjustment", which suggests that the small number of beneficiaries that ended up having negative total costs could have arisen from incorrect classification of primary care versus non-primary care claims or other issues inherent with the data, and with the missing original claims they could have accrued a positive total amount. The final analytical sample included a total of 201,206 beneficiaries, of which 96,461 belongs to the aged group and 104,745 belongs to the younger disabled group.

Variables

Primary Care Claims

We identified primary care services in Medicare OP and Carrier files using a slight modification of the criteria outlined in Goodman et al. (2003), which has been widely adopted.[60-62] Claims in the OP File were restricted to those with provider number and type of facility/service classification indicating rural health clinics or FQHCs that also had a revenue center code in the Revenue Center File indicating "clinic" (051x, 052x). Claims in the Carrier File were restricted to those with line items meeting the following criteria: (1) provider specialty code indicating primary care physicians (general practice, family practice, internal medicine,

pediatrics, geriatrics), non-physicians (nurse practitioner, certified clinical nurse specialist, physician assistant), or multispecialty clinic/group practice; (2) place of service including office, outpatient hospital, rural health clinic, and FQHC; (3) HCPCS codes for evaluation and management services, including office or other outpatient services (CPT code range 99201-99205, 99211-99215) and preventive medicine services (99381-99387, 99391-99397).

Primary Care Settings

The type of primary care setting was our main independent variable of interest. We identified providers as FQHCs based on an extensive examination of Medicare Carrier File line place of service code, provider specialty code, OP File provider number, facility type code, service classification type code, organization NPI, and physician specialty code. The other primary care settings consist of outpatient hospital, physician office, and others, all defined using line place of service code in the Carrier File or combination of type of facility and service classification in the OP File. For each beneficiary, a primary care day is defined as a day that he or she has at least one primary care claim. If a primary care day included primary care claims from multiple settings, the setting with the highest Medicare payment amount on the claim was assigned to that day. We then calculated the percentage of primary care days the beneficiary received care at each of the four settings. Beneficiaries were categorized as FQHC or non-FQHC patients based on whether more than 50% of their primary days occurred in an FQHC, and likewise for outpatient hospital and physician office. Those who did not have a majority of primary care days in any of these three settings constitute the mixed-use group, which is part of the non-FQHC group.

Statistical Analyses

Covariates

Because the aged and younger disabled duals are two very distinct groups with different eligibility criteria, demographics, health status, and service use patterns as suggested by initial analyses, we conducted stratified analyses for the two groups. Other measurable variables that could be associated with type of primary care setting and cost of care included patient demographics (age, gender, race/ethnicity, indicator of death during the year), coverage characteristics (number of months with Medicare Part A coverage, Part B coverage, and number of months with state buy-in, i.e., beneficiary premium paid by the state), health status (number of chronic condition flags, number of other chronic or potentially disabling condition flags), as well as geographics and access to primary care resources (US state, PCSA). The 27 chronic condition flags and 36 other chronic condition/potentially disabling condition flags were assigned for each Medicare beneficiary based on a one-year or multi-year look back period sourced from previous years of Medicare FFS claims, which causes no concern for endogeneity. As for location, we included state in addition to PCSA because PCSAs can span across states, and varying state Medicaid coverage and payment rules may affect choice of care setting and cost of care.

Statistical Model

We conducted descriptive analyses of all the key variables described above, as well as total cost, primary care cost and non-primary care cost across the four service types (inpatient, long term care, outpatient, ER), by primary care setting. Our main analysis focused on FQHC users versus non-FQHC users.

To examine the association between primary care setting and cost of care, we developed a series of generalized linear models (GLMs), using a Gamma distribution with a log link, as is commonly used in previous studies on health care cost outcomes. As our analytic dataset did not include a large fraction of beneficiaries without any care during the year of observation (only 0.85% of final cohort had zero non-primary care cost), it was not necessary to fit the outcomes using two-part models or similar approaches to additionally estimate the probability of observing a positive versus zero outcome.

The GLMs are a generalization of the linear model that specifies the relationship between a dependent variable and a set of independent variables and allows the response variable to have a non-normal distribution. Instead of relying on transformation techniques, GLMs allow flexible modelling of the covariates and enables inference to be made directly about the mean costs. The "family" specifies the probability distribution that reflects the mean-variance relationship, while the link function describes the relationship between the covariates and the mean of the dependent variable. It has been shown that a Gamma distribution with a log link has satisfactory performance with distributions with zeroes and/or long right tails.[63]

Our regression models for estimated mean costs were of the following form:

$$Cost_{i,j,k} = \exp\left(\alpha + \beta \cdot FQHCuser_{i,j,k} + \gamma \cdot X_{i,j,k} + \sum_j PCSA_j + \sum_k state_k\right)$$

where $Cost_{i,j,k}$ represents total annual cost, total primary care cost, or total non-primary care cost, $FQHCuser_{i,j,k}$ is a binary indicator of having more than half of their primary care days in FQHCs rather than in other settings for individual i residing in PCSA j and state k, $X_{i,j,k}$ is a vector of potential confounders as described in the Covariates section above, $PCSA_j$ is a vector of PCSA fixed effects that controls for geographical access to primary care resources, and $state_k$ is a vector of state fixed effects that controls for state-level differences. β is the quantity

of interest, representing the logged ratio of the mean cost of FQHC users relative to non-FQHC users, holding other covariates constant. To account for heteroscedasticity and possible residual correlation between individuals residing in the same PCSA, we clustered standard errors at the PCSA level.

RESULTS

Population Characteristics

Our final analytic sample included 96,461 dually eligible beneficiaries from 2016 who were aged, and 104,745 who were disabled. Descriptive statistics stratified by eligibility group are presented in Table 4.1. The mean age of the aged group was 76.2, much older than the mean age of 48.9 for the disabled group; 0.4% and 0.1% of the beneficiaries in each group had a date of death in 2016, respectively. About two thirds of the aged group and a little over half of the younger disabled group were female. The aged group had a particularly high proportion of Asian/Pacific Islander and Hispanic population because 22.5% of this group were California residents (omitted in Table 6), which is 14.7% Asian and 38.9% Hispanic according to 2016 American Community Survey data.[64] In contrast, the younger disabled group was more predominantly White (66.4% vs 47.3%), with a slightly higher percentage of African American population (19.4% vs 16.2%). In terms of coverage length, on top of being continuously enrolled in FFS Medicare and Medicaid with full benefits, the aged group had fewer months of Part A coverage on average, but almost everyone in the disabled group had both Part A and Part B coverage throughout the year. Aged duals had slightly more months with Medicare premiums paid by the state. As expected, the aged group had more chronic conditions, but the younger disabled group had more other chronic or potentially disabling conditions, which could include

mental health, tobacco use, alcohol and drug use, development disorders, and disability-related conditions.

For both groups, the majority of beneficiaries received most of their primary care in physician offices (72.0% and 69.6%). The younger disabled group had a higher percentage who were considered FQHC users – 12.4% compared to 10.9%. On an unadjusted basis, the median total primary care cost was higher for the aged group ($418.3 vs $371.0). For non-primary cost, the median was higher for the disabled group ($8569.8 vs $6697.8), mostly driven by higher cost on outpatient care ($5906.7 vs $4754.9). Because of the larger magnitude of non-primary care cost relative to primary care cost, the median annual total cost was higher for the disabled group ($9219.2 vs $7351.5).

TABLE 4. 1 Characteristics of dually eligible beneficiaries by eligibility group

	Aged (Age≥65)	**Younger Disabled (Age<65)**
N	96,461	104,745
Age, mean (SD)	76.2 (7.8)	48.9 (10.9)
Death in 2016 (%)	0.4	0.1
Female (%)	67.7	54.4
Race: White (%)	47.3	66.4
Black (RTI_RACE_CD=2)	16.2	19.4
other (=3)	1.3	0.7
Asian/Pacific Islander (=4)	14.8	1.8
Hispanic (=5)	17.0	9.5
American Indian/Alaska Native (=6)	2.0	1.3
Part A coverage months, mean (SD)	10.7 (3.7)	12.0 (0.0)
Part B coverage months, mean (SD)	12.0 (0.2)	12.0 (0.4)
State buy-in coverage months, mean (SD)	11.4 (2.6)	11.0 (3.2)
Number of chronic conditions, mean (SD)	5.1 (2.9)	3.1 (2.5)
Number of other chronic or potentially disabling conditions, mean (SD)	1.8 (1.9)	3.5 (2.6)

TABLE 4. 1 Characteristics of dually eligible beneficiaries by eligibility group, continued

	Aged (Age≥65)	Younger Disabled (Age<65)
% with >50% primary care days in FQHCs	10.9%	12.4%
% with >50% primary care days in outpatient hospitals	8.2%	9.3%
% with >50% primary care days in physician offices	72.0%	69.6%
% with >50% primary care days in mixed settings	8.9%	8.7%
Primary care cost to Medicare	360.0 [175.4,637.9]	304.0 [133.6,589.6]
Primary care cost to Medicaid	33.8 [0.0,101.9]	45.3 [0.0,116.8]
Total primary care cost	418.3 [220.2,726.4]	371.0 [179.4,695.5]
Non-primary care cost to Medicare:		
Outpatient	1982.7 [678.2,4696.5]	1774.7 [589.4,4385.2]
Inpatient [mean (SD)]	2516.8 (10716.1)	2195.7 (11810.8)
Emergency room [mean (SD)]	2806.0 (9863.2)	2765.5 (10977.5)
Non-primary care cost to Medicaid:		
Outpatient	743.2 [134.6,9356.0]	1380.3 [253.2,15254.9]
Inpatient [mean (SD)]	166.9 (2365.8)	118.4 (2768.0)
Emergency room [mean (SD)]	252.2 (1840.4)	175.8 (1948.6)
Long-term care [mean (SD)]	1912.6 (15004.7)	2226.5 (18550.4)
Total outpatient	4754.9 [1423.1,15667.5]	5906.7 [1836.8,22443.9]
Total inpatient [mean (SD)]	2683.7 (11105.2)	2314.1 (12825.2)
Total Emergency room [mean (SD)]	3058.2 (10243.4)	2941.3 (11554.6)
Total non-primary care cost	6697.8 [1519.5,25396.3]	8569.8 [2037.0,36244.4]
Total annual cost	7351.5 [2015.1,26071.4]	9219.2 [2550.2,36881.8]

Note: Cost to Medicare and cost to Medicaid do not include cost-sharing paid by beneficiary or third-party payers. Statistics in table are median [Q1, Q3] unless otherwise noted; mean (SD) is displayed for some categories of non-primary care cost because they have a median of zero.

Table 4.2 and Table 4.3 present unadjusted characteristics of FQHC users compared to non-FQHC users within the aged and within the disabled group, respectively. The age and gender profiles as well as coverage lengths are very similar between the two types of users for both aged and disabled duals. Notably, non-FQHC users were more predominantly White and FQHC users had somewhat higher proportions from racial/ethnic minority groups. With regard to disease burden, among the aged group, non-FQHC users had on average one more chronic

condition and 0.3 more other chronic/potentially disabling conditions. Among the younger disabled group, the differences are even smaller (0.3 more and 0.1 more). Overall, the characteristics of FQHC users did not differ substantially from those of non-FQHC users. Nevertheless, the common pattern for both aged and disabled duals is that FQHC users had higher primary care cost, much lower non-primary care cost, and lower total cost.

TABLE 4. 2 Characteristics of aged (≥65) dually eligible beneficiaries by primary care setting

	Non-FQHC users (N=85,927)	**FQHC users (N=10,534)**
Age, mean (SD)	76.4 (7.8)	74.5 (7.3)
Death in 2016 (%)	0.4	0.4
Female (%)	68.3	62.9
Race: White (%)	48.5	37.8
Black (RTI_RACE_CD=2)	15.8	19.5
other (=3)	1.4	0.7
Asian/Pacific Islander (=4)	14.8	14.4
Hispanic (=5)	16.0	25.2
American Indian/Alaska Native (=6)	2.1	1.4
Part A coverage months, mean (SD)	10.7 (3.7)	10.7 (3.7)
Part B coverage months, mean (SD)	12.0 (0.2)	12.0 (0.2)
State buy-in coverage months, mean (SD)	11.4 (2.7)	11.5 (2.2)
Number of chronic conditions, mean (SD)	5.2 (2.9)	4.2 (2.7)
Number of other chronic or potentially disabling conditions, mean (SD)	1.8 (1.9)	1.5 (1.8)
Total primary care cost	394.4 [207.4,682.4]	668.2 [396.0,1118.8]
Total non-primary care cost	7167.9 [1630.0,26347.3]	3674.2 [839.9,18034.3]
Total annual cost	7780.9 [2087.1,26990.2]	4658.7 [1563.5,19102.8]

Note: Cost to Medicare and cost to Medicaid do not include cost-sharing paid by beneficiary or third-party payers. Statistics in table are median [Q1, Q3] unless otherwise noted.

TABLE 4. 3 Characteristics of younger disabled (<65) dually eligible beneficiaries by primary care setting

	Non-FQHC users (N=91,788)	FQHC users (N=12,957)
Age, mean (SD)	48.9 (10.8)	49.1 (10.9)
Death in 2016 (%)	0.2	0.1
Female (%)	54.6	52.8
Race: White (%)	67.9	55.4
Black (RTI_RACE_CD=2)	18.7	24.5
other (=3)	0.7	0.6
Asian/Pacific Islander (=4)	1.7	2.1
Hispanic (=5)	8.7	15.3
American Indian/Alaska Native (=6)	1.3	1.4
Part A coverage months, mean (SD)	12.0 (0.0)	12.0 (0.0)
Part B coverage months, mean (SD)	12.0 (0.4)	12.0 (0.4)
State buy-in coverage months, mean (SD)	10.9 (3.3)	11.3 (2.7)
Number of chronic conditions, mean (SD)	3.1 (2.5)	2.8 (2.4)
Number of other chronic or potentially disabling conditions, mean (SD)	3.5 (2.6)	3.4 (2.7)
Total primary care cost	342.9 [167.4,637.4]	657.4 [347.6,1158.4]
Total non-primary care cost	9221.2 [2157.9,38609.1]	5231.0 [1308.5,22772.9]
Total annual cost	9811.4 [2638.2,39204.5]	6252.2 [2049.0,24052.1]

Note: Cost to Medicare and cost to Medicaid do not include cost-sharing paid by beneficiary or third-party payers. Statistics in table are median [Q1, Q3] unless otherwise noted.

Regression Analysis

Estimated coefficients from our three cost models were exponentiated and shown in Table 4.4 and Table 4.5 for the aged and younger disabled group, respectively. After adjusting for patient demographics, coverage lengths, health status, and geographical access to primary care resources, for aged duals, those receiving most of their primary care in FQHCs experienced 1.79 times higher primary care cost, 0.85 times lower non-primary care cost, and 0.90 times lower total cost as compared to those who mostly use other settings. The FQHC effect is statistically significant at the 0.01 level for all three cost outcomes. Death during the year

lowered primary care costs by 20% but increased non-primary care by 77% and total cost by 74%. Females had 1.04 times higher primary care cost than males, but 0.91 times lower non-primary care and total cost. Compared to non-Hispanic Whites, African-Americans had lower spending on all three cost measures, whereas Asians and Hispanics had higher primary care cost but lower non-primary care and total cost. Because Medicare Part A only covers non-primary care such as inpatient care in a hospital, the length of Part A coverage does not affect primary care cost and is thus not included in the primary care cost model. As expected, primary care cost increased by 1.05 times with an additional month of Part B coverage ($p<0.01$), but the effect on non-primary care and total care was not statistically significant. For chronic conditions and potentially disabling conditions, one more condition would increase all costs by 7%-29%, and the magnitudes of effects are larger on non-primary care cost and total cost.

The patterns of the coefficients for younger disabled beneficiaries are similar to those for aged beneficiaries. In particular, adjusting for covariates, disabled duals who received most of their primary care in FQHCs experienced 1.78 times higher primary care cost, 0.74 times lower non-primary care cost, and 0.76 times lower total cost as compared to those who mostly use other settings. The effect of death during the year was larger on non-primary care and total cost: 2.76 times and 2.66 times increase, respectively, but primary care cost was 0.87 times lower for the deceased. This suggests that younger disabled duals in their final year of life had substantially higher spending on non-primary care as compared to their peers who remained alive.

TABLE 4. 4 Estimated coefficients (exponentiated) from cost models for aged (≥65) dually eligible beneficiaries

	Primary Care Cost	Non-Primary Care Cost	Total Cost
FQHC user	1.79***	0.85***	0.90***
Age	0.99***	1.02***	1.02***
Death in 2016	0.80***	1.77***	1.74***
Female	1.04***	0.91***	0.91***
Race: Unknown	0.98	0.94	0.94
Black	0.95***	0.91***	0.91***
Other	1.05*	0.80***	0.81***
Asian/Pacific Islander	1.14***	0.66***	0.68***
Hispanic	1.03**	0.68***	0.69***
American Indian/Alaska Native	0.99	0.91	0.91
Part A coverage months	Not included	1	1
Part B coverage months	1.05***	0.97	0.97
State buy-in coverage months	1.01***	0.98***	0.98***
Number of chronic conditions	1.10***	1.17***	1.17***
Number of other chronic or potentially disabling conditions	1.07***	1.30***	1.29***

Note: The Primary Care Services Area fixed effects (3646 in aged cohort) and state fixed effects (51 for both cohorts) are not shown. *** p<0.01, ** p<0.05, * p<0.1

TABLE 4. 5 Estimated coefficients (exponentiated) from cost models for younger disabled (<65) dually eligible beneficiaries

	Primary Care Cost	Non-Primary Care Cost	Total Cost
FQHC user	1.78***	0.74***	0.76***
Age	1.00***	0.99***	0.99***
Death in 2016	0.87**	2.76***	2.66***
Female	1.13***	0.78***	0.79***
Race: Unknown	0.97	0.67***	0.68***
Black	0.98*	0.86***	0.86***
Other	1.02	0.88**	0.88**
Asian/Pacific Islander	1.02	0.81***	0.81***
Hispanic	1	0.73***	0.74***
American Indian/Alaska Native	1.09*	0.94	0.95
Part A coverage months	Not included	0.96**	0.98***
Part B coverage months	1.05***	1.02	1.02
State buy-in coverage months	1.00**	1	1
Number of chronic conditions	1.10***	1.08***	1.08***
Number of other chronic or potentially disabling conditions	1.08***	1.15***	1.14***

Note: The Primary Care Services Area fixed effects (3567 in younger disabled cohort) and state fixed effects (51 for both cohorts) are not shown. *** p<0.01, ** p<0.05, * p<0.1

DISCUSSION

People dually eligible for Medicare and Medicaid have been historically understudied despite being one of the most vulnerable populations in the US. They must navigate two separately administered public insurance programs that function under different rules and cover distinct types of services.[65] This fragmentation of care has led to disproportionately high costs and contributed to worse health outcomes. The COVID-19 pandemic has disproportionately affected the dually eligible population, with higher rates of infection, hospitalization and death than the overall population.[66] As we see these disparities continue to widen at a time of crisis, policy makers are looking to improve care and possibly reduce excessive spending for the dual enrollees. FQHCs funded by HRSA have been delivering affordable and value-based care to the nation's underserved populations for more than 5 decades, and has been successful in driving quality improvement and reducing healthcare spending. During the COVID-19 pandemic, FQHCs are also playing an essential role to provide vaccination, testing, and treatment services for their patient population.

To better understand how the FQHC model of care could help mitigate the issue of increasingly high spending on dually eligible beneficiaries as both Medicare and Medicaid populations continue to grow, our study examines the annual cost of care for duals using fee-for-service claims data across all states. Our analyses suggest that beneficiaries who received the majority of their primary care in FQHCs had higher primary care cost but lower total cost, which is driven by substantially lower non-primary care cost. These general findings on cost patterns were consistent between the aged duals and the younger disabled duals, and also in line with findings among Medicare-only beneficiaries analyzed by Mukamel et al.[58] Another paper by Nocon et al. which examined Medicaid enrollees in 13 states also found that FQHC users had

lower total spending than those receiving primary care in other settings.[54] The robustness of the effect of primary care setting on total cost across different populations suggests that FQHCs offer a cost-efficient care setting likely by reducing non-primary care cost. This could be achieved by providing comprehensive, high-value primary care and preventive services that have positive downstream effects improving the health status of their patients. In particular, chronic diseases and other potentially disabling conditions may be detected earlier and managed better, which makes expensive hospitalizations and ER visits unnecessary.

However, the cost savings of FQHC patients might also be due to differential access to referrals to specialists, lower utilization of diagnostic tests, and other non-primary care services. If FQHC patients had lower non-primary care cost because they had trouble gaining access to specialty care as a result of the limited professional network, then our findings raise concerns. To test this hypothesis, future research should compare health outcomes of dual enrollees who are FQHC patients to those who use other settings for primary care.

Our finding should be interpreted in light of several limitations. First, there are variations in clinical practice and in the literature in terms of what is considered primary care. The criteria we adopted has been widely used but only captures selected services by a set of providers in specific settings that are traditionally regarded as primary care. Furthermore, we only extracted Medicaid claims for the same provider with the same beginning date of service as what we flagged as primary care Medicare claims. If some providers billed Medicaid for the same service on a different date or did not submit a claim to Medicaid at all because of the lower payment rate, our Medicaid primary cost would be underestimated. Nevertheless, any underestimation should equally affect costs for FQHC vs non-FQHC patients, unless FQHC providers systematically fail to submit claims. Second, while we controlled for patient demographics and

health status to the best extent possible, patients could still be heterogeneous across care settings in unmeasurable ways, such as social-economic status and other social determinants of health. However, we should note that the duals population, after stratifying by aged/disabled, is more homogeneous than the Medicaid-only and Medicare-only beneficiaries.

In this study, we did not analyze utilization as an outcome, but understanding how services provided to duals at FQHCs are reimbursed could shed some light on whether there are differences in the number of visits provided. Medicaid pays each FQHC a single, bundled per-visit rate based on that FQHC's historical costs for Medicaid patients, in the 24 states and DC that follow the Prospective Payment System (PPS) as of 2015. Eleven states employ an alternative payment methodology (APM) and 12 other states implement both the PPS and APM. For example, the Medicaid PPS rate in Illinois for medical services is roughly $160 in 2022.[67] Medicare pays FQHCs at 80% of the lesser of charges based on the payment code, or based on another PPS with a national encounter rate, determined using past cost reports, adjusted for location and patient type (new patient or initial Medicare visit). The Medicare PPS rate is $180.16 in 2022.[68] For dual-eligibles, the reimbursement method varies from state to state. As of 2015, 19 states reimburse at the full Medicaid PPS rate, 3 states reimburse at the Medicare FQHC rate, 11 states only pay the Medicare copayment amount for the beneficiary, and 13 states employ other methods.[69] As a comparison, Medicare's average reimbursement for the "Welcome to Medicare visit" is $168.68[70], but more complicated services could have much higher payment rates. Knowing that primary care services provided to duals in FQHCs are reimbursed at similar or lower rates than in other settings like physician offices or outpatient clinics, our observation of higher primary care cost for otherwise equivalent FQHC patients implies that more visits are furnished at FQHCs. These extra visits may be the key to earlier discovery of potential health

problems and better management of chronic diseases, which in turn lead to better health status and less need for specialty care.

As more people age into Medicare, policymakers are exploring alternative approaches to expanding Medicare benefits. At the same time, some states are considering possible forms of expansion of their Medicaid program. From a total cost perspective, the practice style of FQHCs may provide an avenue for taking care of more patients covered by both Medicare and Medicaid in a cost-efficient manner, especially for those with disabilities. Meanwhile, it is also important to note that cost-saving should not be the ultimate purpose; higher spending may be justified for those with high needs. Further research is needed to confirm that the overall quality of care provided by FQHCs to this particularly vulnerable population is better or at least equivalent to other more expensive care settings.

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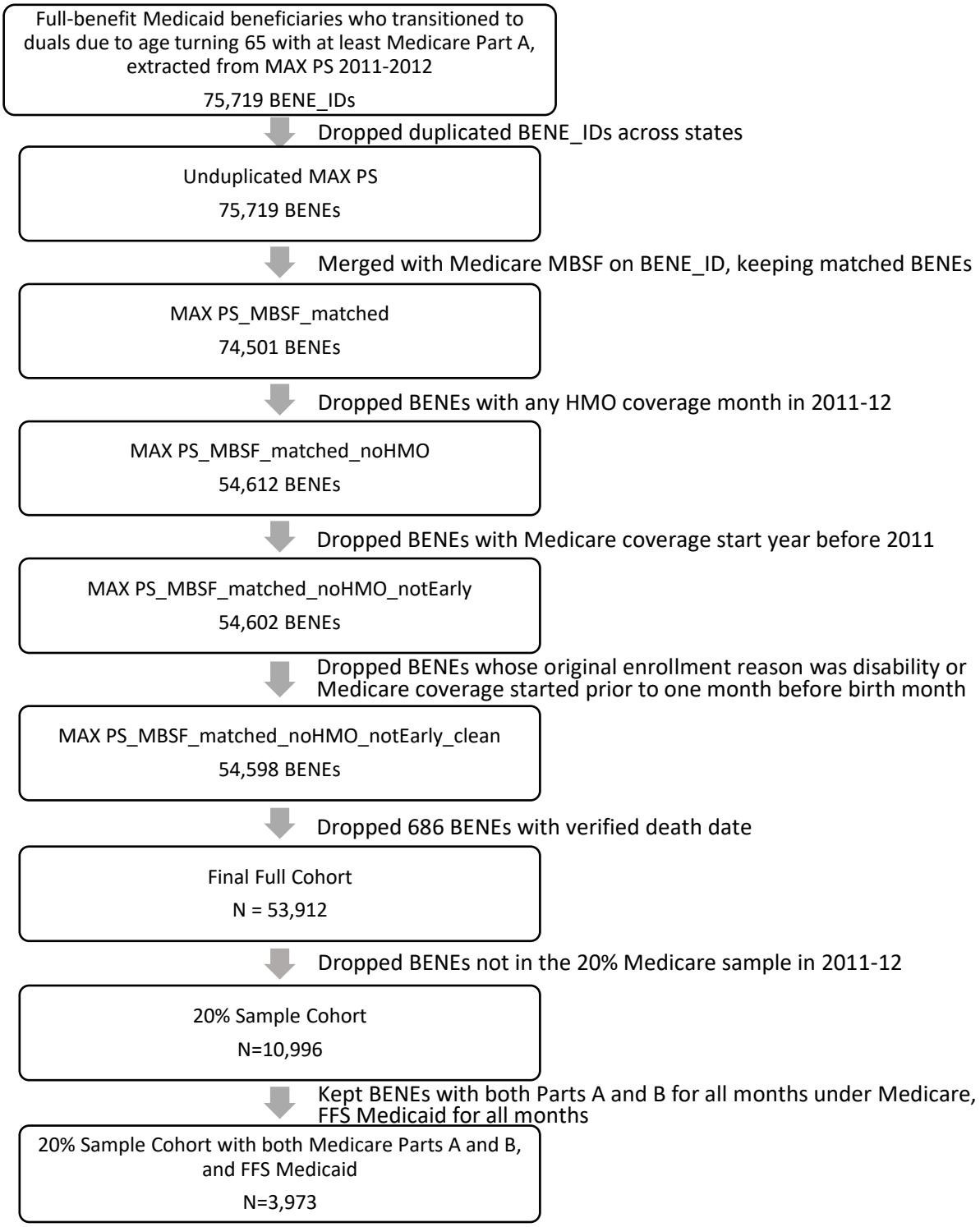
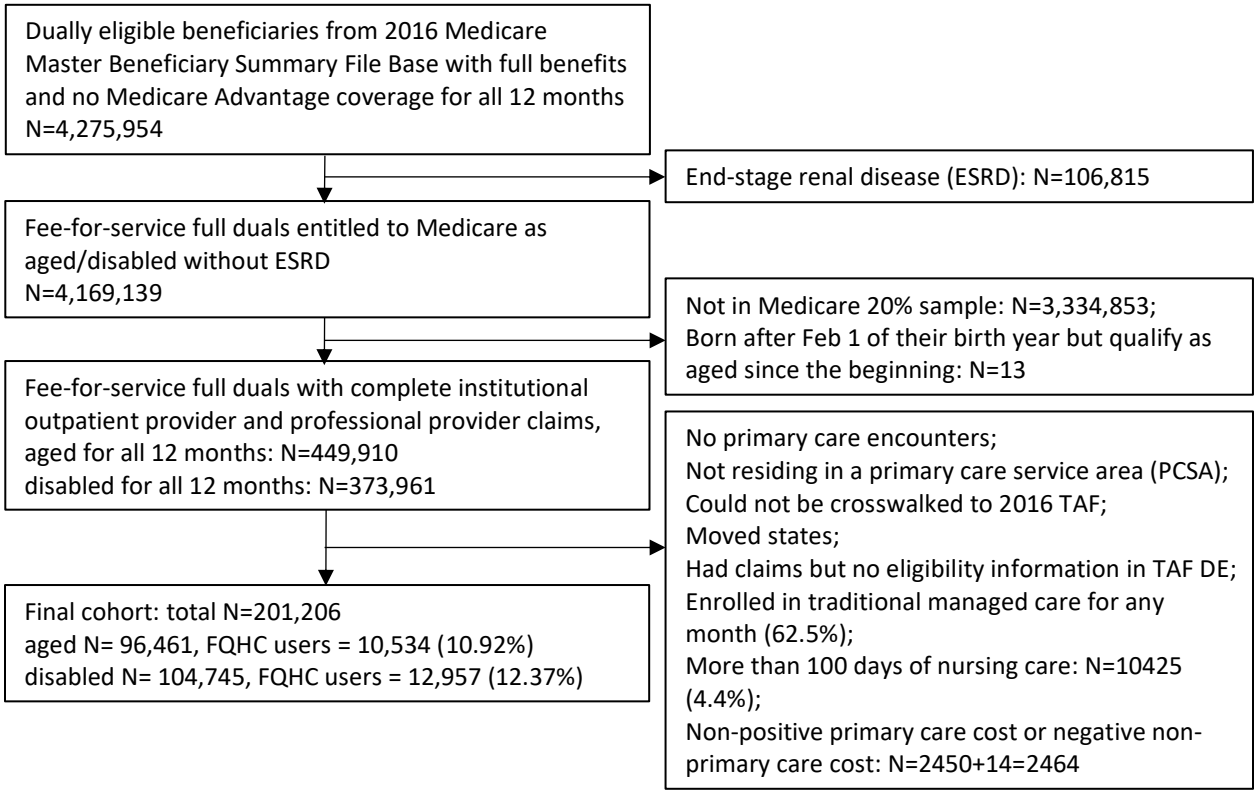
APPENDIX

1. Study population flowchart

- Chapters 2 and 3



- Chapter 4



2. Robustness checks for the transition population

a. Rates of non-avoidable hospitalizations should not change when people transition from Medicaid to Medicare (verified)

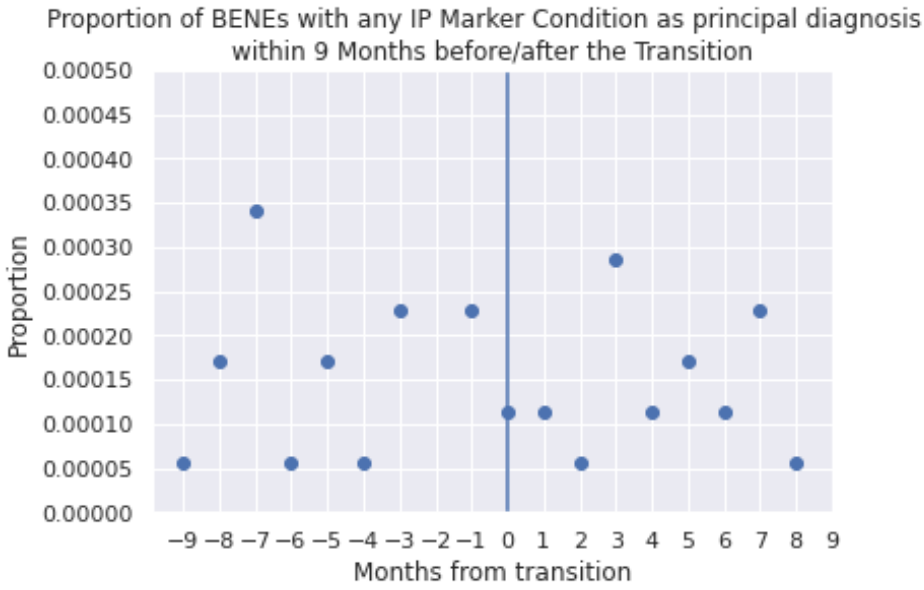
Based on Ambulatory Care Insensitive "Marker" Conditions developed by Billings et al[1]:

"Marker" Conditions

Condition and ICD-9-CM Code(s)	Comments
Appendicitis with appendectomy [540, 541, 542]	With principal procedure of 47
Acute myocardial infarction [410]	Only cases with LOS > 5 days of death
Gastrointestinal Obstruction [560]	
Fracture hip/femur [820]	Age 45+ only

[1] Billings J, Zeitel L, Lukomnik J, Carey TS, Blank AE, Newman L. Impact of Socioeconomic-Status on Hospital Use in New-York-City. *Health Affair.* 1993;12(1):162-173.

FIGURE A. 1 Proportion of beneficiaries having hospitalizations with marker conditions within 6 months before and after the transition from Medicaid to duall enrollment



b. Rates of hospitalizations and total spending should not change between MAX IP and MedPAR for people who got Medicare early because of disability (verified)

FIGURE A. 2 Proportion of disabled Medicare enrollees with hospital admissions within 6 months before and after turning 65

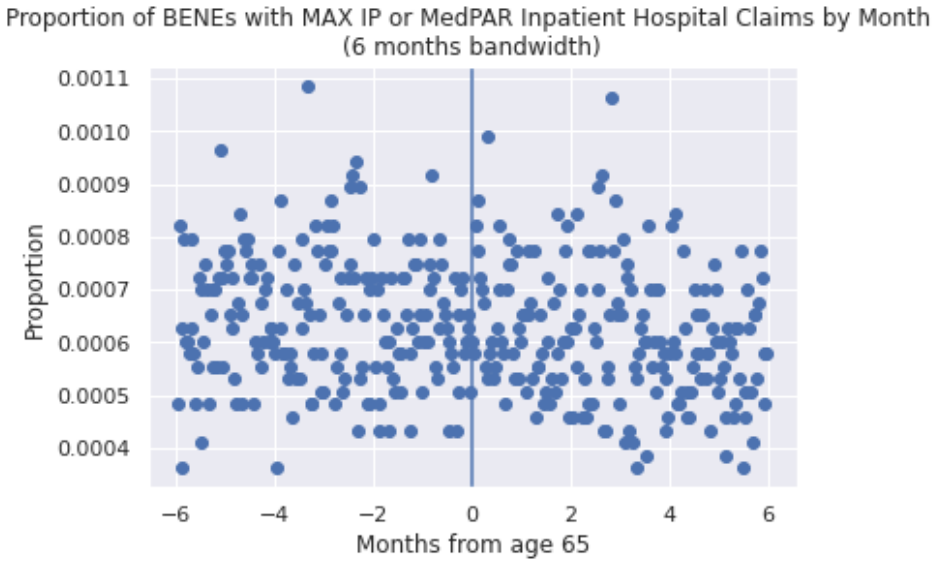
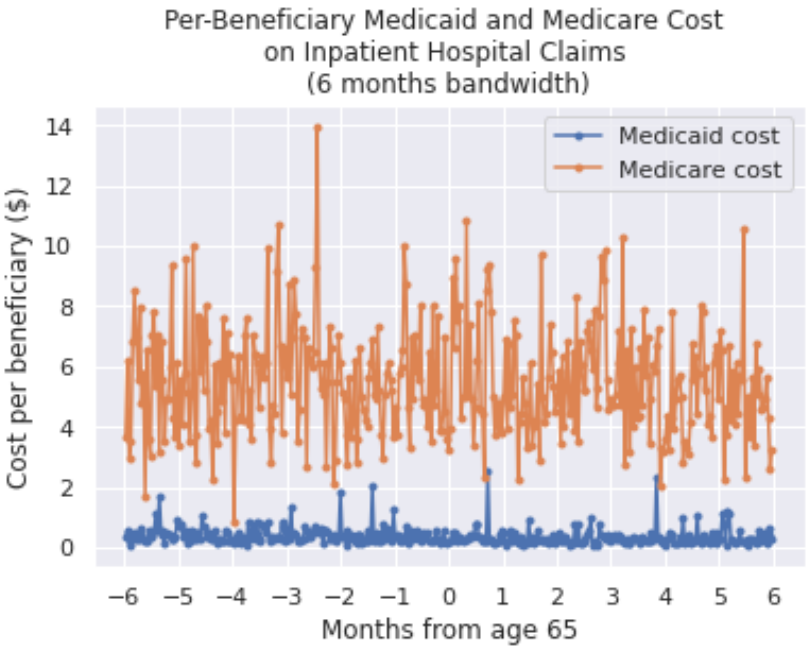


FIGURE A. 3 Per-Beneficiary Medicaid and Medicare costs on hospital admissions within 6 months before and after turning 65



3. Hospital length of stay based on discharge date versus admission date

FIGURE A. 4 Daily mean length of stay for hospital admissions based on admission date

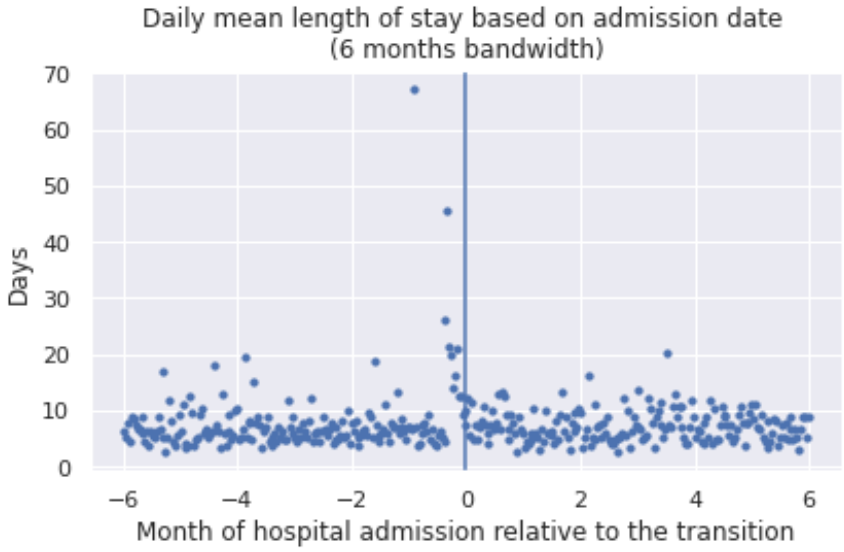
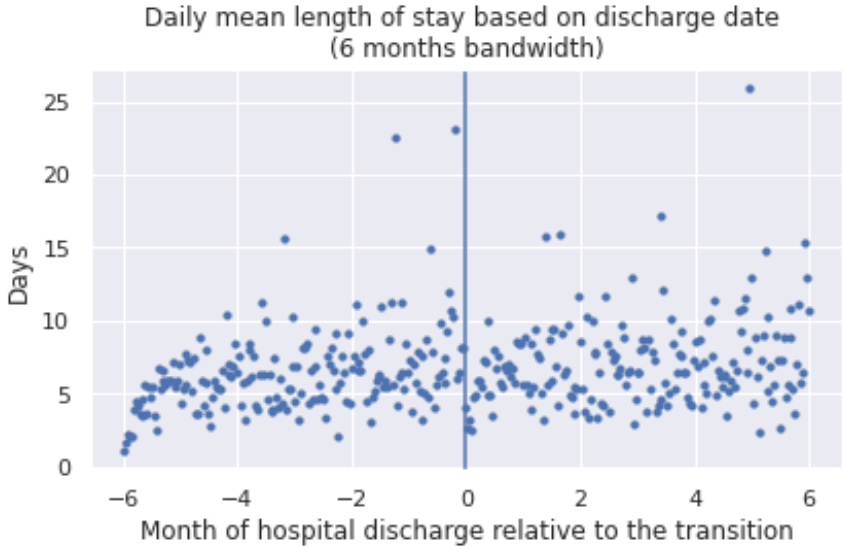


FIGURE A. 5 Daily mean length of stay for hospital admissions based on discharge date



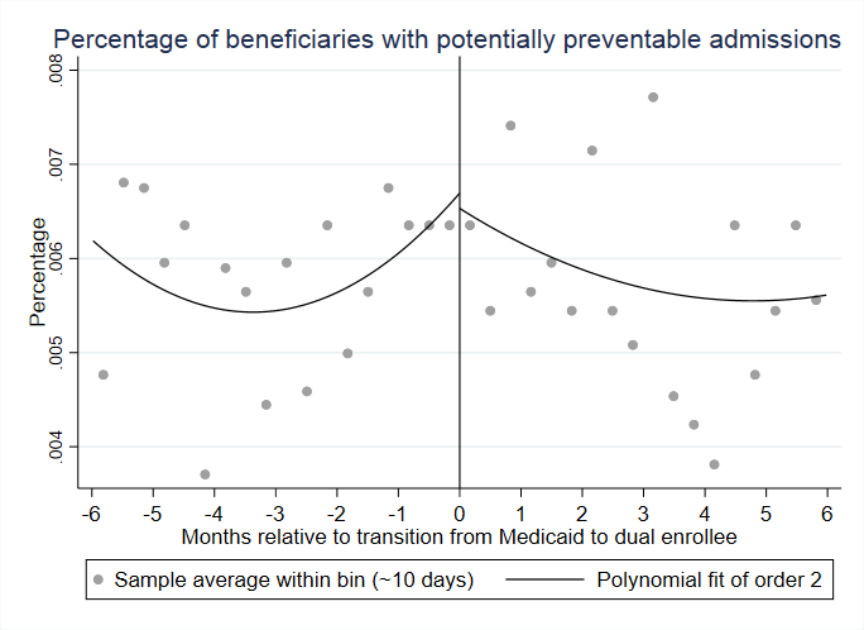
4. Potentially Preventable Hospital Admissions

Based on Prevention Quality Indicators (PQIs) defined by Agency for Healthcare Research and Quality[2], we investigated the effect of Medicare enrollment for the near-elderly Medicaid beneficiaries on hospital admissions that are potentially preventable. The PQIs capture all cases of potentially preventable complications during hospitalizations, such as diabetes with complications, perforated appendix, chronic obstructive pulmonary disease or asthma in older adults, hypertension, heart failure, dehydration, bacterial pneumonia, urinary tract infection, etc. These indicators provide a key tool for assessing quality of health services and primary care access in a community. More specifically, they can help identify issues of access to outpatient care because these admissions could have been avoided through access to high-quality outpatient care. Figure A.1 depicts trends in percentage of beneficiaries with any of these potentially

[2] https://www.qualityindicators.ahrq.gov/Modules/pqi_resources.aspx

preventable admissions before and after the transition. Although there seems to be an uptick around the transition point where the two curves intersect, there is no evident change in the average percentage with potentially preventable admissions before and after the transition due to the wide dispersion of the data points. This might be a good signal that after obtaining Medicare coverage, people did not experience fewer potentially avoidable hospital admissions because they actually had little trouble with access to outpatient care when covered by Medicaid only. Nonetheless, because hospitalizations were rare in our sample, we may not have observed sufficient admissions with these specific complications in order to detect any meaningful change.

FIGURE A. 6 Percentage of beneficiaries with potentially preventable admissions within 6 months before and after the transition from Medicaid to dual enrollment



5. Medicaid and Medicare spending on inpatient care

FIGURE A. 7 Per-Beneficiary Medicaid and Medicare total cost on hospital facility fees for the full cohort with FFS Medicaid, from hospital admission within 6 months before and after the transition from Medicaid to dual enrollment

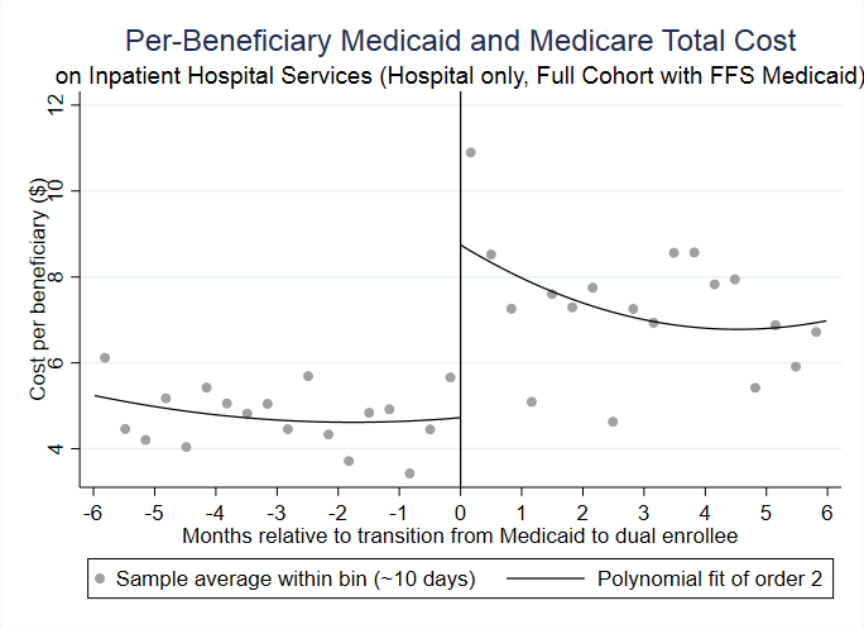


FIGURE A. 8 Per-Beneficiary Medicaid and Medicare total cost on hospital facility fees for the 20% sampled cohort, from hospital admissions within 6 months before and after the transition from Medicaid to dual enrollment

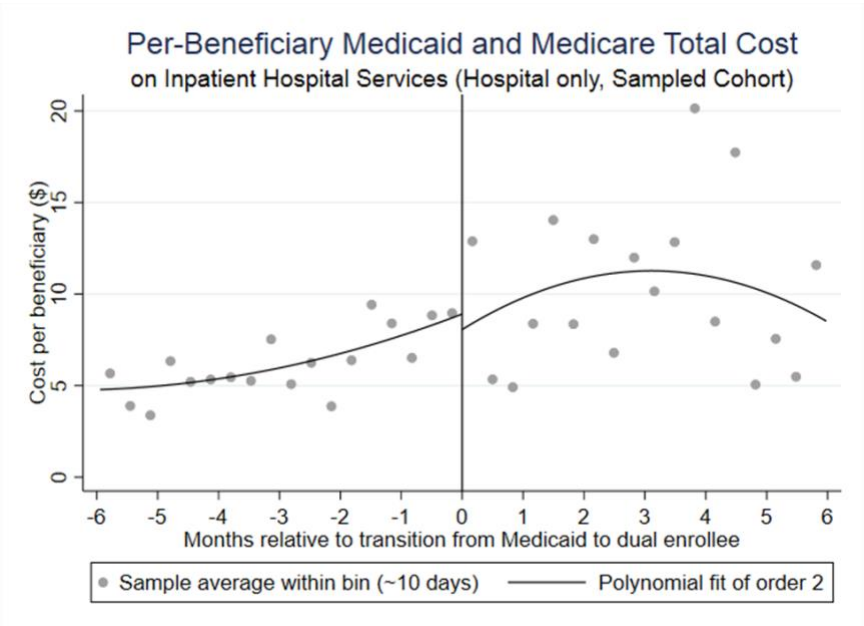


FIGURE A. 9 Per-Beneficiary Medicaid and Medicare total cost on hospital facility fees and professional provider fees for the 20% sampled cohort, from hospital admissions within 6 months before and after the transition from Medicaid to dual enrollment