How Do Managed Care Plans Reduce Healthcare Costs?*

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Abstract

The US public health insurance market is shifting toward reimbursement models that transfer risk away from the government and toward health insurers and healthcare providers. Instead of paying fee-for-service (FFS) to healthcare providers, Medicaid and Medicare now outsource healthcare delivery to managed care plans and the plans accept risk related to their enrollees' healthcare costs. Previous research reaches mixed conclusions about whether managed care plans actually reduce costs. In this paper, I study Florida's 2006 Medicaid Reform, which mandated that Medicaid beneficiaries switch from the state's FFS system to (1) insurer-owned plans, (2) hospital-owned plans, or (3) physician-owned plans. I find that insurer-owned plans reduced costs by 7-12% in all reform markets, but insurers in different markets reduced costs in different ways. Insurers reduced the number of hospital visits after a hospital plan entered one market, but insurers reduced the average cost per hospital visit after physician plans entered another market. Motivated by these empirical findings, I show how insurers choose their strategies in different markets. The results suggest that insurers have leverage in how they reduce costs, but that competition with provider plans may restrict their options.

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1 Introduction

The US public health insurance programs, Medicaid and Medicare, now account for 24% of federal and state budgets, and expenditures on these programs are expected to grow by 6-8% per year through 2023 (CMS 2013;[9] Rudowitz 2014[39]). One in three US citizens is currently enrolled in a public health insurance program and enrollment is expected to increase as the population ages and states expand Medicaid eligibility under the Patient Protection and Affordable Care Act (CMS 2013;[9] State Health Facts Medicaid Expansion 2014[40]). As healthcare expenditures consume an increasing share of public expenditures, state and federal governments are under increasing pressure to reduce program costs (Boyd 2014;[7] State Budget Crisis Task Force 2012[37]).

One of the most championed initiatives to reduce government healthcare expenditures is to switch beneficiaries from the fee-for-service (FFS) system to managed care plans. Historically, Medicaid and Medicare paid a fee for every service to healthcare providers to treat patients. The FFS system, however, encourages the over-utilization of medical resources, so Medicaid and Medicare have been shifting beneficiaries to managed care plans. Managed care plans are owned and operated by health insurers or healthcare providers and they are responsible for coordinating their beneficiaries' healthcare. Managed care plans have incentives to reduce healthcare costs relative to the FFS system, yet it is unclear whether plans actually reduce costs or how they might do so. Moreover, governments often reimburse managed care plans in a way that makes it difficult to realize cost-savings from managed care. This paper contributes to the literature by showing how managed care plans reduce their own healthcare costs, which may help governments redesign reimbursements to share in cost-savings.

This paper uses the rollout of Florida's 2006 Medicaid Reform to show how switching from FFS to managed care affects total hospital costs. Hospital costs include costs associated with emergency room visits (ER) and hospitalizations and they account for the largest share of Medicaid expenditures (CMS 2013;[9] State Health Facts Medicaid Expenditures 2012[15]). Florida's reform mandated that Medicaid children, families, aged, and disabled beneficiaries in five counties switch from the state's FFS system to managed care plans. Medicaid beneficiaries in the remaining 62 counties were not required to switch plans. Since not all beneficiaries were required to switch plans, the reform generated precise treatment and control groups and the groups are quite similar along many observable dimensions. Therefore, to calculate the impact of the switch from FFS to managed care, I estimate a difference-in-difference model where I compare total hospital costs in reform counties to total hospital costs in non-reform counties before and after the reform was implemented.

Florida's 2006 Medicaid Reform is also one of the first examples where health insurers and healthcare providers competed directly for beneficiaries, so it provides a laboratory in which to

test whether competition between insurers and providers affects insurers' strategies to reduce costs. Florida's five reform counties were located in two geographically distinct but equally-sized markets and different managed care plans operated in different markets. Insurer-owned plans operated in both markets, but a hospital plan entered the Northeast Florida market, while physician plans entered the Southeast Florida market. Since different types of provider-owned plans entered different markets, I explore the heterogeneous effects of the reform across markets and I show that insurers adopted different strategies to reduce costs in different markets.

The results of the empirical analysis reveal that switching from FFS to managed care reduced hospital costs by 7-12% in both markets, but that insurers reduced costs in different ways in different markets. In Northeast Florida, insurers reduced the number of nonemergency hospital visits. In Southeast Florida, insurers reduced the average cost per hospital visit. Consistent with these findings, I write a model to explain how insurers choose their strategies to minimize costs and I show that their optimal strategies depend on competition with provider-owned plans.

In the model, plans choose a combination of three labor inputs to minimize the total costs of producing a fixed amount of medical care for their enrollees. The three labor inputs are, (1) the number of primary care physician hours, (3) the number of in-network ER physician hours, and (3) the number of out-of-network ER physician hours. By increasing the number of primary care physician hours, plans reduce the number of nonemergency hospital visits. By increasing the number of in-network ER physician hours, plans reduce the average cost per hospital visit. I show that as the marginal cost of primary care physician hours increases, plans substitute away from primary care physicians and toward ER physicians. Similarly, as the marginal cost of in-network ER physician hours increases, plans substitute away from in-network ER physicians and toward primary care physicians.

The model generates different predictions for different markets. The predictions depend on whether insurers compete with hospital plans or with physician plans. When hospital plans form exclusive contracts with their ER physicians, they reduce the short run supply of ER physicians available to insurers. As the supply of ER physicians decreases, the marginal cost of ER physicians increases. As a result, insurers substitute away from ER physicians and toward primary care physicians. The increase in primary care physicians leads to fewer hospital visits in markets where hospital plans form exclusive networks.

Similarly, when physician plans form exclusive contracts with their primary care physicians, they reduce the short run supply of primary care physicians available to insurers. As the supply of primary care physicians decreases, the marginal cost of primary care physicians increases. Insurers then substitute away from primary care physicians and toward in-network ER physicians. The increase in ER physician networks reduces the average cost per hospital visit in markets where physician-owned plans form exclusive networks. Since the number of hospital visits decreased

after a hospital plan entered the Northeast Florida reform market and the average cost per hospital visit decreased after physician plans entered the Southeast Florida reform market, the model explains the empirical effects of Florida's reform quite well.

This paper is organized into the following sections: Section 2 describes the costs and benefits of fee-for-service and managed care and reviews the Medicaid managed care literature. It also describes the institutional features of Florida's 2006 Medicaid Reform and compares it to reforms in other states. Section 3 solves the cost minimization problem for managed care plans and explains how plans choose their strategies in different markets. Section 4 describes the hospital discharge data and the difference-in-differences empirical strategy. Section 5 presents the results for hospital costs and shows how managed care plans in different markets reduced costs. Section 6 summarizes the paper's contributions and presents ideas for future work.

2 Fee-For-Service (FFS) versus Managed Care

This section describes the differences between fee-for-service and managed care for Medicaid beneficiaries. The main difference between FFS and managed care is that managed care plans have incentives to reduce healthcare costs and utilization. However, states design their Medicaid managed care programs differently, so the Medicaid managed care literature has reached different conclusions about whether managed care plans actually reduce costs or utilization. In this paper, I show that the institutional features of state Medicaid programs affect how managed care plans reduce costs, so in this section, I discuss the key features of Florida's 2006 Medicaid Reform and I compare Florida's reform to Medicaid reforms in other states.

2.1 Incentives Under FFS and Managed Care

Medicaid in the United States has two general models for healthcare delivery. Under fee-for-service (FFS) delivery, Medicaid beneficiaries can visit any healthcare provider and the provider receives a fee for every service that she provides the beneficiary. States set Medicaid fees for all types of healthcare providers including physicians and hospitals.[1] Under managed care delivery, Medicaid beneficiaries enroll in a state-authorized health plan and the health plan is responsible for managing the beneficiaries' care. States use different forms of reimbursement to incentivize managed care plans to reduce healthcare costs relative to the FFS system. The most common

[1]Florida Medicaid establishes a fee for every service for every type of licensed healthcare practitioner. Inpatient hospital fees are flat fees per visit-day, where the fee is a function of the hospital's total costs for treating Medicaid patients. The hospital fees have arbitrary ceilings that vary across counties and healthcare regions. Physician fees are flat fees per service and they do not vary across regions. All fees are updated annually.

form of reimbursement is a flat per-member-per-month fee (capitation) for each beneficiary that the plans enroll.[2]

Medicaid managed care plans have incentives to reduce their healthcare costs relative to the FFS system to remain profitable. State governments only reimburse managed care plans up to a limit, so plans absorb financial losses if their healthcare costs exceed the government limit. Mathematically, if plan profits equal total revenue minus total costs, then plans are profitable when their total revenue exceeds their total costs. Total revenue equals the capitation fee times the number of beneficiaries in the plan. Total costs equal the average cost per medical visit times the number of visits. Therefore, plans have an incentive to reduce either the average cost per visit and/or the number of visits to reduce their total healthcare costs.

Relative to the managed care system, the FFS system is criticized for three reasons. The primary criticism is that FFS encourages the overutilization of medical resources (McGuire 2000;[34] Wennberg 2010[42]). If healthcare providers are reimbursed for how much medical care they provide, then they will provide more care, all else equal. Other criticisms of FFS include: (2) governments are less efficient than markets at determining the optimal price per service, so some services are priced too high while others are priced too low, and (3) the low prices under Medicaid FFS discourage providers from accepting Medicaid patients. The primary justification for switching Medicaid beneficiaries to a market-oriented system, where managed care plans compete for enrollees and receive capitation fees, is that plans will be able to identify and eliminate the inefficiencies in the FFS system.

How states determine capitation fees, however, affects how managed care plans reduce costs.[3] Capitations are the maximum dollar amount that the state reimburses managed care plans per enrollee. States often calculate capitation fees using historical FFS claims from the Medicaid population. For example, states estimate average costs per beneficiary based on the average FFS cost per visit and the average number of visits per beneficiary.[4] Then states discount these rates by 5-10% to glean cost-savings from managed care (Holahan et al. 1998[27]).[5] This means that if

[2]Other types of reimbursement options include prepaid health plans and shared savings. Prepaid health plans receive a fixed per member per month fee for a limited, pre-defined set of services. Florida's reform did not feature prepaid health plans, although Florida Medicaid has a separate prepaid health plan program for behavioral services. Shared savings plans receive fee-for-service, but if their total costs exceed the would-be capitation, then the plans pay a penalty. If their total costs are less than the would-be capitation, then they keep the difference. Florida's reform featured shared savings plans and capitated plans.

[3]Not all states set their capitation fees. CA elicited bids from managed care plans for its Medicaid Reform (Aizer et al. 2007;[2] Duggan et al. 2004[18]).

[4]States vary in their sophistication with risk-adjustment. Pre-reform, Florida risk-adjusted capitation fees based on sex, age, region, and Medicaid eligibility (e.g., TANF males ages 0-1 in Region 4). Post-reform, Florida phased in a system of risk-adjustment that also accounted for prescription drug usage.

[5]CMS waivers require that states achieve budget neutrality from mandated managed care. Budget neutrality is measured in the following way: First states calculate total expenditures for the mandated population under FFS using historical claims records and project that amount into the future (accounting for a growth rate and inflation). Then

Medicaid beneficiaries have historically few medical visits under FFS or if the state has historically low FFS fees, then capitations will be lower and managed care plans may have trouble reducing costs. On the other hand, if the FFS system generated inefficiently high numbers of medical visits, inefficiently high-cost treatments, or inefficiently high fees, then managed care plans may have opportunities to reduce costs. Florida Medicaid set very low provider fees under FFS (Goin and Zuckerman 2012 [23]), so Florida's managed care plans were less likely to reduce the average price per visit, but they were potentially capable of reducing the number of visits or the amount of care provided per visit.

2.2 History of Medicaid Managed Care

The evolution from FFS to managed care has occurred in four phases and Florida's 2006 Reform falls under the most recent phase.[6] Medicaid managed care began in the 1970s, but it accelerated through the 1990s as it became the preferred healthcare delivery system for most states (Iglehart 2011 [29]). The percentage of Medicaid beneficiaries in some form of managed care grew from 10% in 1991 to 72% in 2011. The earliest form of "managed care" was called primary care case management (PCCM), which meant that a primary care physician gatekeeper was responsible for providing preventative care, treating nonemergency conditions, and issuing referrals, but all healthcare providers continued to receive FFS reimbursements from the state. The drawback of PCCM was that it did not incentivize providers to treat patients more efficiently because they continued to receive FFS reimbursements from the state. The purpose of Florida's 2006 Reform was to switch beneficiaries from the PCCM program to capitated managed care plans.

The second phase of Medicaid managed care introduced capitated health plans, but Medicaid beneficiaries voluntarily enrolled in these plans. Insurer-owned plans (e.g., health maintenance organizations (HMOs)) were the most common form of capitated health plan.[7] Insurer-owned plans assigned beneficiaries to primary care physicians who were responsible for issuing referrals to other providers. Insurers also constructed low-cost networks of healthcare providers and, where possible, steered beneficiaries to in-network providers. Throughout the 1990s-2000s, Medicaid beneficiaries in Florida had the option to enroll in insurer-owned plans, but enrolling in these plans was voluntary. The drawback to voluntary managed care was that plans could profit by selecting the healthiest patients instead of finding ways to treat patients more efficiently.

The third phase of Medicaid managed care *mandated* that beneficiaries switch from FFS to

states estimate total expenditures under a managed care system with capitation fees and project that amount into the future. Budget neutrality requires that the latter amount not exceed the former amount. Florida discounted its capitation fees by approximately 7% to achieve budget neutrality.

[6] Glied (2000) [22] reviews the first three phases of managed care.

[7] Other types of plans include provider service networks, community organized health systems, and prepaid health plans. Insurer-owned plans can be Medicaid-Medicare-only HMOs and/or commercial HMOs.

capitated managed care plans. Whereas most of the early managed care enrollment was voluntary, the Balanced Budget Act (BBA) of 1997 made it easier for states to require that beneficiaries enroll in managed care.[8] As a result, states like California, New York, Tennessee, Washington, and Wisconsin mandated that Medicaid children and families (TANF-eligible) enroll in capitated managed care plans. Florida, however, did not mandate beneficiaries into managed care plans until its 2006 reform. The drawback to managed care mandates for only children and families is that those groups have the lowest healthcare costs among Medicaid beneficiaries. The aged and disabled beneficiaries have much higher healthcare costs and they remained in the FFS system.

The fourth phase of managed care is happening now. States want to enroll most, if not all, of their Medicaid beneficiaries into managed care plans and they want to offer more managed care plan options (Carroll 2011 [8]). Since 2005, several states have sought federal approval to mandate their aged and disabled (SSI-related) beneficiaries enroll in managed care.[9] SSI beneficiaries have more complex healthcare needs than TANF beneficiaries and they are, on average, more expensive than TANF beneficiaries. Therefore, states hope to achieve greater cost-savings from requiring SSI beneficiaries to enroll in managed care. Some states also want to offer managed care plans that are owned and operated by healthcare providers and these plans will compete with the traditional insurer-owned plans.[10]

Florida's 2006 Medicaid Reform is one of the most innovative managed care reforms for two reasons. First, the reform mandated that aged and disabled beneficiaries, in addition to children and families, switch from FFS to managed care plans. Fewer states have mandated that aged and disabled beneficiaries enroll in managed care and there is very little research about how managed care affects these types of beneficiaries. Second, Florida's reform offers a wider range of managed care plans for beneficiaries to choose from. Beneficiaries can choose the standard insurer-owned plans, which are similar to the managed care options in other states, or beneficiaries can choose provider-owned plans, which are similar to the Accountable Care Organizations offered by Medicare. Because beneficiaries have more plan options, Florida's reform offers an opportunity to study how competition between insurer-owned plans and provider-owned plans affects insurers' strategies to reduce costs. Therefore, this paper offers insights to policymakers who would like to implement similar reforms in other states.

[8] Prior to the 1997 Balanced Budget Act (BBA), states had to obtain pre-approval from the Centers for Medicare and Medicaid Services (CMS) to require beneficiaries to enroll in managed care. The BBA, however, allowed states to enroll children and families in managed care without obtaining pre-approval from CMS.

[9] AZ, CA, IL, NJ, NY, TN, TX, and WV are some examples of states that either have expanded or expect to expand mandatory managed care to their aged and disabled populations.

[10] AL, IL, MI, and NY are some examples of states that either currently offer or expect to offer provider-owned managed care plans. There has been a growing interest in provider-owned plans for Medicaid beneficiaries since the 2009 Affordable Care Act promoted the use of provider plans for Medicare beneficiaries.

2.3 Research on Medicaid Managed Care Reforms

The central question in the Medicaid managed care literature is, how does managed care affect healthcare utilization, costs, and outcomes? The literature has produced mixed results, largely because states design and implement their managed care programs differently and because managed care has evolved so much over time (Howell et al. 2012[28]).[11] The most common finding is that managed care plans reduce the number of unnecessary emergency room visits and hospitalizations (Baker and Afendulis 2005;[4] Bindman et al. 2005;[6] Dombkowski et al. (2004); Garret et al. 2003;[21] Marton et al. 2014[33]). One potential explanation for the reduction in unnecessary hospital visits is that managed care plans provide better access to primary care (Coughlin et al. 2009;[11] Levinson and Ullman 1998[31]). These findings are far from definitive, however, because some papers find no effects of managed care on primary care access (Basu et al. 2004;[5] Herring and Adams 2010[26]) and other papers find worse access to primary care for some beneficiaries, particularly pregnant women (Aizer et al. 2007;[2] Conover et al. 2001;[10] Currie and Fahr 2005;[13] Kaestner et al. 2005[30]).

A key result from the managed care literature is that plans will not improve access to primary care for beneficiaries who are capable of being carved out. Carve-outs refer to situations in which managed care plans can drop beneficiaries from coverage when they become too expensive, which most often occurs after the onset of a serious medical condition. The carved-out beneficiaries are then re-enrolled in the state's FFS program. When managed care plans are not required to cover high-risk pregnancies, for example, the incentive to provide high-quality prenatal care is eliminated (Aizer et al. 2007[2]).

Fewer studies have determined how managed care affects government expenditures. Duggan and Hayford (2011)[19] find that mandated managed care has not reduced total healthcare expenditures in the average state, and in the states where it has reduced expenditures, the authors suggest that the savings come from lower prices rather than lower utilization. Their hypothesis is that managed care plans can more easily negotiate lower prices with providers in states with high baseline fee-for-service fees. The trouble with this kind of state-level analysis is that states determine their capitation fees differently, they mandate different groups of beneficiaries into managed care plans, and they allow different carve-out services. It is therefore difficult to identify why total expenditures changed in some states, but not others, without taking account of these factors.

One way to account for the institutional differences across managed care programs is to conduct analysis within one state as opposed to comparing multiple states. Duggan (2004)[18] evaluates the rollout of mandated managed care for children and families in California from 1993-1999. He finds

[11] Though the Medicaid managed care literature has reached mixed conclusions, research on managed care in the private health insurance market has shown that managed care plans reduce healthcare costs by reducing healthcare utilization (Glied 2000)[22] and by reducing prices paid to healthcare providers (Cutler et al. 2000[14]).

that mandated managed care increased healthcare expenditures by 17% and it did not improve health outcomes. One interpretation of Duggan's (2004) findings is that California designed its managed care program sub-optimally. For example, CA did not set its capitation fees or allow managed care plans to compete in all counties, as Florida did in 2006. Instead, the state elicited bids for capitation fees from managed care plans and only permitted competition in certain counties. Notably, total expenditures did not increase by as much or as consistently in counties with two managed care plans. Expenditures primarily increased in counties with one plan. This highlights how institutional features can determine the efficacy of healthcare reforms.

Two recent papers by Harman et al. (2011)[24] and Harman et al. (2014)[25] show how Florida's 2006 Medicaid Reform affected total government expenditures on Medicaid. They find no effects on total expenditures in the two years post-reform and they find small decreases in expenditures four years post-reform. One limitation of estimating managed care's effects on government expenditures, however, is that total expenditures are largely determined by the capitation fee set by the state. If Florida sets its capitation fee equal to the expected costs under the FFS system, then even if managed care plans reduced costs, the difference between the capitation fee and the managed care plan's costs is the plan's profit, which is generally unobservable in Medicaid claims data.[12] It is arguably more important to show that managed care plans incur lower costs than the government does under FFS, because then states might be able to reduce their capitation fees and still have functioning Medicaid delivery systems. For that reason, this paper investigates whether Florida's managed care plans reduced hospital costs relative to the FFS system and focuses on the strategies that plans took to reduce costs.

Despite the incomplete evidence on the effects of managed care on healthcare utilization, costs, and outcomes, many states continue to expand their managed care programs (Draper et al. 2004;[17] Iglehart et al. 2011;[29] Libersky et al. 2013[32]). This paper offers two contributions to the states that wish to expand mandated managed care. First, it shows that managed care plans can reduce hospital costs, which account for the largest share of Medicaid expenditures. Second, it shows that plans have leverage in how they reduce costs and that competition between insurers and providers affects insurers' strategies to reduce costs. Since the institutional features of Florida's 2006 Reform are important for contextualizing these findings, the next section describes the details of Florida's reform.

2.4 Florida's 2006 Medicaid Reform Pilot

This section discusses the institutional features of Florida's 2006 Medicaid Reform Pilot and compares it to reforms in other states. Florida's reform mandated that Medicaid beneficiaries switch

[12] Medicaid claims data report the capitation fee for Medicaid beneficiaries on managed care plans. The data usually do not report the number of medical visits per beneficiary or the costs per visit.

from the state's fee-for-service (FFS) system to managed care plans. Children, families, aged and disabled beneficiaries were required to enroll in managed care plans, while pregnant women and Medicaid-Medicare dual eligibles were not required to enroll in managed care plans.[13] The purpose of the pilot was to test run mandated managed care in a few counties and to ultimately expand the program statewide. The reform's goals were to improve access to care, improve the quality of care, reduce fraud, and lower costs.[14] Figure 1 shows that the reform affected Baker, Broward, Clay, Duval, and Nassau Counties. These counties are located in two equally-sized and distinct healthcare markets, which I will refer to as the "Northeast" and "Southeast" Florida reform markets. Though it may seem like Northeast Florida was relatively more affected by the reform, there are approximately the same number of Medicaid beneficiaries in the Northeast and Southeast reform regions.

Florida's Medicaid Reform was implemented in two waves. The first wave began in September 2006 when children, families, aged, and disabled populations, herein referred to as the "target populations," in Broward and Duval Counties were required to switch from the state's FFS system to reform-approved managed care plans. Most beneficiaries were counseled to switch plans within the first three months of implementation and all beneficiaries were required to switch plans by August 2007. If beneficiaries did not select a managed care plan, then the state automatically assigned them to a plan.[15] The second wave of reform began in September 2007 and mandated that the target populations in Baker, Clay, and Nassau counties switch from the FFS system to managed care plans. The rules and implementation were the same in both waves; however, beneficiaries in different counties had different plan options.

There were significant differences between the state's FFS "MediPass" system and the reform-approved managed care plans. The MediPass system began in 1990 and expanded statewide in 1996. Each enrollee was assigned to a primary care case manager (PCCM) who coordinated the enrollee's care. Primary care physicians and other healthcare providers registered with the state to become MediPass service providers. Under MediPass, all healthcare providers received FFS reimbursements from the state.

Insurer-owned plans (i.e., health maintenance organizations (HMOs)) are one type of reform-approved managed care plan. Insurer-owned plans are private health insurance companies that receive capitated payments from the state for each Medicaid beneficiary that they enroll. Insurers

[13]The TANF and SSI populations in five counties were required to switch from FFS to managed care plans. Pregnant women with incomes above 26% of the federal poverty level, infants between 185-200% of the federal poverty level, and Medicaid-Medicare dual eligibles were not mandated to switch plans.

[14]Florida Medicaid Reform Application for 1115 Research and Demonstration Waiver August 30, 2005: http://www.fdhc.state.fl.us/medicaid/medicaid_reform/waiver/index.shtml

[15]When beneficiaries did not select a plan within their 30-day enrollment window, the state randomly assigned them to plans. Approximately 30% of newly enrolled beneficiaries were randomly assigned to plans in the first wave of reform.

create networks of healthcare providers to treat patients and they negotiate prices with healthcare providers. Plan networks vary in size and scope, and different plans reimburse providers at different prices. Insurers typically reimburse in-network providers at lower prices than out-of-network providers, and their goal is to direct patients to in-network providers who supply care at the lowest costs.

Provider-owned plans (i.e., provider service networks (PSNs)) are another type of reform-approved managed care plan. Provider-owned plans are networks of providers that directly provided care for their enrollees. Provider plans are owned by either primary care physician groups or hospitals. Florida Medicaid reimburses provider plans on the same fee-for-service schedule as the MediPass providers, but the provider plans are partially at-risk for their enrollees' healthcare costs. If a provider plan's total healthcare costs are less than the total capitations set by the state, then the plan keeps the difference between its total healthcare costs and the total capitated reimbursement. If the plan's total healthcare costs exceed the total capitation, then the plan has to return the difference between its total costs and the total capitation with a maximum penalty equal to 50% of its administrative fee (Moewe 2006 [35]).[16] In this way, the provider plans receive the same benefits as insurers if they achieve cost-savings relative to FFS, but their losses are minimized if they did not. Thus, the primary difference between provider plans and insurers is that insurers are exposed to greater downside risk.

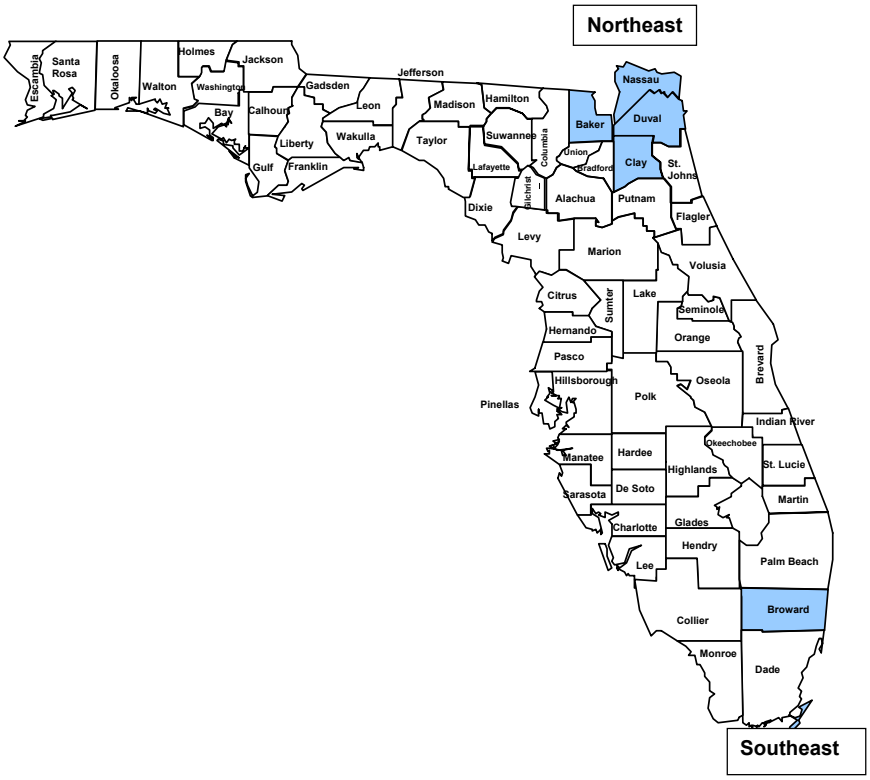
The FFS system and the reform plans differed in several key ways. Since the reform plans were at-risk for their enrollees' healthcare costs, they were allowed to employ different strategies to reduce their healthcare costs relative to the FFS system. The reform plans could vary the amount, duration, and scope of (some) medical benefits. They could vary cost-sharing to a (very) limited extent. They could conduct utilization review for medical care, which means that they could deny payment for unnecessary medical tests and procedures. However, the most significant difference between the managed care plans and the fee-for-service system was that reform plans could create networks of providers and discourage the use of out-of-network providers. Consequently, Medicaid beneficiaries on managed care plans had access to different healthcare providers than Medicaid beneficiaries on the FFS system.

Florida's reform is comparable to other state reforms along several dimensions, and it offers two innovations. Other states typically mandate that children and families switch from FFS to insurer-owned plans and states usually set capitation fees using historical FFS data. Florida's reform is innovative because it also required aged and disabled beneficiaries to switch from FFS into managed care plans and it allowed beneficiaries to choose between insurer-owned plans and provider-owned plans. At least six other states have now mandated that their aged and disabled

[16] Florida Medicaid evaluates provider plans every six months. The administrative fee is a fraction of the capitation fee and the state loans that amount to the provider plans at the start of each evaluation period.

Medicaid populations enroll in managed care plans and the US Medicare program now encourages provider plans to compete with insurers, so Florida's reform leads the way for these two types of healthcare delivery innovations.

Figure 1: Florida Medicaid Reform Counties



Source: FL AHCA's 1115 Research and Demonstration Waiver.

3 Model of Managed Care Plan Strategies

This section presents a model for how managed care plans might choose their cost-saving strategies. It shows that competition with provider plans affects how insurers choose their strategies to reduce total costs. Though insurer-owned plans operated in both of Florida's reform markets pre- and post-reform, a hospital-owned plan entered the Northeast Florida market post-reform, while physician-owned plans entered the Southeast Florida market post-reform. The model in this section generates predictions for both markets and compares those predictions to the what might have happened if insurers had only competed with other insurers post-reform.

In the model, managed care plans choose a combination of three labor inputs to minimize the total costs of producing a fixed amount of medical output. The fixed amount of medical output can be thought of as the amount of medical care that the plans' enrollees required post-reform. The three labor inputs are (1) the number of primary care physician hours, (2) the number of in-network emergency room (ER) physician hours, and (3) the number of out-of-network ER physician hours. Primary care physicians are gatekeepers who reduce the number of unnecessary hospital visits, while in-network ER physicians reduce the average cost per hospital visit. Plans reduce their total costs when their patients receive treatment from primary care physicians or in-network ER physicians compared to out-of-network ER physicians. Since some kinds of medical conditions require medical care from primary care physicians and hospitals, while other conditions require primary care or hospital care only, the model allows plans to imperfectly substitute between primary care physicians and ER physicians.

This section proceeds in three steps. First, I solve the cost minimization problem for a representative managed care plan. Second, I discuss how provider plans can form exclusive networks with their physicians, which affects the marginal cost to insurers of forming their own physician networks. Third, I relate the discussion to Florida's reform markets and show how the entry of different types of provider plans generates different predictions for Florida's markets.

3.1 Cost Minimization Problem

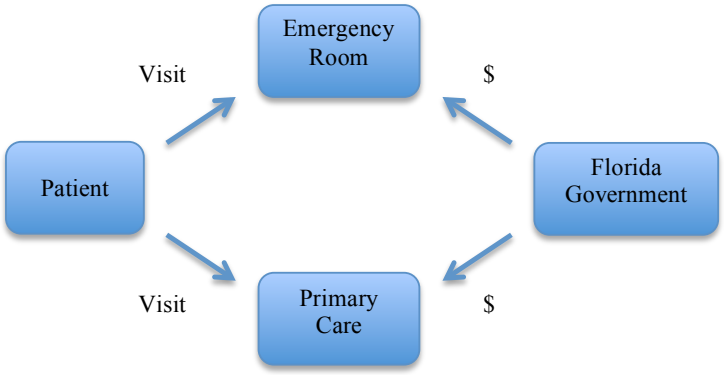
Background: Prior to Florida's Medicaid reform, approximately 50% of Medicaid beneficiaries were enrolled in the state's fee-for-service (FFS) system. Figure 2 presents a stylized description of how FFS operated. Patients could visit primary care providers or hospital emergency rooms to receive medical care. Florida Medicaid reimbursed primary care providers and hospitals with a fee for every service that they provided the patients.

Post-reform, Medicaid beneficiaries were required to choose a managed care plan. Figure 3 depicts the types of plans that were available. Patients could choose (1) insurer-owned plans, (2) hospital-owned plans, or (3) physician-owned plans. Once they chose a plan, they were locked into their plan for a year. Plans were available at the county-level, so beneficiaries in different counties had different options. Beneficiaries in Southeast Florida could choose between insurer-owned plans, physician-owned plans, and a physician-hospital hybrid plan. Beneficiaries in Northeast Florida could choose between insurer-owned plans and a hospital-owned plan. The fact that insurers operated in both markets, but different types of provider plans entered different markets, allows me to test whether the insurers' strategies to reduce costs could have been affected by competition with different types of provider plans.

Agents: At the start of reform, plans expect that their enrollees will require a fixed amount of

medical care, $\bar{V}$. When enrollees require medical care, they can visit a primary care provider, an in-network emergency room physician, or an out-of-network emergency room physician. Enrollees are less likely to visit the hospital when their managed care plan has a larger primary care physician network. Similarly, enrollees are less likely to visit out-of-network ER physicians when their managed care plan has a larger ER physician network.[17] Given these facts, plans choose the number of primary care physician hours (PCP), the number of in-network ER physician hours (ER_I), and the number of out-of-network ER physician hours (ER_O) to minimize the total costs of providing a fixed amount of medical care, $\bar{V}$.[18]

Figure 2: Pre-Reform Fee-For-Service



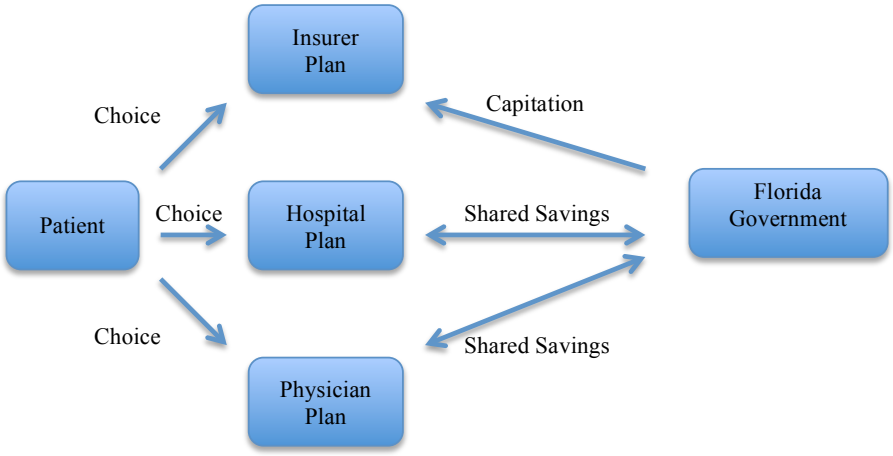
Notes: Pre-reform, 50% of Medicaid beneficiaries were in the FFS system, while the other 50% were voluntarily enrolled in insurer-owned plans.

[17]The same emergency room can have in-network and out-of-network ER physicians on staff, so patients do not necessarily have to visit a different emergency room to receive treatment from an in-network ER physician. A recent New York Times article discusses how out-of-network ER physicians can work at in-network hospitals (Rosenthal 2014[38]).

[18]The model is written for a representative managed care plan, which means it is applicable to include insurer-owned plans or provider-owned plans. Florida Medicaid reimbursed insurer plans and provider plans differently, but under one assumption, they had the same incentives to reduce costs relative to the FFS system. Florida Medicaid reimbursed insurers a flat fee per enrollee (i.e., capitation) and it shared savings with provider plans. The "shared savings" program worked as follows: Provider plans provided medical care to their enrollees and charged Florida Medicaid a fee for every service (FFS) that they provided. Every six months, Florida Medicaid compared the provider plan's total costs to what the costs would have been if the provider plan had received capitation reimbursements. If the total costs were less than the total capitations, then the state would refund the difference to the plan (i.e., a shared-savings bonus). If, however, the plan's total costs exceeded the total capitation, then the plan would refund the difference to the state, up to a maximum penalty (i.e., a shared-savings penalty).[19]

The main difference between the insurers and the provider plans is that the provider plans had limited downside risk. If the difference between the provider plans' total costs and the total capitaitons was less than the maximum penalty, then the provider plans faced the same incentives as the insurers. Florida Medicaid intended to convert the provider plans to capitation in 2009 and it had the authority to discontinue contracts, so for the purposes of the model, I assume that the provider plans had the same incentives as the insurers to reduce their total costs.

Figure 3: Post-Reform Plan Choice



Notes: Post-reform, Medicaid beneficiaries in the reform counties were mandated to enroll in (1) insurer-owned plans, (2) a hospital-owned plan, or (3) physician-owned plans. Insurers received capitation reimbursements from the state, while the hospital plan and the physician plans received share-savings reimbursements. Different plans were available in different counties, so beneficiaries in different counties did not necessarily have the same options. Post-reform, Medicaid beneficiaries in the non-reform counties had the same options that they had pre-reform: they could stay in the fee-for-service system or they could voluntarily enroll in a managed care plan.

Exogenous Variables: Each plan minimizes its total costs to produce a fixed amount of medical output, $\bar{V}$. Total costs include the costs to treat patients plus the costs to keep physicians in-network. The cost to treat patients varies with physician type, so $\bar{C}_{PCP}$ is the hourly cost of primary care physicians, $\bar{C}_{ER_I}$ is the hourly cost of an in-network ER physician, and $\bar{C}_{ER_O}$ is the hourly cost of an out-of-network ER physician. I assume that all medical tests, procedures, supplies, facility fees, ancillary staff, etc. are contained in these hourly costs, and I assume that $\bar{C}_{PCP} < \bar{C}_{ER_I} < \bar{C}_{ER_O}$.[20] The costs to keep physicians in-network equal $W \times H$, where W is the hourly price per physician and H is the number of physician hours the plan chooses for its network. $W \times H$ can be decomposed into the price to keep primary care physicians in-network (w_{PCP}) and the price to keep ER physicians in-network (w_{ER}), so $W \times H = w_{PCP}PCP + w_{ER}ER_I$.

Production Function for Medical Care: The production function for medical care is Cobb-Douglas with constant returns to scale and an elasticity of substitution equal to one. It takes the form,

$$\bar{V} = ER_I^{\alpha} ER_O^{\beta} PCP^{1-\alpha-\beta},\ 0 < \alpha < 1,\ 0 < \beta < 1,\ 0 \leq \alpha + \beta \leq 1$$

[20] These cost functions could be much more complex, but this simple model has enough structure to capture the intuition behind the plans' optimization problem.

Solving the production function for ER_O gives,

$$ER_O = \bar{V}^{\frac{1}{\beta}} ER_I^{\frac{-\alpha}{\beta}} PCP^{\frac{\alpha+\beta-1}{\beta}}$$

Cost Minimization Problem: Now each plan chooses the number of primary care physician hours (PCP), the number of in-network ER physician hours (ER_I), and the number of out-of-network ER physician hours (ER_O) to solve:

$$\begin{aligned}
\min_{PCP,ER_I,ER_O} TC &= \bar{C}_{PCP} PCP + \bar{C}_{ER_I} ER_I + \bar{C}_{ER_O} ER_O + w_{PCP} PCP + w_{ER_I} ER_I \\
&\quad st: ER_O = \bar{V}^{\frac{1}{\beta}} ER_I^{\frac{-\alpha}{\beta}} PCP^{\frac{\alpha+\beta-1}{\beta}} \\
\min_{PCP,ER_I} TC &= (\bar{C}_{PCP} + w_{PCP}) PCP + (\bar{C}_{ER_I} + w_{ER}) ER_I + \bar{C}_{ER_O} \bar{V}^{\frac{1}{\beta}} ER_I^{\frac{-\alpha}{\beta}} PCP^{\frac{\alpha+\beta-1}{\beta}}
\end{aligned}$$

First-Order Conditions: The FOCs of the plan's cost minimization problem are:

$$\begin{aligned}
\frac{\partial TC}{\partial PCP} &= \bar{C}_{PCP} + w_{PCP} + \bar{C}_{ER_O} \left(\frac{\alpha+\beta-1}{\beta} \right) \bar{V}^{\frac{1}{\beta}} ER_I^{\frac{-\alpha}{\beta}} PCP^{\frac{\alpha-1}{\beta}} = 0 \\
\frac{\partial TC}{\partial ER_I} &= \bar{C}_{ER_I} + w_{ER_I} + \bar{C}_{ER_O} \left(\frac{-\alpha}{\beta} \right) \bar{V}^{\frac{1}{\beta}} ER_I^{\frac{-\alpha-\beta}{\beta}} PCP^{\frac{\alpha+\beta-1}{\beta}} = 0
\end{aligned}$$

Model Solution: Solving the system yields:

$$\begin{aligned}
PCP^* &= \bar{V} \times \frac{(1-\alpha-\beta)^{\alpha+\beta}}{\alpha^\alpha \beta^\beta} \times \left[\frac{MC_{ER_I}^\alpha \times MC_{ER_O}^\beta}{MC_{PCP}^{\alpha+\beta}} \right] \\
ER_I^* &= \bar{V} \times \frac{\alpha^{1-\alpha}}{\beta^\beta (1-\alpha-\beta)^{1-\alpha-\beta}} \times \left[\frac{MC_{PCP}^{1-\alpha-\beta} \times MC_{ER_O}^\beta}{MC_{ER_I}^{1-\alpha}} \right] \\
ER_O^* &= \bar{V} \times \frac{\beta^{1-\beta}}{\alpha^\alpha (1-\alpha-\beta)^{1-\alpha-\beta}} \left[\frac{MC_{PCP}^{1-\alpha-\beta} \times MC_{ER_I}^\alpha}{MC_{ER_O}^{1-\beta}} \right]
\end{aligned}$$

where MC_{PCP} is the marginal cost of one additional primary care physician hour, MC_{ER_I} is the marginal cost of one additional in-network ER physician hour, and MC_{ER_O} is the marginal cost one additional out-of-network ER physician hour. I assume that all marginal costs are positive.

Specifically,

$$\begin{aligned} MC_{PCP} &= \bar{C}_{PCP} + w_{PCP} > 0 \\ MC_{ER_I} &= \bar{C}_{ER_I} + w_{ER} > 0 \\ MC_{ER_O} &= \bar{C}_{ER_O} > 0 \end{aligned}$$

Comparative Statics: It can be seen quite easily that the own-price elasticities of demand are negative while the cross-price elasticities of demand are positive. To illustrate, I show how the optimal demand for primary care physician hours (PCP^*) changes with respect to the marginal cost of primary care physician hours (MC_{PCP}), the marginal cost of in-network ER physician hours (MC_{ER_I}), and the marginal cost of out-of-network ER physician hours (MC_{ER_O}).[21] As the marginal cost of primary care physicians increases, plans substitute away from primary care physicians and toward ER physicians. Similarly, as the marginal cost of in-network or out-of-network ER physicians increases, plans substitute away from ER physicians and toward primary care physicians.

$$\begin{aligned} \frac{\partial PCP^*}{\partial MC_{PCP}} &= (-\alpha-\beta) \times \bar{V} \times \frac{(1-\alpha-\beta)^{\alpha+\beta}}{\alpha^\alpha \beta^\beta} \times \left[\frac{MC_{ER_I}^{\alpha} \times MC_{ER_O}^{\beta}}{MC_{PCP}^{\alpha+\beta+1}} \right] < 0 \\ \frac{\partial PCP^*}{\partial MC_{ER_I}} &= \alpha \times \bar{V} \times \frac{(1-\alpha-\beta)^{\alpha+\beta}}{\alpha^\alpha \beta^\beta} \times \left[\frac{MC_{ER_I}^{\alpha-1} \times MC_{ER_O}^{\beta}}{MC_{PCP}^{\alpha+\beta}} \right] > 0 \\ \frac{\partial PCP^*}{\partial MC_{ER_O}} &= \beta \times \bar{V} \times \frac{(1-\alpha-\beta)^{\alpha+\beta}}{(\alpha\beta)^\alpha} \times \left[\frac{MC_{ER_I}^{\alpha} \times MC_{ER_O}^{\beta-1}}{MC_{PCP}^{\alpha+\beta}} \right] > 0 \end{aligned}$$

Equilibrium Predictions: The model generates optimal labor demand functions for a representative plan for every quantity of medical output that the plan produces. Importantly, the model shows what would happen in a baseline case when, for example, insurers only compete with other insurers in the same market.[22] The model predicts that insurers will choose a combination of primary care physician hours, in-network ER physician hours, and out-of-network ER physician hours to produce a given amount of medical care. Because insurers optimize their primary care and ER physician networks, they will reduce their total costs by reducing both the number of hospital visits *and* the average cost per visit relative to the FFS system. The model's comparative statics, however, generate two additional hypotheses that can be tested empirically.

[21] The full set of comparative statics appear in Appendix B.

[22] I assume that insurer-owned plans are not vertically-integrated and do not form exclusive networks with their physicians.

Hypothesis 1: If the cost to keep ER physicians in-network (w_{ER}) increases, then plans will substitute away from ER physicians and toward primary care physicians. Assuming that the substitution effect dominates, plans will choose larger primary care physician networks and smaller ER physician networks compared to the baseline case where w_{ER} does not change.[23] Therefore, an increase in w_{ER} will lead to a decrease in the number of unnecessary hospitalizations and an increase in the average cost per hospital visit relative to the baseline case.

Hypothesis 2: If the cost to keep primary care physicians in-network (w_{PCP}) increases, then plans will substitute away from primary care physicians and toward ER physicians. Assuming that the substitution effect dominates, plans will choose smaller primary care physician networks and larger ER physician networks compared to the baseline case where w_{PCP} does not change. Therefore, an increase in w_{PCP} will lead to an increase in the number of unnecessary hospital visits and a decrease in the average cost per hospital visit relative to the baseline case.

3.2 The Effects of Exclusive Networks

The model predicts that entry by provider plans will affect insurers' strategies to reduce costs and that the effects will depend on which types of provider plans enter the market. The previous section showed that insurers will minimize their total costs by choosing the number of primary care physicians and ER physicians for their networks. Their optimal choices will result in fewer hospital visits *and* lower average costs per hospital visit relative to the FFS system. This section and the next section use the intuition of a market foreclosure model to show that insurers have fewer strategies when provider plans enter the market. Market foreclosure occurs when a downstream buyer (insurer) is denied access to an upstream supplier (provider), and it can occur when the upstream supplier has increased market power as a result of vertical integration (Asker 2005 [3]).

Market foreclosure is possible under Florida's Medicaid reform because Florida encourages entry of vertically-integrated, provider-owned plans. Florida's three types of managed care plans include (1) insurer-owned plans, (2) hospital-owned plans, and (3) physician-owned plans. Hospital-owned plans and physician-owned plans are vertically-integrated plans, meaning that they own some of the upstream production of medical care. Hospital plans own the upstream production of hospital care, but they create networks of primary care physicians. Physician plans own the upstream production of primary care, but they create networks of hospitals. Insurers are not vertically integrated, so they create networks of primary care physicians and hospitals.

Vertical integration means that the upstream firm can form an exclusive contract with the downstream firm.[24] In the case of Florida's reform, the vertically-integrated physicians (upstream firms)

[23] For example, if plans cannot adjust $\bar{V}$ in the short run, then the substitution effect will necessarily dominate.

[24] Please see Gaynor and Town (2011) [20] for a review of the theoretical literature on vertical restraints in healthcare. There is very little empirical literature on the effects of vertical restraints in healthcare because it is a relatively new

formed exclusive *networks*, rather than exclusive contracts, with their downstream partners. The exclusive networks prohibited the vertically-integrated physicians from joining other plan networks (other downstream firms). The exclusive networks did not necessarily preclude the vertically-integrated physicians from treating out-of-network patients, but it did preclude them from treating out-of-network patients at in-network costs.

As in the foreclosure model, the provider plans' exclusive networks restricted the short run supply of physicians available for the insurers' networks. As the short run supply of physicians decreased, the marginal cost of recruiting the remaining physicians to an insurer network increased. For example, when a large hospital formed a vertically integrated plan in Northeast Florida, the cost to insurers of forming networks with the remaining ER physicians, w_{ER}, increased. Similarly, when physician groups formed vertically integrated plans in Southeast Florida, the cost to insurers of forming networks with the remaining primary care physicians, w_{PCP}, increased. As a result, insurers in Northeast Florida chose smaller ER physician networks and insurers in Southeast Florida chose smaller primary care physician networks compared to what they would have chosen in the absence of provider plan entry.

3.3 Application to Florida's Reform Markets

This paper shows that Florida's managed care plans reduced hospital costs relative to the FFS system; however, it also shows that insurers in different markets adopted different strategies to reduce costs. Solving the representative plan's cost minimization problem shows that its optimal strategies depend on the relative costs of using primary care physicians, in-network ER physicians, and out-of-network ER physicians to treat patients. This section discusses how the marginal costs of adding primary care and ER physicians to insurer networks differed across Florida's two reform markets and how competition with different provider plans explains the differences across markets.

Northeast Florida

The Northeast Florida market featured a hospital-owned plan and four insurer-owned plans. The University of Florida at Shands-Jacksonville Hospital (Shands-Jacksonville) created a vertically-integrated hospital plan in 2006, and it operated with 20% market share, while the insurer-owned plans had a combined 80% market share. When the Shands-Jacksonville plan entered the reform market, it formed an exclusive network with its ER physicians, thereby reducing the short run supply of ER physicians available to the insurers. As the supply of ER physicians decreased, insurers faced higher costs of adding ER physicians to their networks. As a result, insurers in

phenomenon. Gaynor and Town write, "Nonetheless, there are reports that vertical integration and exclusive deals are on the increase in healthcare, in part because of elements in the healthcare reform law."

Northeast Florida substituted away from ER physicians and toward primary care physicians, which resulted in fewer nonemergency hospital visits, but higher average costs per visit relative to what would have happened under insurer-insurer competition. From the model,

(1) w_{ER} increased post-reform.

(2) From the optimal demand functions, $\frac{\partial ER_I^*}{\partial w_{ER}} < 0$ and $\frac{\partial PCP^*}{\partial w_{ER}} > 0$.

(3) Insurers in Northeast Florida increased the number of primary care physician hours and decreased the number of in-network ER physician hours.

(4) As the number of primary care physician hours increased, the number of nonemergency hospital visits decreased. As the number of ER physicians decreased, the average cost per visit increased.

(5) The total costs to producing the same amount of medical output increased relative to what they would have been under insurer-insurer competition.

Southeast Florida

The Southeast Florida market featured two physician plans, a physician-hospital hybrid plan, and nine insurer plans.[25] The physician plans had 22% market share, while the insurers had 78% market share. When the physician plans became reform plans in 2006, they formed exclusive networks with their primary care physicians, which reduced the short run supply of primary care physicians available to the insurers. As the supply of primary care physicians decreased, insurers faced higher costs of adding primary care physicians to their networks. As a result, insurers in Southeast Florida substituted away from primary care physicians and toward ER physicians, which resulted in more nonemergency hospital visits, but lower average costs per hospital visit relative to what would have happened under insurer-insurer competition. From the model,

(1) w_{PCP} increased post-reform.

(2) From the optimal demand functions, $\frac{\partial ER_I^*}{\partial w_{PCP}} > 0$ and $\frac{\partial PCP^*}{\partial w_{PCP}} < 0$.

(3) Insurers in Southeast Florida increased the number of in-network ER physician hours and decreased the number of primary care physician hours.

[25] The physician-hospital hybrid was a partnership between two hospital systems that spanned 8 hospitals and 2 physician groups. The physician-hospital hybrid plan had been operating as a managed care plan since 2001 and, perhaps due to the fact that it was a partnership, I find no evidence that it formed exclusive networks with its physicians. Thus, for simplification, I classify the physician-hospital hybrid plan as a physician plan that did not participate in foreclosure.

(4) As the number of in-network ER physician hours increased, the average cost per hospital visit decreased. As the number of primary care physicians decreased, the number of nonemergency hospital visits increased.

(5) The total costs to producing the same amount of medical output increased relative to what they would have been under insurer-insurer competition.

Conclusion: When provider plans entered the reform markets, they increased the marginal cost of physicians to insurer-owned plans. If insurers could have adjusted their output, $\bar{V}$, then they would have produced less medical output in response to the increase in the price of one of their inputs. However, if their medical output was fixed in the short run, then insurers would have produced the same amount of output, but at higher total costs. Therefore, the results suggest that insurers may have been able to decrease their total costs by more if the provider plans had not entered the markets or if the provider plans had not formed exclusive networks.

4 Hospital Discharge Data and the Empirical Method

This section describes the empirical strategy that tests the model's predictions from the previous section. First, I estimate a difference-in-difference model to determine whether managed care plans reduced hospital costs post-reform. The model compares total hospital costs for Medicaid beneficiaries in reform counties to similar beneficiaries in non-reform counties pre- and post-reform. Second, I investigate whether plans in different markets reduced costs in different ways. Estimating the heterogeneous effects of the reform across different markets tests whether market structure could have affected plan strategies to reduce costs.

4.1 Sample

The empirical analysis uses two types of data. The first data source is county-level enrollment data from the Florida Agency for Healthcare Administration (FL AHCA). The enrollment data show how enrollment in fee-for-service (FFS), insurer-owned plans, and provider-owned plans changed post-reform. The AHCA data show that Florida's reform dramatically increased enrollment in managed care plans. The second data source is visit-level emergency room (ER) and hospitalization discharge data for the years 2005-2008.[26] The ER and hospitalization data contain information about hospital care for all types of patients pre- and post-reform. To evaluate the effects of the reform, I restrict the sample to Medicaid visits for non-pregnant patients ages 0-64 in reform and

[26]The time period is restricted to 2005-2008 because the ER data is not available before 2005.

non-reform counties. I restrict the sample in this way because these are the types of patients who were targeted by the reform.

4.2 Reform versus Non-Reform Counties

Since the empirical strategy is a difference-in-difference model across the reform and non-reform counties, it is important to consider why the reform counties were chosen and how the reform and non-reform counties differed. One concern is that Baker, Broward, Clay, Duval, and Nassau were endogenously chosen, for example, because Florida Medicaid believed that those counties would perform particularly well under reform. If that were the case, then this paper's results would have limited applicability in other settings, so this section shows that the reform counties were not very different from the non-reform counties and that the counties were chosen largely because the senators who designed the Medicaid Reform Bill represented those districts.

The reform counties were chosen very early in the legislative process. Senator Paeden and his six Senate Bill sponsors chose the reform counties before they introduced the Medicaid Reform Bill to the Florida Senate in January 2005. Four of the seven bill sponsors were representatives from the reform county districts. Since the Bill's sponsors represented the reform counties and since local government cooperation was critical to implementation, it is likely that the reform counties were chosen because the Senators wanted credit for implementing the reform.

Conversations with Florida Medicaid staff revealed two additional reasons why Baker, Broward, Clay, Duval, and Nassau were chosen as reform counties. The two explanations were that (1) the counties have racially diverse Medicaid populations and the senators wanted the reform to affect a diverse set of beneficiaries, and (2) the counties' local governments were willing to help implement choice counseling. Choice counseling occurs when Medicaid beneficiaries switch from FFS to managed care plans. Medicaid Reform required counselors to be physically and telephonically present to help beneficiaries choose their plans. Reform also required counselors to perform face-to-face education and outreach.[27] Therefore, local government participation was crucial for the reform's implementation.

To test whether the reform and non-reform counties differed in systematic ways, Table 1 shows descriptive statistics for beneficiaries in reform and non-reform counties in the pre-reform period. Table 1 shows that the reform and non-reform counties had similar numbers of beneficiaries enrolled in FFS and managed care plans prior to the reform.[28] It also shows that total hospital costs, total hospital visits, and the share of visits for different types of medical conditions were similar across reform and non-reform counties in the pre-reform period. The only characteristics that ap-

[27] Florida Medicaid Reform Quarterly Progress Report July 1, 2006 - September 30, 2006: http://www.fdhc.state.fl.us/medicaid/medicaid_reform/quarterly.shtml

[28] Recall that Medicaid beneficiaries could voluntarily choose to enroll in insurer-owned plans pre-reform.

pear to differ across the reform and non-reform counties are race and ethnicity. Patients in reform counties were more likely to be black and less likely to be white or Hispanic, which is consistent with Florida Medicaid's observation that the reform counties are more racially diverse than non-reform counties. Despite differences in demographic characteristics, patient health status appears similar. There are not meaningful differences in the percentages of patients with comorbidities or with various types of medical conditions. In sum, it appears that the reform counties do not differ in meaningful ways from the non-reform counties; nevertheless, Section 5.3 presents a full set of robustness checks to ensure that the results do not depend on differential trends across the reform and non-reform counties.

Table 1: Comparing Reform and Non-Reform Counties in the Pre-Reform Period

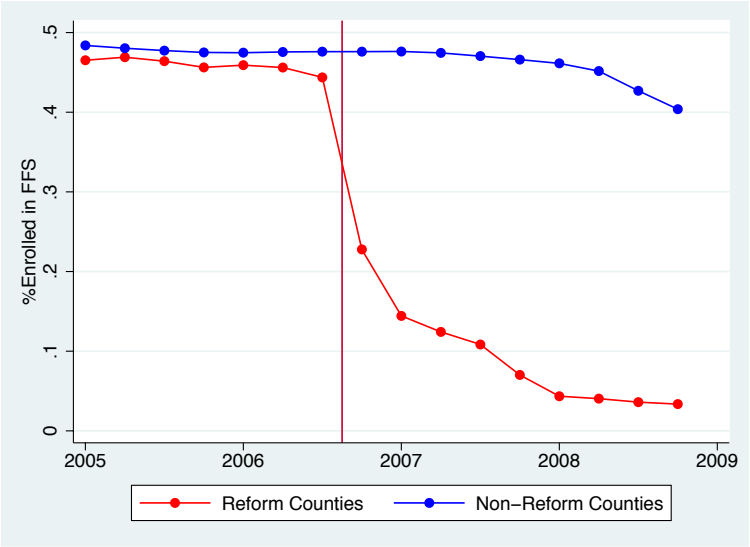
Pre-Reform Period	Non-Reform Counties	Reform Counties	Difference p-value
Enrollment			
Target Population	105,225	105,259	p = 0.997
Fee-for-Service	45,652	43,487	p = 0.497
Managed Care	59,572	61,771	p = 0.665
# Managed Care Plans	3.01	3.27	p = 0.560
Demographics			
Average Age	18.77	18.97	p = 0.262
% Children	0.62	0.61	p = 0.156
% Female	0.57	0.58	p = 0.153
% White	0.41	0.33	p = 0.002
% Black	0.30	0.50	p = 0.000
% Hispanic	0.26	0.13	p = 0.000
Medical Conditions			
% Comorbidities	0.17	0.17	p = 0.681
% Infectious Disease	0.05	0.05	p = 0.630
% Cancer	0.02	0.02	p = 0.404
% Endocrine Disorder	0.01	0.02	p = 0.000
% Disease of Blood	0.00	0.01	p = 0.000
% Mental Illness	0.03	0.04	p = 0.072
% Nervous System Disorder	0.08	0.08	p = 0.032
% Circulatory System Disorder	0.02	0.02	p = 0.407
% Respiratory System Disorder	0.18	0.18	p = 0.121
% Digestive System Disorder	0.08	0.08	p = 0.083
% Genitourinary Disorder	0.05	0.05	p = 0.067
% Skin Disorder	0.05	0.05	p = 0.896
% Muscular Tissue Disorder	0.04	0.04	p = 0.519
% Injuries	0.18	0.18	p = 0.067
% Ill-Defined Conditions	0.20	0.20	p = 0.024
Outcomes			
Total Hospital Costs	39,145,924	39,863,889	p = 0.844
Total Hospital Visits	20,348	22,617	p = 0.112
% Nonemergency Visits	0.45	0.44	p = 0.130
% Emergency Visits	0.55	0.56	p = 0.130
% Preventable Visits	0.04	0.04	p = 0.142
% Chronic Condition Visits	0.09	0.10	p = 0.054
N	434	35	

Notes: Each cell reflects the average per county per year-quarter in the pre-reform period. There are 5 reform counties, 62 non-reform counties, and 7 quarters in the pre-reform period. Means are weighted by the number of beneficiaries in the target population.

4.3 Enrollment in FFS and Managed Care Plans

The objective of Florida's Medicaid Reform was to switch beneficiaries from the state's FFS system into managed care plans. Using county-level enrollment data from Florida AHCA, I test whether the reform accomplished its enrollment objective. Figure 4 shows how the percentage of Medicaid beneficiaries on the FFS system changed pre- and post-reform across the reform and non-reform counties from Q1-2005 to Q4-2008. The red line indicates September 2006 when the reform was first implemented in the two largest counties. There is a nearly 100% decline in the percentage of Medicaid beneficiaries on FFS in the reform counties post-reform; meanwhile, the percentage of FFS beneficiaries in the non-reform counties remains relatively constant.

Figure 4: Changes in Fee-For-Service Enrollment

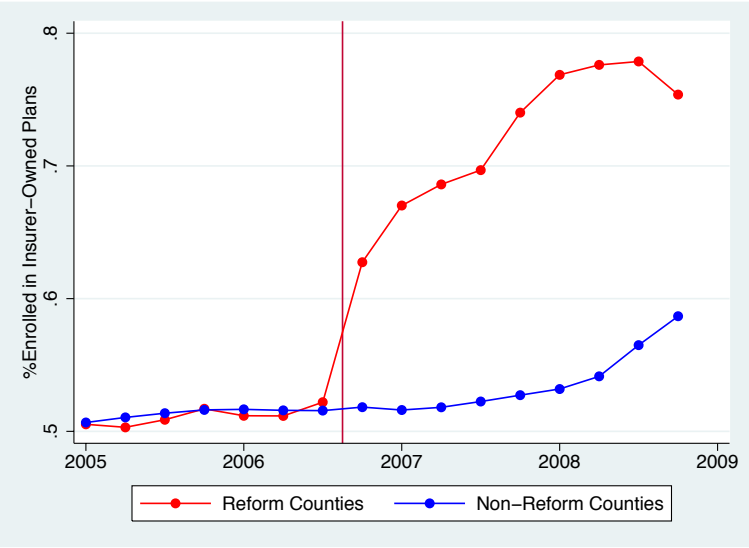


Notes: This figure shows how the percentage of Medicaid beneficiaries in the fee-for-service system changed in the reform and non-reform counties pre- and post-reform. The percentage is constructed using the target population, so the numerator equals the number of beneficiaries on the FFS (MediPass) system and the denominator equals the number of beneficiaries on FFS (MediPass) plus the number of beneficiaries on insurer-owned plans plus the number of beneficiaries on provider-owned plans.

Next, I show how enrollment in managed care plans changed as a result of reform. Figure 5 shows that 50% of the targeted Medicaid beneficiaries were voluntarily enrolled in an insurer-owned plan prior to reform, but the percentage increased to nearly 80% when beneficiaries were mandated to choose managed care plans. Insurer-owned plan enrollment declined at the end of 2008 because some insurers exited the reform markets in 2009; however, the percentage of beneficiaries on insurer-owned plans remained higher in the reform counties than the non-reform counties. Figure 6 shows that there were very few Medicaid beneficiaries in provider-owned plans prior to reform. Post-reform, however, provider plans enrolled up to 20% of the target populations in reform counties. Overall, the figures demonstrate that Florida's Medicaid reform successfully

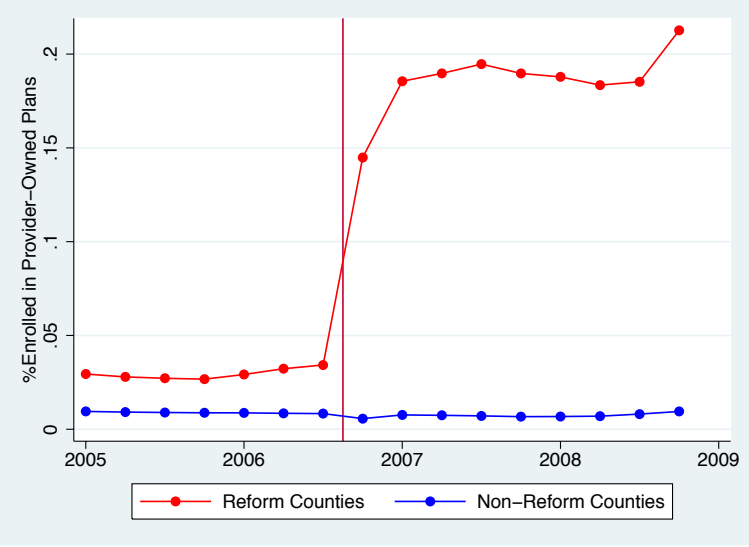
transitioned beneficiaries from FFS into managed care plans.

Figure 5: Changes in Insurer-Owned Plan Enrollment



Notes: This figure shows how the percentage of Medicaid beneficiaries on insurer-owned plans changed in the reform and non-reform counties pre- and post-reform. The percentage is constructed using the target population.

Figure 6: Changes in Provider-Owned Plan Enrollment



Notes: This figure shows how the percentage of Medicaid beneficiaries on provider-owned plans changed in the reform and non-reform counties pre- and post-reform. The percentage is constructed using the target population.

4.4 County-Level Analysis

I estimate two sets of analyses in this paper, which correspond to the two types of data sets that are available. The first set of analysis is a difference-in-difference model at the county-level to quantify the effects of Florida's Medicaid reform on total enrollment, enrollment in managed care plans, the number of hospital visits, and the total costs for hospital visits. The second set of analysis is a difference-in-difference model at the visit-level to determine how Florida's reform affected the average cost per hospital visit. The county-level difference-in-difference model is specified in the following equation,

$$Y_{ct} = \beta_1 Reform_c Year_1 + \beta_2 Reform_c Year_2 + K * X_{ct} + \theta_c + \lambda_t + \delta_c * t + \epsilon_{ct} \quad (1)$$

where c indexes the county in quarter-year t and $K * X_{ct}$ is a vector of average patient characteristics constructed from the sample of hospital visits. Average patient characteristics appear in Table 1 and include patient gender, age, race, and ethnicity. θ_c is a county fixed effect, λ_t is a quarter*year fixed effect, and $\delta_c * t$ allows for differential linear time trends across counties. β_1 and β_2 capture the average effects of switching from FFS to managed care in the first two years post-reform.[29] To estimate the effects of the reform on enrollment, Y_{ct} includes log(total enrollment), enrollment in FFS, enrollment in insurer-owned plans, and enrollment in provider-owned plans. To estimate the effects of reform on hospital costs and visits, Y_{ct} includes log(total costs),[30] log(total visits), log(nonemergency visits),[31] log(emergency visits),[32] log(preventable visits),[33] and

[29] The time period is the year-quarter because the emergency room and hospitalization data are only available on a quarterly basis.

[30] Hospital costs come from the hospital discharge records. I pre-multiply the total charges on the hospital record by the Cost-to-Charge Ratio (CCR) in each hospital-year. The CCR comes from the Healthcare Cost and Utilization Project (HCUP) (http://www.hcup-us.ahrq.gov/db/state/costtocharge.jsp). I use the hospital group CCR because it is available for all hospitals in the sample. Pre-multiplying the charges by the CCR makes hospital costs comparable across hospitals over time.

[31] New York University's Wagner School developed an algorithm to classify emergency room visits based on the patient's primary diagnosis (http://wagner.nyu.edu/faculty/billings/nyued-background). Each visit receives a probability that it is a nonemergency visit or a visit that is treatable by a primary care physician. I combine the Wagner School's nonemergency visits and primary-care-treatable visits into one measure that I call "nonemergency visits" because the purpose is to classify *all* visits that could be treated by primary care physicians. Since the measure is a probability between 0 and 1, I adjust it based on the ER's CPT code for the initial patient evaluation. If the ER determined that the patient's case was high severity or life-threatening (by issuing a CPT code equal to 99284 or 9925), then I code nonemergency=0. Similarly, if the ER determined that the patient's case was minor or low-severity (by issuing a CPT code equal to 99281 or 99282), then I code nonemergency=1. Otherwise, the nonemergency visit variable reflects the Wagner School's probabilities. The results are not sensitive to these classifications.

[32] $Pr(emergency = 1) = 1 - Pr(nonemergency = 1)$

[33] The Agency for Healthcare Research and Quality (AHRQ) publishes Prevention Quality Indicators (PQIs) that categorize preventable hospital visits. A guide to AHRQ's PQIs can be found here: http://www.ahrq.gov/downloads/pub/ahrqqi/pqiguide.pdf

Table 2: The Effect of Reform on Enrollment in FFS and Managed Care Plans

Enrollment	(1) Log(Total)	(2) Total	(3) FFS	(4) Insurer Plans	(5) Provider Plans
Year 1	0.023	58	-27,702***	14,659***	13,101***
	(0.019)	(1,043)	(2,506)	(1,590)	(1,956)
Year 2	0.019	53	-27,269***	15,187***	12,135***
	(0.042)	(3,201)	(3,002)	(2,628)	(1,608)
Dept Variable Mean	10.98	105,379	36,590	62,960	5,827
N	1,072	1,072	1,072	1,072	1,072

Notes: Each column represents estimates from a separate regression and the unit of analysis is the county-year-quarter. "Total" equals the number of Medicaid beneficiaries in the target population, which is the number of beneficiaries on FFS (MediPass) plus the number of beneficiaries on insurer-owned plans plus the number of beneficiaries on provider-owned plans. The regressions control for county fixed effects, year*quarter fixed effects, county-linear time trends, and average demographic characteristics (average age, % female, % white, % black, % Hispanic). Regressions are weighted by the number of Medicaid beneficiaries in the target population. Standard errors are clustered at the county-level and are reported in parentheses. $+p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$

log(visits for chronic conditions).[34] The regressions are weighted by the number of beneficiaries in the target population in each county-year-quarter and the standard errors are clustered at the county-level.

Results for enrollment appear in Table 2 and the results for total costs and visits are presented in Section 5. Consistent with Figures 4-6, there is a nearly 100% decline in enrollment in fee-for-service. Approximately 55% of beneficiaries who were previously enrolled in FFS switched to insurer-owned plans and the remaining 45% of beneficiaries switched to provider-owned plans. To summarize, the reform successfully transitioned Medicaid beneficiaries from FFS into managed care plans and that the vast majority of beneficiaries switched plans within the first three months of reform.

4.5 Visit-Level Analysis

The second set of analysis is a difference-in-difference model at the visit-level using emergency room and hospitalization data from the Florida Agency for Healthcare Administration (FL AHCA). These visit-level data contain information about every emergency room visit and hospitalization that occurred in Florida from 2005-2008. The visit-level model is the same as the county-level model except that it is estimated at the visit-level, so it includes visit i as a subscript,

[34]Florida Medicaid monitored how well managed care plans managed five chronic conditions under reform. The chronic conditions were asthma, congestive heart failure, diabetes, HIV/AIDs, and hypertension.

$$Y_{ict} = \beta_1 Reform_c Year_1 + \beta_2 Reform_c Year_2 + K * X_{ict} + \theta_c + \lambda_t + \delta_c * t + \epsilon_{ict} \quad (2)$$

The sample of hospital visits is the same for both models. The purpose of estimating the visit-level model in addition to the county-level model is to understand how the switch from FFS to managed care affected the average cost per hospital visit and the average amount of treatment provided per visit. Y_{ict} now includes the average cost per visit (Log(Cost)), the probability the patient was admitted to the hospital conditional on the visit (Pr(Admit=1)), the patient's length of stay conditional on visit (LOS), and the number of Relative Value Units on the visit record (Log(RVU)).[35] The standard errors are also clustered at the county-level.

4.6 Differences Across Healthcare Markets

The Medicaid managed care literature shows that switching from FFS to managed care can have different effects in different contexts. The different effects stem from institutional differences across state managed care programs, but they also stem from differences within states in the types of managed care plans that are available (Duggan 2004;[18] Marton et al. 2014[33]). If managed care plans take different strategies to reduce costs, and some of those strategies are more successful than others, then research should explore and highlight those strategies. In other words, it is not enough to know that managed care plans sometimes reduces costs; it is more informative to know when managed care plans reduce costs and why.

In this paper I show that managed care plans in different healthcare markets took different strategies to reduce costs. Florida's reform affected two healthcare markets, Northeast and Southeast Florida, and different types of provider plans entered each market. Beneficiaries in both markets could choose among insurer-owned plans, but a hospital plan entered the Northeast market, while physician plans entered the Southeast market. Table 3 summarizes these differences and shows that the insurers had 80% market share in both markets, while the provider plans had 20% market share. Moreover, Appendix Tables A1-2 show that every insurance plan that operated in Northeast Florida also operated in Southeast Florida.

[35] RVUs are the building blocks for the Medicare physician fee schedule. The Center for Medicare and Medicaid Services (CMS) establishes RVUs for every Current Procedural Terminology (CPT) procedure. RVUs measure the amount of resources that are used to treat the patient, including physician time and effort. More resource-intense procedures have higher RVUs. To calculate the log(Total RVU) measure, I sum all RVUs for all procedures on the patient record and take the log.

Table 3: The Types of Managed Care Plans in Florida's Reform Markets

Post-Reform: As of 12/2008		
Northeast Florida	**Market Share**	**# Plans**
Insurer-owned plans	80%	4
Hospital-owned plans	20%	1
Physician-owned plans	0%	0
Southeast Florida	**Market Share**	**# Plans**
Insurer-owned plans	78%	11
Hospital-owned plans	0%	0
Physician-owned plans	22%	3

Notes: The table is constructed using county-level enrollment data. Insurer-owned plans are managed care plans that are owned by health insurance companies, hospital-owned plans are owned by hospitals, and physician-owned plans are owned by primary care physician groups. An exception is the South Florida Community Care Network (SFCCN), which is a physician-hospital hybrid plan in Southeast Florida. Section 3.3 discusses the difference between SFCCN and a traditional hospital plan, so for simplicity in this table, I classify SFCCN as a physician plan. The table excludes Children's Medical Services (CMS), a statewide, government-operated plan that only serves disabled children. The table classifies Access Health Solutions as an insurer-owned plan despite its 2003 origins as a minority physician network. Access was purchased in 2007 by Centene Corporation and officially transformed into an insurer-owned plan in 2009. The market share measure excludes beneficiaries still enrolled in FFS or CMS.

Because different types of provider plans entered different markets, I allow the effects of the reform to differ for Northeast Florida compared to Southeast Florida. Specifically, I estimate

$$\begin{aligned} Y_{ct} &= \beta_1 Ref_c Year_1 Hosp_c + \beta_2 Ref_c Year_2 Hosp_c + \gamma_1 Ref_c Year_1 Phys_c + \gamma_2 Ref_c Year_2 Phys_c \\ &+ K * X_{ct} + \theta_c + \lambda_t + \delta_c * t + \epsilon_{ct} \end{aligned} \tag{3}$$

where $Hosp_c$ equals one in the Northeast Florida reform counties and zero otherwise. $Hosp_c$ equals one in the Northeast Florida reform counties because a hospital plan entered that market. Similarly, $Phys_c$ equals one in the Southeast Florida reform county and zero otherwise. $Phys_c$ equals one in the Southeast Florida reform county because physician plans entered that market. The rest of the equation is the same as in equations (1) and (2) and I estimate the heterogeneous effects of the reform at both the county-level and the visit-level.

It is worth noting that the difference-in-difference estimates reflect the total effect of the reform in each market. The total effect of the reform shows what happened to hospital costs when beneficiaries switched from FFS to either insurer plans or provider plans. It does not show what would have happened to total hospital costs if beneficiaries had switched from FFS to insurer plans only. Similarly, the total effect of the reform is determined by the strategies of both the insurers and the provider plans in the market. The provider plans only had 20% market share, however, so the average effects from the difference-in-difference estimation will be driven by the strategies of the insurers. Since the model from Section 3 specifically predicts the insurers' strategies in different markets, Section 5.2 confirms that the average effects of the reform are driven by the insurers'

strategies, not the provider plans' strategies.

It may seem unconventional to focus on the heterogeneous effects of managed care, but exploring the heterogeneity is critical for understanding how competition with different types of provider plans may have affected the insurers' strategies to reduce costs. I show that hospital costs declined in both markets, but it is arguably more interesting to determine why costs declined, and the answer is obfuscated when I only estimate average treatment effects using both markets. As I will show in Section 5, hospital costs declined in Northeast Florida because insurers steered patients away from emergency rooms, and hospital costs declined in Southeast Florida because insurers steered beneficiaries toward in-network ER physicians who provided less care per visit. Insurers were unable to reduce both the number of visits and the average cost per visit because they were constrained by provider plan entry.

5 Total Hospital Costs

Do managed care plans reduce hospital costs, and if so, how do plans reduce costs? Table 4 shows that Florida's managed care plans reduced total hospital costs by 7% in the first year of reform and by 12% in the second year of reform. It is reassuring to see that the estimates do not change markedly after controlling for demographic characteristics or county linear time trends. To test whether the effect is robust to changes in enrollment in the reform and non-reform counties, Figure 7 shows how the average hospital costs per beneficiary changed in the reform counties relative to the non-reform counties pre- and post-reform. The figure shows that there is no difference in hospital costs per beneficiary in the pre-reform period, but that hospital costs decreased in the reform counties immediately after the reform. To summarize, Florida's switch from FFS to managed care reduced total hospital costs and hospital costs per beneficiary, and the decrease in hospital costs was larger in the second year of reform than the first.

5.1 Plan Strategies to Reduce Hospital Costs

While the previous section showed that switching Medicaid beneficiaries from fee-for-service (FFS) to managed care plans reduced total costs, this section shows *how* managed care plans reduced costs. Total hospital costs can be decomposed into the number of hospital visits times the average cost per visit, so this section determines whether the number of hospital visits decreased or whether the average cost per visit decreased or whether plans took a combination of both strategies. This section shows that insurers in Northeast Florida reduced the number of hospital visits, while insurers in Southeast Florida reduced the average cost per hospital visit. The fact that insurers in different markets took different strategies to reduce costs is one of the main contributions of this

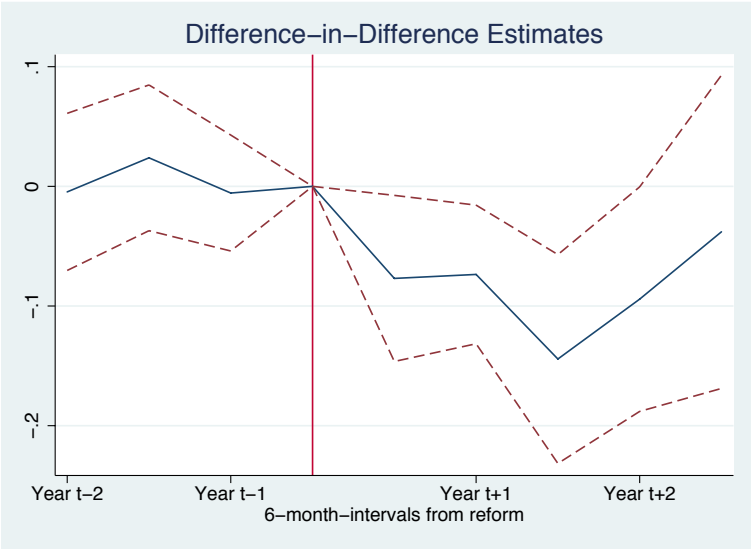
paper.

Table 4: Managed Care Plans Reduced Total Costs

Total Hospital Costs	(1) Log(Costs)	(2) Log(Costs)	(3) Log(Costs)
Year 1	-0.056*	-0.062*	-0.073***
	(0.027)	(0.027)	(0.013)
Year 2	-0.090*	-0.101**	-0.124***
	(0.041)	(0.031)	(0.019)
County Fixed Effects	Y	Y	Y
Year*Quarter Fixed Effects	Y	Y	Y
Weight = # Target Population	Y	Y	Y
Patient Characteristics		Y	Y
County Linear Time Trends			Y
N	1,072	1,072	1,072

Notes: Each column presents estimates from a separate regression. The unit of analysis is the county-year-quarter. The dependent variable is the log of total hospital costs. Total costs are constructed by pre-multiplying total charges on the hospital record by the cost-to-charge ratio for each hospital and summing across all visits for patients from each county. Regressions are weighted by the number of Medicaid beneficiaries in the target population. Patient characteristics include gender, age, race, and ethnicity. Standard errors are clustered at the county-level and are reported in parentheses. $+p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$

Figure 7: Managed Care Plans Reduced Total Costs Per Beneficiary



Notes: The figure plots estimates from a difference-in-difference model with binary variables corresponding to each 6 months around the date of the reform. The unit of analysis is the county-year-quarter. The outcome variable is the log(total costs per beneficiary) where total costs per beneficiary = total costs / #beneficiaries in the target population. The regression controls for county fixed effects, year-quarter fixed effects, county linear time trends, and average patient characteristics in the county. Standard errors are clustered at the county-level and appear as red dashed lines.

5.1.1 Plans Reduced the Number of Visits

The Medicaid managed care literature discusses the trade-off between hospital visits and primary care visits. It posits that primary care visits and hospital visits are substitutable to some degree, so if Medicaid beneficiaries have better access to primary care access, then they are less likely to visit the hospital. The reasoning is straightforward. If Medicaid patients visit the hospital for nonemergency conditions when their primary care physician is unavailable, then improving access to primary care physicians can reduce the number of nonemergency hospital visits. Similarly, if beneficiaries visit the hospital for conditions that could have been prevented with better primary care, then increasing access to primary care could also reduce the number of hospital visits for preventable conditions.

Consistent with the hypothesis that managed care plans can improve access to primary care, Table 5 shows that the number of hospital visits decreased 7-10% when a hospital plan entered the Northeast Florida reform market. Column (3) shows that the total number of visits decreased because the number of nonemergency visits decreased 14-18%. Column (4) shows that there is no statistically significant decrease in emergency visits, which is consistent with the hypothesis that plans can decrease nonemergency hospital visits by increasing access to primary care, but there is not much they can do about emergency visits. Table 5 also shows that total hospital costs decreased by the same amount in both reform markets, but the number of hospital visits did not change in the Southeast Florida market, so plans in Southeast Florida must have reduced the average cost per hospital visit instead. The results from Table 5 suggest that plans in Northeast Florida increased access to primary care physicians, which decreased the number of times Medicaid beneficiaries sought nonemergency medical care at the hospital.

The fact that managed care plans in Northeast Florida reduced the number of hospital visits is consistent with the model's predictions in Section 3. In the model, plans trade-off among three labor inputs to minimize total costs: (1) the number of primary care physician (PCP) hours, (2) the number of in-network ER physician hours, and (3) the number of out-of-network physician hours. The model predicts that competition between insurers and hospital plans results in greater access to primary care physicians relative to in-network ER physicians. The intuition is that when hospital plans form exclusive networks with their ER physicians, they increase the relative cost of ER physicians to insurers, so insurers substitute toward primary care physicians. The model predicts that insurers will have smaller ER physician networks and larger primary care physician networks in markets where hospital plans form exclusive networks. When insurers expand their primary care networks, they reduce the number of hospital visits, which reduces their total hospital costs.

To support the hypothesis that Northeast Florida plans increased primary care access, I provide

Table 5: The Number of Hospital Visits Decreased in the Market with the Hospital Plan

	(1) Log(Costs)	(2) Log(#Visits)	(3) Log(#NonEmerg)	(4) Log(#Emerg)	(5) Log(#Prevent)	(6) Log(#Chronic)
Year 1*Mkt w/Hospital Plan	-0.070***	-0.071**	-0.143**	-0.012	-0.046	-0.008
	(0.014)	(0.022)	(0.050)	(0.020)	(0.025)	(0.018)
Year 2*Mkt w/Hospital Plan	-0.129***	-0.096*	-0.181*	-0.026	-0.031	-0.030
	(0.022)	(0.045)	(0.091)	(0.021)	(0.028)	(0.046)
Year 1*Mkt w/Physician Plans	-0.075***	-0.007	0.003	-0.011	-0.015	-0.014
	(0.013)	(0.015)	(0.022)	(0.014)	(0.023)	(0.016)
Year 2*Mkt w/Physician Plans	-0.120***	-0.018	-0.008	-0.019	-0.017	-0.040
	(0.018)	(0.021)	(0.034)	(0.017)	(0.030)	(0.030)
N	1,072	1,072	1,072	1,072	1,072	1,072

Notes: Each column presents estimates from a separate regression. The unit of analysis is the county-year-quarter. The dependent variables are the logs of different types of hospital visits, starting with the total number of visits in column (2) and ending with the number of visits for chronic conditions (asthma, congestive heart failure, diabetes, HIV/AIDs, and hypertension). Each regression controls for county fixed effects, year*quarter fixed effects, county-linear time trends, and patient characteristics (gender, age, race, ethnicity). Regressions are weighted by the number of Medicaid beneficiaries in the target population. Standard errors are clustered at the county-level and are reported in parentheses. $+p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$

two pieces of evidence.[36] First, I show that a large hospital plan in Northeast Florida excluded the competing insurers from its network, thereby establishing an exclusive network with its ER physicians. Second, I show that beneficiaries from the county with the hospital plan were even less likely to visit the hospital for nonemergency conditions, and when they did visit the hospital, they were more likely to be referred to the hospital rather than arrive through the ER. The first piece of evidence substantiates the claim that hospital plans can form exclusive networks with their physicians. The second piece of evidence supports the hypothesis that access to primary care increases when hospital plans form exclusive networks and directly compete with insurers.

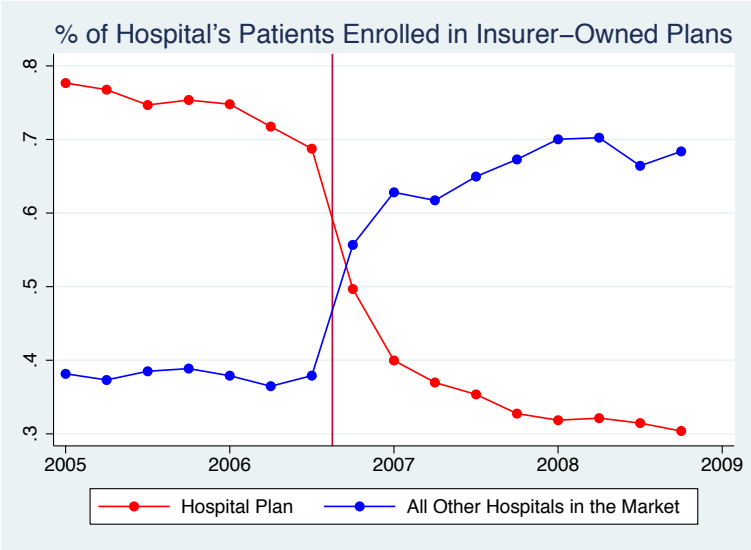
At the start of reform, a large hospital formed a managed care plan in the Northeast Florida reform market. It competed for Medicaid beneficiaries against four insurer-owned plans.[37] When the hospital became a managed care plan, it no longer participated in its competitors' networks (Figure 7).[38] In effect, the hospital's entry decreased the short run supply of ER physicians available to the insurers, which increased the marginal cost of adding ER physicians to their networks. As a result, insurers contracted with fewer ER physicians than they would have in the absence of

[36] Unfortunately, without data on the number of primary care visits, I cannot simply count the number of primary care physicians on each plan's network.

[37] One of the insurer-owned plans, Access Health Solutions, was originally a minority physician network, but it was purchased by Centene Corporation in 2007 and it was officially converted to an insurer-owned plan in 2009.

[38] For example, Shands-Jacksonville hospital was not listed among WellCare's in-network hospitals. This information was taken from WellCare's 2012 provider directory: https://florida.wellcare.com/WCAssets/florida/assets/fl_healthease_provider_directory_baker_11_2012.pdf

Figure 7: Hospital Plan Excludes Insurer-Owned Plans From Its Network



Notes: This figure shows how the percentage of Medicaid patients on insurer-owned plans changed around the date of reform. The red line shows that the percentage dropped precipitously in the hospital that formed a managed care plan post-reform, while the blue line shows that the percentage increased, on average, in all other Northeast Florida hospitals. The percentage of patients on insurer-owned plans is calculated using the number of Medicaid visits for patients on insurer-owned plans (HMOs) divided by the total number of Medicaid visits. The total number of Medicaid visits is the same as in other sections of the paper. It includes Medicaid visits for all patients ages 0-64, excluding pregnant women.

exclusive networks. To reduce costs, then, insurers added more primary care physicians to their networks because primary care physicians were not subject to exclusive networks.

To show that competition between the hospital plan and the insurers reduced ER visits in North Florida, Table 6 recreates Table 5, but re-estimates the effects only for Duval County in Northeast Florida.[39] Duval County was one of the four counties affected by reform in Northeast Florida, but it was the only county where the hospital plan directly competed with the insurers for beneficiaries.[40] Table 6 shows that the decrease in total visits from Table 5 is driven by Duval County, where the hospital plan and the insurers directly competed. Total visits decreased 9-14% and nonemergency visits decreased 19-27%. Visits for emergency conditions, preventable conditions, and chronic conditions are negative, but much smaller in magnitudes, and lacking statistical significance. Moreover, Table 7 shows that patients from Duval County were 14% more likely to have scheduled hospitalizations rather than be admitted through the ER. Overall, these results suggest that the insurers increased primary care access and reduced the number of hospital visits in response to competition from the hospital plan.

[39]The model is the same as in Table 5, except I drop Baker, Clay, and Nassau Counties in Northeast Florida.

[40]Residents of Duval County could choose the hospital plan or any of the four insurer plans, but residents of Baker, Clay, and Nassau Counties could only choose between two insurer plans.

Table 6: Hospital Visits Decrease the Most in the County with the Hospital Plan

Log(#Visits)	(1) Log(Total)	(2) Log(NonEmerg)	(3) Log(Emerg)	(4) Log(Prevent)	(5) Log(Chronic)
Year 1*Cty w/Hospital Plan	-0.087***	-0.191***	-0.002	-0.045	-0.023
	(0.014)	(0.021)	(0.013)	(0.022)	(0.016)
Year 2*Cty w/Hospital Plan	-0.137***	-0.270***	-0.028	-0.036	-0.067*
	(0.024)	(0.039)	(0.019)	(0.032)	(0.032)
Year 1*Mkt w/Physician Plans	-0.009	-0.002	-0.011	-0.018	-0.015
	(0.016)	(0.022)	(0.014)	(0.024)	(0.017)
Year 2*Mkt w/Physician Plans	-0.023	-0.015	-0.022	-0.021	-0.043
	(0.022)	(0.035)	(0.017)	(0.032)	(0.031)
N	1,024	1,024	1,024	1,024	1,024

Notes: This table replicates Table 5, but drops Baker, Clay, and Nassau Counties in Northeast Florida because the hospital-owned plan only enrolled residents from Duval County in Northeast Florida. $+p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$

Table 7: Scheduled Hospitalizations Increase in the County with the Hospital-Owned Plan

	Pr(Scheduled Visit=1)
Year 1*Mkt w/Hospital Plan	0.027***
	(0.006)
Year 2*Mkt w/Hospital Plan	0.051***
	(0.006)
Year 1*Mkt w/Physician Plans	-0.007
	(0.006)
Year 2*Mkt w/Physician Plans	0.004
	(0.006)
Dependent Variable Mean	0.28
N	795,462
R^2	0.06

Notes: The unit of analysis is the hospitalization-year-quarter. The dependent variable is the probability that the hospitalization was scheduled. Scheduled hospitalizations include referrals or transfers to the hospital. Unscheduled hospitalizations include patients admitted through the ER. The sample is restricted to hospitalized patients because the non-hospitalized records do not contain the visit source. The regression controls for county fixed effects, year*quarter fixed effects, county-linear time trends, and patient characteristics (gender, age, race, ethnicity). Standard errors are clustered at the county-level and are reported in parentheses. $+p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$

5.1.2 Plans Reduced the Average Cost Per Visit

The previous section showed that managed care plans in Northeast Florida reduced the number of hospital visits. The managed care plans in Southeast Florida, however, did not reduce the number

Table 8: The Average Cost Per Hospital Visit Decreases in the Market with Physician Plans

	(1) Log(Costs)	(2) Pr(Admit=1)	(3) LOS	(4) Log(RVU)
Year 1*Mkt w/Hospital Plan	0.012	-0.003	0.032	0.096***
	(0.034)	(0.002)	(0.026)	(0.027)
Year 2*Mkt w/Hospital Plan	-0.028	-0.005	0.003	0.073*
	(0.034)	(0.004)	(0.026)	(0.036)
Year 1*Mkt w/Physician Plans	-0.051***	-0.014***	-0.089***	-0.037**
	(0.015)	(0.002)	(0.018)	(0.011)
Year 2*Mkt w/Physician Plans	-0.114***	-0.017***	-0.146***	-0.059***
	(0.019)	(0.003)	(0.021)	(0.016)
Dependent Variable Mean	5.86	0.15	0.90	2.60
N	5,522,093	5,541,676	5,541,676	4,649,431
R^2	0.19	0.11	0.04	0.08

Notes: Each column represents estimates from a separate regression. The unit of analysis is the visit-year-quarter. Cost is the cost of the visit, Admit is the probability that the visit resulted in a hospitalization, LOS is the length of stay for the visit, and RVU is the number of Relative Value Units on the hospital record. Each regression controls for county fixed effects, year*quarter fixed effects, county-linear time trends, and patient characteristics (gender, age, race, ethnicity). Standard errors are clustered at the county-level and are reported in parentheses. $+p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$

of hospital visits. This section shows, instead, that Southeast Florida plans reduced the average cost per hospital visit. Table 8 shows that the average cost per visit decreased by 5% in the first year of reform and 11% in the second year of reform in Southeast Florida after physician plans entered market. The average cost per hospital visit decreased in Southeast Florida because ER physicians provided less care per hospital visit. Patients were 11% less likely to be admitted to the hospital (0.017/0.15), had 16% shorter lengths of stays (0.146/0.9), and had 6% less resource intense treatments post-reform (0.059/2.6).[41] Meanwhile, the average cost per visit did not change in the Northeast Florida market.

The fact that Southeast Florida plans reduced the average cost per hospital visit is consistent with the model's predictions in Section 3. The model predicts that when physician plans form exclusive networks with primary care physicians, insurers expand their network of ER physicians more than their network of primary care physicians. The intuition is that physician plans increase the cost of primary care physicians to insurers, so insurers substitute away from primary care physicians and toward ER physicians. The model predicts that insurers will have smaller primary care physician networks and larger ER physician networks in markets where physician plans form

[41] RVUs capture the relative resource intensity of various medical treatments. Each procedure has a RVU and a higher RVU means that the procedure requires more hospital and physician resources. The AHCA visit-level data only contain CPT codes for non-hospitalized patients, so column (4) is estimated using only non-hospitalized patients. Since Florida's reform affected the probability that patients were hospitalized, conditional on appearing in the ER, Column (4) should be interpreted with a degree of caution, though it is likely to be biased toward zero.

exclusive networks. When insurers expand their ER physician networks, they reduce the average cost per visit.

I provide two pieces of evidence to support the hypothesis that Southeast Florida plans increased access to in-network ER physicians. First, I show that insurers had the legal authority to add ER physicians to their networks and to request that their in-network ER physicians treat their patients at the hospital. Second, I show that Southeast Florida patients were treated by different ER physicians post-reform, whereas patients from other parts of Florida were not treated by different ER physicians. The first piece of evidence shows that adding ER physicians to a network is a feasible strategy for insurers and the second piece of evidence shows that the Southeast Florida plans were more likely to have their in-network ER physicians treat their patients.

The first piece of evidence comes from the Florida Medicaid's managed care contract for reform plans, which states that plans can recruit hospital staff to their networks and that plans can request that in-network hospital staff treat their patients at the hospital. In reference to emergency room care, the reform contract stipulates that, "If the provider determines that an Emergency Medical Condition exists [...], the Hospital must make a reasonable attempt to notify the Enrollee's PCP [...] or Health Plan [...]. If the Enrollee's PCP responds to the Hospital's notification, [...] the Health Plan may have a member of the Hospital staff with whom it has a Participating Provider contract participate in the treatment of the Enrollee."[42]

Table 9 shows that Southeast Florida patients were more likely to be treated by different ER physicians post-reform. Patients were 12% less likely to be treated by high-cost physicians (column 1) and 1.5% more likely to be treated by hospitalists (column 2). Patients were also treated by physicians who had 3.4% higher managed care patient volume pre-reform (column 3). In contrast, patients in Northeast Florida were no less likely to be treated by high-cost ER physicians, and they were actually less likely to be treated by hospitalists, which is consistent with the hypothesis that they had greater access to their primary care physicians. Overall, Table 9 suggests that insurers requested that in-network ER physicians treat their patients in response to physician plans entering the market.

5.2 Insurer Strategies versus Provider Plan Strategies

This paper's results thus far have reflected the combined efforts of insurance plans and provider plans to reduce hospital costs. I showed that plans in Northeast Florida reduced the number of hospital visits and I claimed that the effect was driven by the strategies of insurer plans that have 80% market share. Similarly, I showed that the plans in Southeast Florida reduced the average cost per visit and I claimed that the effect was driven by the strategies of insurer plans that have

[42] http://ahca.myflorida.com/MCHQ/Managed_Health_Care/MHMO/med_prov_0912.shtml

Table 9: Patients Less Likely to Be Treated by High-Cost ER Physicians

Physician Characteristics	(1) High-Cost Physician	(2) Physician Pr(Hospitalist=1)	(3) Physcian % MC Volume
Year 1*Mkt w/Hospital Plan	0.019	-0.005**	-0.002
	(0.013)	(0.002)	(0.005)
Year 2*Mkt w/Hospital Plan	0.013	-0.008*	0.003
	(0.020)	(0.004)	(0.009)
Year 1*Mkt w/Physician Plans	-0.034***	0.007***	0.010***
	(0.006)	(0.002)	(0.003)
Year 2*Mkt w/Physician Plans	-0.031***	0.014***	0.014***
	(0.008)	(0.004)	(0.004)
Dependent Variable Mean	0.25	0.90	0.41
N	5,009,192	5,308,409	5,011,376
R^2	0.11	0.09	0.45

Notes: Each column represents estimates from a separate regression. The unit of analysis is the visit-year-quarter. Physicians are the attending physicians on the hospital discharge record. Physicians are classified as high-cost if their average costs in the pre-reform period were in the top cost quartile in their market. Physicians are classified as hospitalists if they treat at least 25 Medicaid patients per quarter. %MC Volume is the percentage of the physician's Medicaid volume in the pre-reform period for patients on insurer-owned plans. Each regression controls for county fixed effects, year*quarter fixed effects, county-linear time trends, and patient characteristics (gender, age, race, ethnicity). Standard errors are clustered at the county-level and are reported in parentheses. $+p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$

80% market share. The model in Section 3, however, generated specific predictions for insurance plans. Therefore, this section explores whether the previous estimates are, in fact, driven by insurer plan strategies. To isolate the strategies of insurers, I estimate the heterogeneous treatment effects of the reform for patients who were enrolled in insurer plans versus provider plans in the two reform markets. I do this by exploiting the fact that the hospital discharge data displays whether the patient's primary payer was a Medicaid health maintenance organization (HMO) or not.

Appendix Table C4 shows that the decrease in hospital visits in Northeast Florida is driven by a decrease in visits for patients enrolled on insurer plans. By design, the reform increased the number of patients on insurer plans, so the outcome variable is the visit rate. The visit rate equals the number of hospital visits for patients on one type of plan divided by the total number of Medicaid beneficiaries enrolled in that type of plan. To make the results comparable across columns, I restrict the sample to counties that had at least one Medicaid beneficiary enrolled in an insurer plan in every quarter. The results show that the insurer plans reduced the visit rate by 25% in the county where the hospital plan entered, but the hospital plan itself did not reduce the visit rate in any statistically significant way.

Appendix Table C5 shows that the decrease in the average cost per visit in Southeast Florida is driven by a decrease in hospital costs for patients on insurer plans. With and without controlling for the patient's medical condition, columns (1) and (2) show that the average cost per hospital visit decreased 5-10% for patients on insurer plans in Southeast Florida. The average cost per hospital

visit did not decrease by nearly as much or as consistently for patients on provider plans. The average cost per hospital visit for patients on insurer plans actually increased in Northeast Florida, which is what would happen if the composition of hospital visits changed after insurers reduced the number of visits for nonemergency medical conditions. Once I control for the patient's medical condition, however, there is no change in the average cost per visit for patients on insurer plans in Northeast Florida. Taken together, the results suggest that insurers reduced the number of hospital visits in Northeast Florida and insurers reduced the average cost per hospital visit in Southeast Florida, but insurers were unable to do both in the same market.

5.3 Robustness

This section shows robustness tests for the difference-in-difference estimates that were presented in the previous sections. In general, there are two types of threats that could produce inconsistent estimates in the difference-in-difference model. The first threat is that reform and non-reform counties could have differential trends in the outcome variables. If the reform markets had different pre-existing non-linear trends than the non-reform markets, then the difference-in-difference estimators will generate inconsistent results.

The second threat is that the reform can affect the composition of the sample of hospital visits. For example, Currie and Fahr (2001)[12] show that the introduction of managed care plans can affect Medicaid take-up, which can affect the composition of Medicaid beneficiaries post-reform. Another example from Aizer et al. (2007)[2] shows that beneficiaries may move into or out of reform counties as a result of reform. These papers show that healthcare reforms can generate sample selection post-reform, so without unique patient identifiers, the difference-in-difference estimates may be biased. This section offers two robustness tests that test for differential trends across reform and non-reform counties and three robustness tests that test for compositional bias.

5.3.1 Differential Trends Across Reform and Non-Reform Counties

I address the threat from differential trends in two ways, first focusing on differential trends in the county-level regressions, then turning to differential trends in the visit-level regressions. First, I estimate the same county-level difference-in-difference results from Table 5, but I include a leading dummy variable that captures the effect of the reform in the 6 months before the reform started.[43] If the county-specific linear time trends adequately control for the differences across reform and non-reform counties, then the 6-month lead coefficient should not be negative and statistically significant. Appendix Table D1 shows that the leading coefficient is negative, but it is very small

[43] I use the 6 months pre-reform because the data only date back to 1.5 years pre-reform.

and not statistically significant for all outcome variables. I take this as evidence that confounding trends in the county-level outcome variables are unlikely.

Next, I turn to the threat of differential trends in the visit-level regressions. I re-estimate the results from Table 8, this time using a triple-difference estimator. The triple-difference estimator compares Medicaid to non-Medicaid hospital visits in reform and non-reform counties pre- and post-reform. The non-Medicaid visits are comparable to Medicaid visits because I restrict the sample to patients ages 0-64 years old and exclude childbirths. The triple-difference estimator is meant to control non-linear trends in the outcome variables that may be biasing the results. Appendix Table D2 shows that the triple-difference estimates are almost exactly identical to the original difference-in-difference estimates; that is, the average cost per visit decreases in the Southeast Florida (column (1)), but does not change in Northeast Florida reform market (column (2)). From these results, I conclude that differential trends across the reform and non-reform counties are unlikely to be responsible for the results.

5.3.2 Compositional Changes to the Sample

I address the threat from compositional bias in three ways and I focus on the average cost per visit in the visit-level regressions because that is where the bias is likely to appear. First, I estimate the effect of the reform with and without controlling for patient characteristics to see if the controls affect the estimates. Second, I use a different data set to create a panel of patients who visited the hospital before and after the reform.[44] Column (1) of Appendix Table D3 shows the effects of the reform on the average cost per visit without controlling for patient characteristics, column (2) shows the results after controlling for patient characteristics, and column (3) shows the results for the panel of patients who visited the hospital before and after the reform. The results are remarkably consistent across columns, indicating that the average cost of a hospital visit decreased in Southeast Florida, and did not change in Northeast Florida.

Third, I estimate the effect of the reform on the average cost per visit, but I control for the patient's medical condition. The results from Section 5.2.1 revealed that Medicaid beneficiaries from Northeast Florida were less likely to visit the hospital for nonemergency conditions post-reform. Therefore, the post-reform sample of patients from Northeast Florida may have been relatively sicker than patients from the non-reform counties, which would make the reform and non-reform counties less comparable post-reform. So column (4) of Appendix Table D3 shows the results for the average cost per visit with controls for the number of comorbidities on the record

[44]To construct the panel, I use the Healthcare Cost and Utilization Project (HCUP) State Inpatient and Emergency Department Databases for Florida from 2005-2008. HCUP data access was provided by the National Bureau of Economic Research (NBER). I use the Revisit Files, including the visitlink and daystoevent variables, to track the same patients before and after the reform was implemented.

and whether the visit was for a nonemergency, preventable, or chronic condition. Average costs per visit are still 5-10% lower in Southeast Florida (because the composition of visits did not change), but the average costs per visit are now 3-8% lower in Northeast Florida as well. However, the results from the previous section revealed that the decrease in the average cost per visit in Northeast Florida was driven by the hospital plan, not the insurers. The insurer plans in Northeast Florida reduced the number of hospital visits, but did not reduce the average cost per hospital visit, which is consistent with the model's predictions in Section 3. To summarize, this section presented five pieces of evidence to show that differential time trends and compositional changes to the sample are unlikely to have driven the paper's results.

6 Discussion

As public health insurance expenditures have increased over time, policymakers have expressed interest in switching Medicaid and Medicare beneficiaries from the fee-for-service (FFS) system to managed care plans. Forty-two states have implemented Medicaid managed care programs with risk-based reimbursements and at least ten states plan to expand their managed care programs.[45,46] In 1997, the federal government formally created a managed care program for Medicare beneficiaries, and in 2009, the federal government added Accountable Care Organizations to the list of managed care options that Medicare beneficiaries could choose from.[47] With the public health insurance markets evolving to include new forms of healthcare delivery, it is important to understand how switching beneficiaries from FFS to managed care affects healthcare utilization, costs, and outcomes.

This paper shows that shifting Medicaid beneficiaries from fee-for-service to managed care plans can reduce hospital costs by 7-12%. Hospital costs are costs associated with emergency room visits and hospitalizations and they account for the largest share of Medicaid expenditures. To estimate the impact of switching from FFS to managed care, I use Florida's 2006 Medicaid Reform, which mandated that children, families, aged and disabled beneficiaries in two healthcare markets switch from the state's FFS system to (1) insurer-owned plans, (2) hospital-owned plans, or (3) physician-owned plans. Using a difference-in-difference estimator across the reform and non-reform markets pre- and post-reform, I show that insurers reduced costs in different ways in different markets. Insurers reduced the number of hospital visits in Northeast Florida, but reduced

[45]Managed care statistics are available from Kaiser State Health Facts: http://kff.org/medicaid/state-indicator/medicaid-enrollment-in-comprehensive-risk-based-managed-care/

[46]California, Florida, Louisiana, Kentucky, New Jersey, New York, Ohio, South Carolina, Washington, and Wisconsin have submitted CMS waivers to expand their managed care programs (Iglehart 2011 [29]).

[47]The Medicare Advantage plans from 1997-onward are insurer-owned plans, while the Accountable Care Organizations are provider-owned plans.

the average cost per visit in Southeast Florida.

I explain how insurers choose their strategies to reduce costs and I show that competition with provider plans affects their strategies to reduce costs. Insurers expanded access to primary care physicians in Northeast Florida because the competing hospital plan increased the cost of adding ER physicians to the insurers' networks. Insurers expanded access to in-network ER physicians in Southeast Florida because the competing physician plans increased the cost of adding primary care physicians to their networks. This is the first paper to model competition between insurers and provider plans in the Medicaid market and to generate different predictions for different markets. The results suggest that insurers have leverage in how they reduce costs, but their leverage may be restricted by provider plan entry.

This paper has two limitations that I plan to address in future research. One limitation is that I do not show how switching from FFS to managed care affected patient health outcomes. I have shown that patients in Southeast Florida received less care per hospital visit, which may have resulted in worse health outcomes. Because I use hospital discharge data, however, I do not observe health outcomes that occur after the hospital visit. Another limitation of the paper is that I estimate the short-run effects of switching from FFS to managed care. I have shown that insurers in different markets reduced costs in different ways in the short run, but it is possible that the insurers adjusted their strategies in the long run. Moreover, if the entry of provider plans caused insurers to exit the market, which can occur in a market foreclosure model, then there is another reason to expect the reform to have different long run effects. These two questions remain open areas of research.[48]

[48] In September 2014, I received a dissertation grant from the Agency for Healthcare Research and Quality that will sponsor the purchase of Medicaid claims data (CMS MAX). The Medicaid claims data include all healthcare encounters and mortality records for Florida's Medicaid beneficiaries from 2003-2011 and the data can be linked within beneficiaries over time. I plan to use these data in future research.

References

[1] Aitken, Murray. 2013. "Shift from Fee-for-Service to Managed Medicaid: What is the Impact on Patient Care?" *IMS Institute for Healthcare Informatics Report.*

[2] Aizer, Anna, Janet Currie, and Enrico Moretti. 2007. "Does Managed Care Hurt Health? Evidence from Medicaid Mothers." *Review of Economics and Statistics*, 89: 385-399.

[3] Asker, John. 2005. Diagnosing Foreclosure Due to Exclusive Dealing. NYU Working Paper No. EC-04-36.

[4] Baker, Laurence and Christopher Afendulis. 2005. "Medicaid Managed Care and Health Care for Children." *Health Services Research*, 40: 19-38.

[5] Basu, Jayasree, Bernard Friedman, and Helen Burstein. 2004. "Managed Care and Preventable Hospitalization among Medicaid Adults." *Health Services Research*, 39(3): 489-509.

[6] Bindman, Andrew B., Arpita Chattopadyay, Dennis H. Osmond, William Huen, and Peter Bacchetti. 2005. "The Impact of Medicaid Managed Care on Hospitalizations for Ambulatory Care Sensitive Conditions." *Health Services Research*, 40(1): 19-38.

[7] Boyd, Donald. 2014. "The Potential Impact of Alternative Health Care Spending Scenarios on Future State and Local Government Budgets." Engelberg Center for Health Care Reform at Brookings. http://www.brookings.edu/research/papers/2014/04/11-health-care-spending-state-local-budgets-boyd

[8] Carroll, John. 2011. "Stressed States Open Doors to Medicaid Managed Care." Managed Care Magazine. http://www.managedcaremag.com/archives/1103/1103.medicaid.html

[9] Center for Medicare and Medicaid Services. 2013. "National Health Expenditures Highlights." http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsProjected.html

[10] Conover, Christopher J., Peter J. Rankin, and Frank A. Sloan. 2001. "Effects of Tennessee Medicaid Managed Care on Obstetrical Care and Birth Outcomes." *Journal of Health Politics*, 26(6): 1291-1324.

[11] Coughlin, Teresa, Sharon Long, and John Graves. 2009. "Does Managed Care Improve Access to Care for Medicaid Beneficiaries with Disabilities? A National Study." *Inquiry*, 45: 395-407.

[12] Currie, Janet and John Fahr. 2001. "Hospitals, Managed Care, and the Charity Caseload in California." *Journal of Health Economics*, 23: 421-442.

[13] Currie, Janet and John Fahr. 2005. "Medicaid Managed Care: Effects on Children's Medicaid Coverage and Utilization." *Journal of Public Economics*, 89: 85-108.

[14] Cutler, David M., Mark McClellan, and Joseph P. Newhouse. 2000. "How Does Managed Care Do It?" *RAND Journal of Economics*, 31: 526-548.

[15] "Distribution of Medicaid Spending on Acute Care." 2012. Kaiser State Health Facts. http://kff.org/medicaid/state-indicator/spending-on-acute-care/

[16] Dombkowski, Kevin J., Rachel Stanley, and Sarah J. Clark. 2004. "Influence of Medicaid Managed Care Enrollment on Emergency Department Utilization by Children." *Pediatric Adolescent Medicine*, 158(1): 17-21.

[17] Draper, Debra A., Robert E. Hurley, and Ashley C. Short. 2004. "Medicaid Managed Care: The Last Bastion of the HMO?" *Health Affairs*, 23(2): 155-167.

[18] Duggan, Mark. 2004. "Does Contracting Out Increase the Efficiency of Government Programs? Evidence from Medicaid HMOs." *The Journal of Public Economics*, 88: 2549-2572.

[19] Duggan, Mark and Tamara Hayford. 2011. "Has the Shift to Managed Care Reduced Medicaid Expenditures? Evidence from State and Local-Level Mandates." *NBER Working Paper No. 17236*.

[20] Gaynor, Martin and Robert Town. 2011. "Competition in Health Care Markets." Handbook of Health Economics, Mark V. Pauly, Thomas G. McGuire, and Pedro P. Barros (eds) (Amsterdam: North Holland) volume 2.

[21] Garret, B., A. Davidoff, and A. Yemane. 2003. "Effects of Medicaid Managed Care Programs on Health Services Access and Use." *Health Services Research*, 32: 575-594.

[22] Gleid, Sherri. 2000. "Managed Care." Handbook of Health Economics, A.J. Culyer and J.P. Newhouse (eds) (Amsterdam: North Holland) volume 1A.

[23] Goin, Dana, and Stephen Zuckerman. 2012. "How Much Will Medicaid Physician Fees for Primary Care Rise in 2013? Evidence from a 2012 Survey of Medicaid Physician Fees." The Kaiser Commisson on Medicaid and the Uninsured.

[24] Harman, Jeffrey S., Christy H. Lemak, Mona Al-Amin, Allyson G. Hall, and Robert Paul Duncan. 2011. "Changes in Per Member Per Month Expenditures after Implementation of Florida's Medicaid Reform Demonstration." *Health Services Research*, 46(3): 787-804.

[25] Harman, Jerry S., Allyson G. Hall, Christy H. Lemak, and R. Paul Duncan. 2014. "Do Provider Service Networks Result in Lower Expenditures Compared with HMOs or Primary Care Case Management in Florida's Medicaid Program?" *Health Services Research*, 49: 858 877.

[26] Herring, Brad and Kathleen E. Adams. 2010. "Using HMOs to Serve the Medicaid Population: What are the Effects on Utilization and Does the Type of HMO Matter?" *Health Economics*, 20: 446-460.

[27] Holahan, John, Stephen Zuckerman, Alison Evans, and Suresh Rangarajan. 1998. "Medicaid Managed Care in Thirteen States." *Health Affairs*, 17(3): 43-63.

[28] Howell, Embry A., Ashley Palmer, and Fiona Adams. 2012. "Medicaid and CHIP Risk-Based Managed Care in 20 States." The Urban Institute. http://www.urban.org/publications/412617.html

[29] Iglehart, John K. 2011. "Desperately Seeking Savings: States Shift More Medicaid Enrollees to Managed Care." *Health Affairs*, 30(9): 1627-1629.

[30] Kaestner, Robert, Lisa Dubay, and Genevieve Kenney. 2005. "Managed Care and Infant Health: An Evaluation of Medicaid in the US." *Social Science and Medicine*, 60: 1815-1833.

[31] Levinson, Arik and Frank Ullman. 1998. "Medicaid Managed Care and Infant Health." *Journal of Health Economics*, 17: 351-368.

[32] Libersky, Jenna, Allison Hedley Dodd, and Shinu Verghese. 2013. "National and State Trends in Enrollment and Spending for Dual Eligibles Under Age 65 in Medicaid Managed Care." *Disability and Health Journal*, 6: 87-94.

[33] Marton, James, Aaron Yelowitz, and Jeffrey C. Talbert. 2014. "A Tale of Two Cities? The Heterogeneous Impact of Medicaid Managed Care." *Journal of Health Economics*, 36: 47-68.

[34] McGuire, Thomas G. 2000. "Physician Agency." Handbook of Health Economics, A.J. Culyer and J.P. Newhouse (eds) (Amsterdam: North Holland) volume 1A.

[35] Moewe, M.C. 2006. “Shands Invests Millions to Launch Medicaid Plan” *Jacksonville Business Journal*. http://www.bizjournals.com/jacksonville/stories/2006/07/10/story5.html

[36] National Governors Association and the National Association of State Budget Officers. 2011. “The Fiscal Survey of the States: An Update of State Fiscal Conditions.”

[37] State Budget Crisis Task Force. 2012. “Report of the State Budget Crisis Task Force.” http://www.statebudgetcrisis.org/wpcms/wp-content/images/Report-of-the-State-Budget-Crisis-Task-Force-Full.pdf

[38] Rosenthal, Elisabeth. 2014. “Costs Can Go Up Fast When E.R. Is in Network but Doctors Are Not.” *The New York Times.*

[39] Rudowitz, Robin. 2014. “A Look at CBO Projections for Medicaid and CHIP.” The Kaiser Commission on Medicaid and the Uninsured.

[40] “Status of State Action on the Medicaid Expansion Decision.” 2014. Kaiser State Health Facts. http://kff.org/health-reform/state-indicator/state-activity-around-expanding-medicaid-under-the-affordable-care-act/

[41] Truffer, Christopher J., John D. Klem, Christian J. Wolfe, Kathryn E. Rennie, and Jessica F. Shuff. 2012. “2012 Actuarial Report on the Financial Outlook for Medicaid.” Office of the Actuary, Centers for Medicare and Medicaid Services, and the United States Department of Health and Human Services.

[42] Wennberg, John E. 2010. Tracking Medicine: A Researcher’s Quest to Understand Healthcare, Oxford University Press.

Appendix A: Medicaid Enrollment by Plan Type

Table 1A: Southeast Florida Managed Care Plans

Plan Name	Plan Type	Enrollment
Southeast Florida		
Access Health Solutions	Insurer	2,936
Amerigroup	Insurer	14,889
Freedom	Insurer	1,019
Humana	Insurer	12,088
Preferred Medical Plan	Insurer	2,504
Total Health Choice	Insurer	3,621
United Healthcare	Insurer	755
Universal	Insurer	810
Vista dba Buena Vista	Insurer	6
Vista Healthplan S. Florida	Insurer	6
WellCare	Insurer	41,549
Pediatric Associates	Provider	9,254
South Florida Community Care Network	Provider	8,205
NetPass	Provider	5,138
Total		102,070

Notes: This table shows the number of Medicaid beneficiaries who were enrolled in managed care plans post-reform. These enrollment figures come from a county-level enrollment report from December 2008, which was published by the FL AHCA.

Table 2A: Northeast Florida Managed Care Plans

Plan Name	Plan Type	Enrollment
Northeast Florida		
Access Health Solutions	Insurer	18,322
WellCare	Insurer	37,253
United Healthcare	Insurer	14,291
Universal	Insurer	2,554
Shands-Jacksonville Hospital	Provider	18,502
Total		90,922

Notes: This table shows the number of Medicaid beneficiaries who were enrolled in managed care plans post-reform. These enrollment figures come from a county-level enrollment report from December 2008, which was published by the FL AHCA.

Appendix B: Comparative Statics

PCP^*: Below I show how optimal demand for primary care physician hours (PCP^*) changes with respect to the marginal cost of primary care physician hours, the marginal cost of in-network ER physician hours, and the marginal cost of out-of-network ER physicians hours.

$$\begin{aligned}
\frac{\partial PCP^*}{\partial MC_{PCP}} &= (-\alpha-\beta)\times\bar{V}\times\frac{(1-\alpha-\beta)^{\alpha+\beta}}{\alpha^\alpha\beta^\beta}\times\left[\frac{MC_{ER_I}^{\alpha}\times MC_{ER_O}^{\beta}}{MC_{PCP}^{\alpha+\beta+1}}\right]<0\\
\frac{\partial PCP^*}{\partial MC_{ER_I}} &= \alpha\times\bar{V}\times\frac{(1-\alpha-\beta)^{\alpha+\beta}}{\alpha^\alpha\beta^\beta}\times\left[\frac{MC_{ER_I}^{\alpha-1}\times MC_{ER_O}^{\beta}}{MC_{PCP}^{\alpha+\beta}}\right]>0\\
\frac{\partial PCP^*}{\partial MC_{ER_O}} &= \beta\times\bar{V}\times\frac{(1-\alpha-\beta)^{\alpha+\beta}}{(\alpha\beta)^\alpha}\times\left[\frac{MC_{ER_I}^{\alpha}\times MC_{ER_O}^{\beta-1}}{MC_{PCP}^{\alpha+\beta}}\right]>0
\end{aligned}$$

ER_I^*: Below I show how optimal demand for in-network ER physician hours (ER_I^*) changes with respect to the marginal cost of primary care physician hours, the marginal cost of in-network ER physician hours, and the marginal cost of out-of-network ER physicians hours.

$$\begin{aligned}
\frac{\partial ER_I^*}{\partial MC_{PCP}} &= (1-\alpha-\beta)\times\bar{V}\times\frac{\alpha^{1-\alpha}}{\beta^\beta(1-\alpha-\beta)^{1-\alpha-\beta}}\times\left[\frac{MC_{PCP}^{-\alpha-\beta}\times MC_{ER_O}^{\beta}}{MC_{ER_I}^{1-\alpha}}\right]>0\\
\frac{\partial ER_I^*}{\partial MC_{ER_I}} &= (\alpha-1)\times\bar{V}\times\frac{\alpha^{1-\alpha}}{\beta^\beta(1-\alpha-\beta)^{1-\alpha-\beta}}\times\left[\frac{MC_{PCP}^{1-\alpha-\beta}\times MC_{ER_O}^{\beta}}{MC_{ER_I}^{2-\alpha}}\right]<0\\
\frac{\partial ER_I^*}{\partial MC_{ER_O}} &= \beta\times\bar{V}\times\frac{\alpha^{1-\alpha}}{\beta^\beta(1-\alpha-\beta)^{1-\alpha-\beta}}\times\left[\frac{MC_{PCP}^{1-\alpha-\beta}\times MC_{ER_O}^{\beta-1}}{MC_{ER_I}^{1-\alpha}}\right]>0
\end{aligned}$$

ER_O^*: Below I show how optimal demand for in-network ER physician hours (ER_O^*) changes with respect to the marginal cost of primary care physician hours, the marginal cost of in-network ER physician hours, and the marginal cost of out-of-network ER physicians hours.

$$\begin{aligned}
\frac{\partial ER_O^*}{\partial MC_{PCP}} &= (1-\alpha-\beta)\times\bar{V}\times\frac{\beta^{1-\beta}}{\alpha^\alpha(1-\alpha-\beta)^{1-\alpha-\beta}}\left[\frac{MC_{PCP}^{-\alpha-\beta}\times MC_{ER_I}^{\alpha}}{MC_{ER_O}^{1-\beta}}\right]>0\\
\frac{\partial ER_O^*}{\partial MC_{ER_I}} &= \alpha\times\bar{V}\times\frac{\beta^{1-\beta}}{\alpha^\alpha(1-\alpha-\beta)^{1-\alpha-\beta}}\left[\frac{MC_{PCP}^{1-\alpha-\beta}\times MC_{ER_I}^{\alpha-1}}{MC_{ER_O}^{1-\beta}}\right]>0\\
\frac{\partial ER_O^*}{\partial MC_{ER_O}} &= (\beta-1)\times\bar{V}\times\frac{\beta^{1-\beta}}{\alpha^\alpha(1-\alpha-\beta)^{1-\alpha-\beta}}\left[\frac{MC_{PCP}^{1-\alpha-\beta}\times MC_{ER_I}^{\alpha}}{MC_{ER_O}^{2-\beta}}\right]<0
\end{aligned}$$

Appendix C: Insurer Plan Strategies vs Provider Plan Strategies

Table C1: Visit Rates for Patients on Different Types of Plans

Hospital Visit Rates	(1) Overall	(2) Insurer Plan	(3) Provider Plan
Year 1*Cty w/Hospital Plan	-0.016***	-0.053***	-0.009
	(0.004)	(0.007)	(0.004)
Year 2*Cty w/Hospital Plan	-0.012+	-0.041***	-0.016
	(0.007)	(0.010)	(0.008)
Year 1*Mkt w/Physician Plans	-0.006	-0.024**	-0.002
	(0.004)	(0.008)	(0.004)
Year 2*Mkt w/Physician Plans	-0.016*	-0.020	-0.026**
	(0.006)	(0.010)	(0.007)
Dependent Variable Mean	0.17	0.22	0.15
N	496	496	496
R^2	0.94	0.94	0.85

Notes: The unit of analysis is the county-year-quarter. The analysis is restricted to counties with at least one beneficiary enrolled in an insurer plan every quarter. "Overall" is the number of Medicaid visits divided by the number of Medicaid beneficiaries. "Insurer Plan" is the number of Medicaid visits for patients on insurer plans divided by the number of Medicaid beneficiaries enrolled in insurer plans. "Provider plan" is the number of Medicaid visits for patients not on insurer plans divided by the number of beneficiaries enrolled in Medicaid, but not enrolled in insurer plans. Each regression controls for county fixed effects, year*quarter fixed effects, county-linear time trends, and patient characteristics (gender, age, race, ethnicity). Regressions are weighted by the number of beneficiaries in the target population. Standard errors are clustered at the county-level and are reported in parentheses. $+p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$

Table C2: Average Cost Per Visit for Patients on Different Types of Plans

Log(Costs)	(1) Mkt w/Physician Plans	(2) Mkt w/Physician Plans	(3) Mkt w/Hospital Plan	(4) Mkt w/Hospital Plan
Year 1*Insurer Plan	-0.052**	-0.040*	0.073*	0.012
	(0.017)	(0.015)	(0.029)	(0.017)
Year 2*Insurer Plan	-0.116***	-0.109***	0.077*	-0.010
	(0.019)	(0.016)	(0.032)	(0.023)
Year 1*Provider Plan	0.014	-0.002	0.009	-0.024
	(0.016)	(0.015)	(0.024)	(0.014)
Year 2*Provider Plan	-0.020	-0.038*	-0.073*	-0.095***
	(0.021)	(0.016)	(0.030)	(0.024)
Insurer Plan	Y	Y	Y	Y
County Fixed Effects	Y	Y	Y	Y
Year*Quarter Fixed Effects	Y	Y	Y	Y
County Linear Time Trends	Y	Y	Y	Y
Patient Characteristics	Y	Y	Y	Y
Patient Medical Condition		Y		Y
N	5,151,513	5,151,513	5,086,178	5,086,178
R^2	0.20	0.34	0.20	0.35

Notes: The unit of analysis is the visit-year-quarter. The first two columns compare the Northeast Florida reform counties to all other counties in Florida and the second two columns compare the Southeast Florida reform county to all other counties in Florida. The second column in each sequence controls for the type of medical visit. The types of medical visits include (1) nonemergency (vs emergency), (2) preventable, (3) chronic, and (4) the number of comorbidities on the record. Each regression controls for whether the patient is on an insurer plan, county fixed effects, year*quarter fixed effects, county-linear time trends, and patient characteristics (gender, age, race, ethnicity). Standard errors are clustered at the county-level and are reported in parentheses. $+p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$

Appendix D: Robustness

Table D1: Testing for Pre-Trends

All Counties	(1) Log(#Visits)	(2) Log(#Non-Emerg)	(3) Log(#Emerg)	(4) Log(Prevent)	(5) Log(Chronic)
6 months pre-reform	-0.010	-0.008	-0.015	-0.052	0.019
	(0.013)	(0.023)	(0.013)	(0.050)	(0.043)
Year 1*Mkt w/Hospital Plan	-0.080*	-0.150*	-0.025	-0.092	0.009
	(0.031)	(0.063)	(0.026)	(0.052)	(0.048)
Year 2*Mkt w/Hospital Plan	-0.110+	-0.192+	-0.047	-0.103	-0.004
	(0.057)	(0.111)	(0.031)	(0.080)	(0.088)
Year 1*Mkt w/Physician Plans	-0.017	-0.005	-0.026	-0.064	0.004
	(0.023)	(0.032)	(0.022)	(0.053)	(0.041)
Year 2*Mkt w/Physician Plans	-0.033	-0.019	-0.042	-0.093	-0.012
	(0.029)	(0.045)	(0.027)	(0.079)	(0.065)
N	1,072	1,072	1,072	1,072	1,072

Notes: This table replicates Table 5, but adds a dummy variable for the reform counties in the six months pre-reform. The dummy variable shows whether there were pre-trends prior to the reform's implementation. Each regression controls for county fixed effects, year*quarter fixed effects, county-linear time trends, and patient characteristics (gender, age, race, ethnicity). Regressions are weighted by the number of Medicaid beneficiaries in the target population. Standard errors are clustered at the county-level and are reported in parentheses. $+p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$

Table D2: Triple-Difference Estimator

All Counties	(1) Log(Costs) Mkt w/Hospital Plan	(2) Log(Costs) Mkt w/Physician Plans
Year 1*Reform*Medicaid	0.003	-0.035**
	(0.025)	(0.011)
Year 2*Reform*Medicaid	0.032	-0.091***
	(0.024)	(0.016)
Medicaid*Reform County	Y	Y
Post*Reform County	Y	Y
Medicaid*Post	Y	Y
Medicaid Fixed Effect	Y	Y
County Fixed Effects	Y	Y
Year*Quarter Fixed Effects	Y	Y
Medicaid Time Trend	Y	Y
County Linear Time Trends	Y	Y
Patient Characteristics	Y	Y
N	20,361,731	20,948,107
R^2	0.19	0.18

Notes: This table replicates the first two columns of Table 8, but uses a triple-difference estimator across reform and non-reform counties, pre- and post-reform, for Medicaid and non-Medicaid patients. Columns (1) and (3) give results for Southeast Florida compared to all other counties in Florida. Columns (2) and (4) give results for Northeast Florida compared to all other counties in Florida. Regressions also control for county fixed effects, year*quarter fixed effects, county-linear time trends, a Medicaid time trend, and patient characteristics (gender, age, race, ethnicity). Standard errors are clustered at the county-level and are reported in parentheses. $+p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$

Table D3: Controlling for Compositional Changes to the Sample

	(1) Log(Costs)	(2) Log(Costs)	(3) Log(Costs)	(4) Log(Costs)
Year 1*Mkt w/Hospital Plan	0.002	0.012	0.024	-0.035*
	(0.036)	(0.034)	(0.017)	(0.016)
Year 2*Mkt w/Hospital Plan	-0.033	-0.028	-0.005	-0.084***
	(0.040)	(0.034)	(0.019)	(0.017)
Year 1*Mkt w/Physician Plans	-0.057***	-0.051***	-0.030**	-0.041**
	(0.015)	(0.015)	(0.015)	(0.013)
Year 2*Mkt w/Physician Plans	-0.102***	-0.114***	-0.087***	-0.104***
	(0.020)	(0.019)	(0.016)	(0.014)
County Fixed Effects	Y	Y	Y	Y
Year*Quarter Fixed Effects	Y	Y	Y	Y
County Linear Time Trends	Y	Y	Y	Y
Patient Characteristics		Y		Y
Patient Medical Condition				Y
Patient Fixed Effects			Y	
N	5,548,860	5,522,093	3,447,375	5,522,093
R^2	0.04	0.19	0.48	0.51

Notes: Column (1) replicates the first column of Table 8, while columns (2) and (3) control for changes to the composition of the sample of hospital visits. Column (2) controls for a patient fixed effect and column (3) controls for the patient's medical condition. Patient medical condition includes (1) the number of diagnoses on record, (2) the number of comorbidities on the record, (3) whether the visit was a nonemergency, and (4) whether the visit was preventable. Regressions also control for county fixed effects, year*quarter fixed effects, county-linear time trends, and patient characteristics (gender, age, race, ethnicity). Standard errors are clustered at the county-level and are reported in parentheses. $+p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$