HEALTH PLAN PARTICIPATION IN THE MEDICARE MANAGED CARE MARKET

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ABSTRACT

BACKGROUND: The payment and regulatory policies facing Medicare managed care plans have changed considerably over time, but rather than being evidence-based, these policy changes have often been politically motivated. Shifts in Medicare managed care policies have seemingly been accompanied by fluctuations in plan participation.

PURPOSE: The purpose of this research is to identify and understand the factors associated with plan participation in the Medicare managed care market.

DATA AND METHODS: This study utilizes data from the Centers for Medicare and Medicaid Services, the HealthLeaders-InterStudy Managed Market Surveyor-R_x data files, the Area Health Resources File, the Census, and the Current Population Survey.

Cross-sectional analyses examine plan participation in 2008, 2011, and 2012. First difference analyses examine changes in plan participation from 2008-2011 and 2011-2012.

KEY RESULTS: A change in the relative benchmark rate (the ratio of the county-level Medicare Advantage benchmark rate to average costs under traditional fee-for-service Medicare) between 2008 and 2011 of two standard deviations below the mean change – a 10.1 percentage point decrease in the relative benchmark rate – was associated with a 2 percentage point lower predicted probability of a plan entering relative to never entering a county between 2008 and 2011 (predicted probability [PP] 0.67, 95% CI 0.67-0.67, $p<.001$), as compared to the predicted probability of plan entry at the mean change in the relative benchmark rate (PP 0.69, 95% CI 0.69-0.69, $p<.001$), and was associated with a

5 percentage point increase in the predicted probability of a plan exiting relative to staying in a county between 2008 and 2011 (PP 0.90, 95% CI 0.87-0.90, p<.001), as compared to the predicted probability of plan exit at the mean change in the relative benchmark rate (PP 0.85, 95% CI 0.85-0.88, p<.001).

Plan profit status, local rates of employer-sponsored retiree coverage and Medicaid supplemental insurance coverage, hospital market concentration, and a parent company's participation in the local non-Medicare managed care market were also found to be statistically significantly associated with plan participation.

CONCLUSION: County-level Medicare Advantage benchmark rates are, in fact, associated with plan participation, but the magnitude of the association may be lower than is commonly thought.

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CHAPTER I: INTRODUCTION

For several decades, there have been significant shifts in the payment and regulatory policies facing Medicare managed care plans, which currently cover 30 percent of Medicare beneficiaries.[1] Rather than being evidence-based, these policy changes have often been politically motivated, with Republicans arguing that higher payments and looser regulation would encourage private plan participation and promote choice in the Medicare program, and Democrats arguing that private plans should not cost more per beneficiary than traditional fee-for-service Medicare. Largely as a result of this changing policy landscape, payment rates to Medicare managed care plans have fluctuated widely since the 1980s, ranging from 95 percent to well over 130 percent of average costs under traditional fee-for-service Medicare in certain counties.[2]

Such shifts in Medicare managed care plan payment rates have seemingly been accompanied by fluctuations in market entry and exit. Most recently, the 2010 passage of the Patient Protection and Affordable Care Act (ACA), which included modifications to the payment and regulatory policies affecting Medicare managed care plans, renewed fears of health insurance market instability. Some predicted that plans, now facing lower payment rates, would pull out of the market leaving Medicare beneficiaries without access to private plans.[3,4] This is important because research suggests that instability in plan participation can adversely impact Medicare beneficiaries' health and well-being through disruptions in access to health care services and higher out-of-pocket costs for displaced beneficiaries.[5] However, despite these fears, recent aggregate data suggests that there have not been decreases in enrollment or dramatic changes in overall plan participation following the implementation of the ACA.[6]

Given increasing concerns over the long-term spending projections for Medicare, and given the prominent role that private plans have come to play in the Medicare program in recent years, understanding the effects of variations in payment rates on plan participation in the Medicare program is critical to both the development of appropriate payment policies and better predictions of the impact of future payment changes. Understanding this relationship between payment rates and plan participation is therefore the primary goal of this dissertation.

MANAGED CARE AND THE MEDICARE PROGRAM

Since its creation in 1965, Medicare has expanded rapidly and today provides health insurance to over 54 million elderly and disabled members of society.[7] When President Lyndon Johnson signed the Medicare program into law, the intention was that Medicare would serve as a dependable source of health care coverage for people 65 and older. Since that time, the Medicare program has changed considerably, but it continues to contribute substantially to the health and well being of some of the most vulnerable in society.

MEDICARE MANAGED CARE. For nearly four decades, Medicare beneficiaries have been able to choose between participating in the traditional fee-for-service Medicare program, or enrolling in a private Medicare managed care plan. In 1972, health maintenance organizations (HMOs) were first allowed to participate in Medicare under a prepaid payment program and in 1982, the Tax Equity and Fiscal Responsibility Act established a risk-based prospective payment system for HMOs, where plans received prospective

payments of 95 percent of the average per-capita fee-for-service Medicare cost in each county.[8,9]

Fifteen years later, the Balanced Budget Act of 1997 (BBA) established the Medicare+Choice program, which restructured the way that HMOs and other private plans operated in Medicare.[10] Key provisions within the BBA modified the plan payment system by introducing a new formula for calculating capitation rates, adjusting payment growth rates, and implementing a new risk-adjustment mechanism. Though some of these provisions effectively reduced payments to particular plans over time, other provisions were intended to expand the role of private plans in certain, primarily rural, areas by increasing plan payments in areas with lower average fee-for-service costs.[11] However, following the implementation of these policy changes, and also in part due to the general consumer backlash against managed care plans in the late 1990s, a number of private plans exited the market and enrollment in Medicare managed care plans declined from 16 percent of all Medicare beneficiaries in 1999 to 12 percent by 2003.[12]

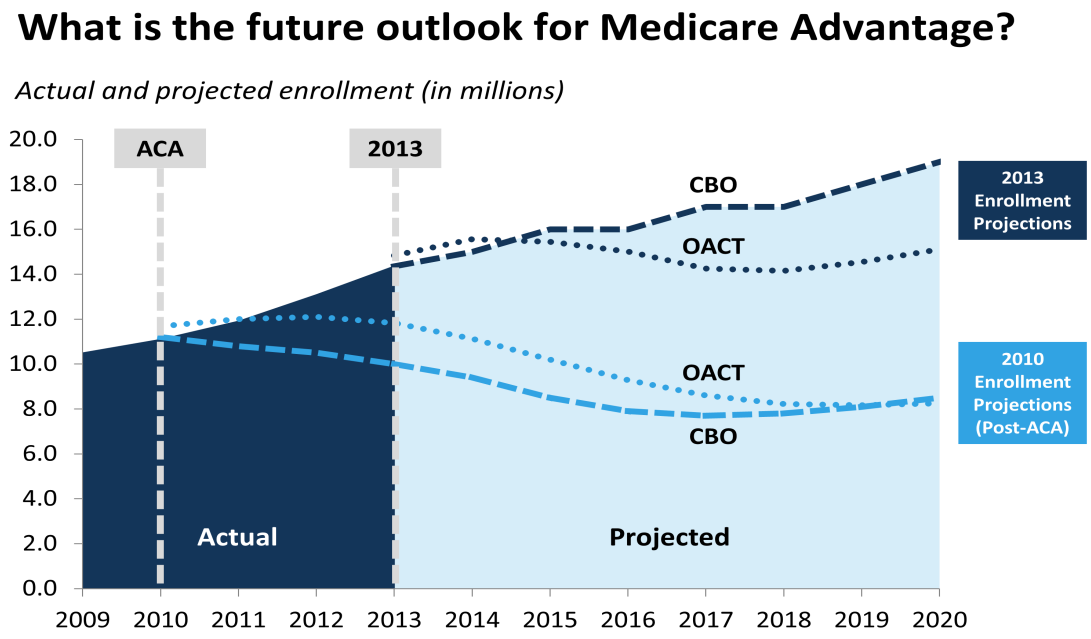
In 2003, the Medicare Prescription Drug, Improvement, and Modernization Act (MMA) was an attempt to reverse these downward trends in enrollment and plan participation by establishing the Medicare Advantage (MA) program and introducing a number of new policies that were designed to expand the role of private plans in Medicare. This was achieved primarily by raising payments to MA plans to levels that were substantially higher than average costs in traditional fee-for-service Medicare.[13] The MMA also introduced a new benchmark-based bidding system implemented in 2006 (discussed in further detail in Chapter 2), where plans submit bids to the Centers for Medicare and Medicaid Services (CMS) that reflect the cost of providing Medicare Parts A and B

services to enrollees. Under this system, plans with bids that are less than a county-level benchmark established by CMS would receive a "rebate" of 75 percent of the difference between the bid and the benchmark. The MMA required that the rebate be used to provide extra benefits to MA enrollees, with the rationale that this would likely attract more beneficiaries into private plans. As a result of these provisions within the MMA, the average MA plan payment grew to be as high as 114 percent of average costs in traditional fee-for-service Medicare in 2009.[14]

Plan availability and enrollment in MA plans also grew steadily as a result of the MMA. By 2008, the typical Medicare beneficiary had 35 MA plans from which to choose.[15] In 2010, 24 percent of all Medicare beneficiaries were enrolled in a private plan and 99.6 percent of Medicare beneficiaries had access to one or more private Medicare managed care plan in their county.[16,17]

The Medicare Improvements for Patients and Providers Act (MIPPA), passed in 2008, and the 2010 Patient Protection and Affordable Care Act (ACA) both not only modified plan payment rates further, but also introduced new regulations affecting Medicare managed care plans. Key provisions included in the ACA modified MA plan payments through a reduction in benchmark rates to plans and through the implementation of a new system of quality-related bonuses.[18]

FIGURE 1.1



Source: G. Jacobsen, T. Neuman and J. Huang. Projecting Medicare Advantage Enrollment: Expect the Unexpected? Kaiser Family Foundation. June 12, 2013. Available at: http://kff.org/medicare/perspective/projecting-medicare-advantage-enrollment-expect-the-unexpected/
CBO: Congressional Budget Office
OACT: Office of the Actuary

In their March 2011 Medicare baseline, the Congressional Budget Office projected that as a result of these policy changes, average monthly enrollment in MA plans would fall from approximately 11.7 million enrollees in 2011 to 8.7 million in 2021.[19] Interestingly, the Congressional Budget Office has since revised their projections considerably; projections released in 2013 now suggest MA enrollment could be as high as 19 million by 2021.[20] [Figure 1.1] This dramatic shift in projections illustrates the policy world's lack of understanding of how changes in MA payment policy can affect plan participation and beneficiary enrollment in private plans.

The primary goal of the research presented here is to elucidate the relationship between payment rates and plan participation. However, a number of other factors likely affect plan participation decisions, including individual plan characteristics that may lead plans to respond differently to changes in payment policies, as well as other factors that may impact a plan's projected level of enrollment (e.g., the number of beneficiaries without supplemental plans) or expected costs (e.g., hospital concentration, prior activity in commercial insurance). Thus, another goal of the research presented here is to identify and understand other factors associated with private plan participation in Medicare.

There are six specific research aims, which will be discussed in greater detail in later chapters:

1. To examine the association between county-level benchmark rate variations and plan participation in the MA program.
2. To examine whether a plan's profit status (for-profit versus nonprofit designation) affects the relationship between county-level benchmark rates and MA plan participation.
3. To examine whether a plan's type (e.g. health maintenance organization (HMO), local preferred provider organization (local PPO), private fee-for-service plan (PFFS)) affects the relationship between county-level benchmark rates and MA plan participation.
4. To examine whether rates of employer-sponsored retiree coverage and Medicaid supplemental insurance coverage are associated with plan participation.

5. To examine whether hospital market concentration in an area is associated with plan participation.
6. To examine whether a parent company's participation in the non-MA health insurance market is associated with plan participation in the MA program.

CHAPTER II: POLICY BACKGROUND AND REVIEW OF THE LITERATURE

The current mechanisms that determine MA plan payments and regulate participation are quite complex, in part due to shifting Medicare managed care policies over time. This chapter reviews the more recent changes to private Medicare managed care payment policies and describes the process health insurers must undertake in order to participate in Medicare. Finally, a review of the existing literature on Medicare managed care plan participation is presented.

POLICY BACKGROUND

MEDICARE ADVANTAGE PAYMENT POLICY. Prior to the passage of the MMA in 2003 (and the implementation of the specific payment policy provisions it included in 2006), the system through which managed care plans participating in Medicare were paid remained loosely based on the original prospective payment program introduced in 1982. Plan payments were generally derived from average per-capita spending in traditional fee-for-service Medicare in a county, though the passage of laws such as the 1997 BBA established higher payment "floors" for certain types of counties (e.g. rural counties).

Since 2006, however, MA plan capitation payments have been calculated through a benchmark-based bidding system. Under this system, private plans submit bids that represent the cost of providing Medicare Part A and Part B benefits to an enrollee.[21] That bid is then compared to a county-level benchmark rate – essentially a "bidding target" – determined by CMS. Benchmarks are calculated using the same general system – established through the MMA in 2003 – under which county-level payment rates were set prior to the implementation of the bidding system. Under the MMA, county-level MA

benchmark rates were set at the highest of five different rates: 1) a rural floor rate, 2) an urban floor rate, 3) a blended rate calculated as 50 percent of the county's average cost under fee-for-service Medicare and 50 percent of the national average cost under fee-for-service Medicare, 4) a minimum update of the 2003 payment rate, or 5) 100 percent of average costs under fee-for-service Medicare in the county. In the years following the implementation of the MMA in 2004, benchmark rates were typically updated annually based on the average growth rate in per capita Medicare spending.

Prior to the passage of the ACA, under the benchmark-based bidding system, if a plan's bid was less than the county benchmark, CMS kept 25 percent of the difference between the bid and the benchmark, and 75 percent was returned to the plan in what is referred to as a "rebate". The plan was required to use that 75 percent rebate to offer additional benefits or reduced cost sharing to their enrollees.[22] If, however, a plan's bid was higher than the benchmark rate, the plan received a payment from CMS equal to the benchmark, and the plan's enrollees would pay the difference between the bid and the benchmark as part of their premium. Actual plan payment rates were risk adjusted to account for variations in the age, health status, gender, Medicaid eligibility status, institutionalized status and working status of each plans' enrollees.[23]

Though the benchmark rates were typically updated annually based on the average growth rate in fee-for-service Medicare spending, there has been some variation in the benchmark growth rates over time across counties. This variation is the result of particular MA payment policies. First, under the MMA, CMS was required to "rebase" benchmark rates every few years so that county benchmarks were updated to be either the higher of: a) their post-MMA rate category (the highest of the five categories mentioned

above) updated annually or b) a recalculated rate equal to 100 percent of fee-for-service costs in that county that year. CMS rebased benchmark rates in 2007 and 2009, which led to the benchmarks in some counties being increased to new 100 percent of fee-for-service levels. As a result, the benchmark rates across counties did not increase by a uniform growth rate in these years. In addition, policy changes included in the 2008 MIPPA, which mandated a phase out of the inclusion of Indirect Medical Education payments as part of the calculation of the benchmark rates, led to variation in the growth rates in benchmarks between 2009 and 2010.[24]

Finally, modifications to the MA payment system included in the ACA have also lead to variations in the benchmark growth rates across counties between 2011 and 2012. Specifically, the MA payment provisions included in the ACA have modified the MA payment system over the six years following the law's passage. In 2011, plan payments were frozen at 2010 levels. Beginning in 2012, a gradual reduction in benchmark rates to levels as low as 95 percent of average fee-for-service Medicare costs in counties that ranked in the top quartile for fee-for-service spending, and as high as 115 percent of average fee-for-service Medicare costs in counties that ranked in the bottom quartile of fee-for-service spending was implemented. These reductions were to be phased-in over a period of two to six years, depending on the size of the reduction of the benchmark in each county.[25]

The ACA also outlined a new system of quality-related bonuses that were designed to adjust MA benchmark rates depending on each plan's quality rating. This ACA provision was to be implemented beginning in 2012, however, prior to its implementation, CMS introduced a quality bonus payment demonstration of their own, superseding the ACA

provision. This CMS demonstration effectively modified the bonus system outlined under the ACA by expanding the bonuses to more plans – including those with lower quality ratings – and increasing the size of the bonuses. The CMS demonstration provided an additional $8 billion to plans beyond what was outlined under the ACA between 2012-2014.[26]

In addition to changing the way that county benchmark rates are calculated, the ACA included provisions that modified the rebate system as well. Under the legislation, the rebates that plans receive are no longer based on the 25/75 percent system discussed above, but instead vary depending on each plan's quality rating. Plans with lower quality ratings now receive rebates of just 50 percent of the difference between their Part A and B bid and the county level benchmark (with the remaining 50 percent going to CMS), whereas plans with higher quality ratings now receive up to 70 percent of the difference (with the remaining 30 percent going to CMS).[27,28]

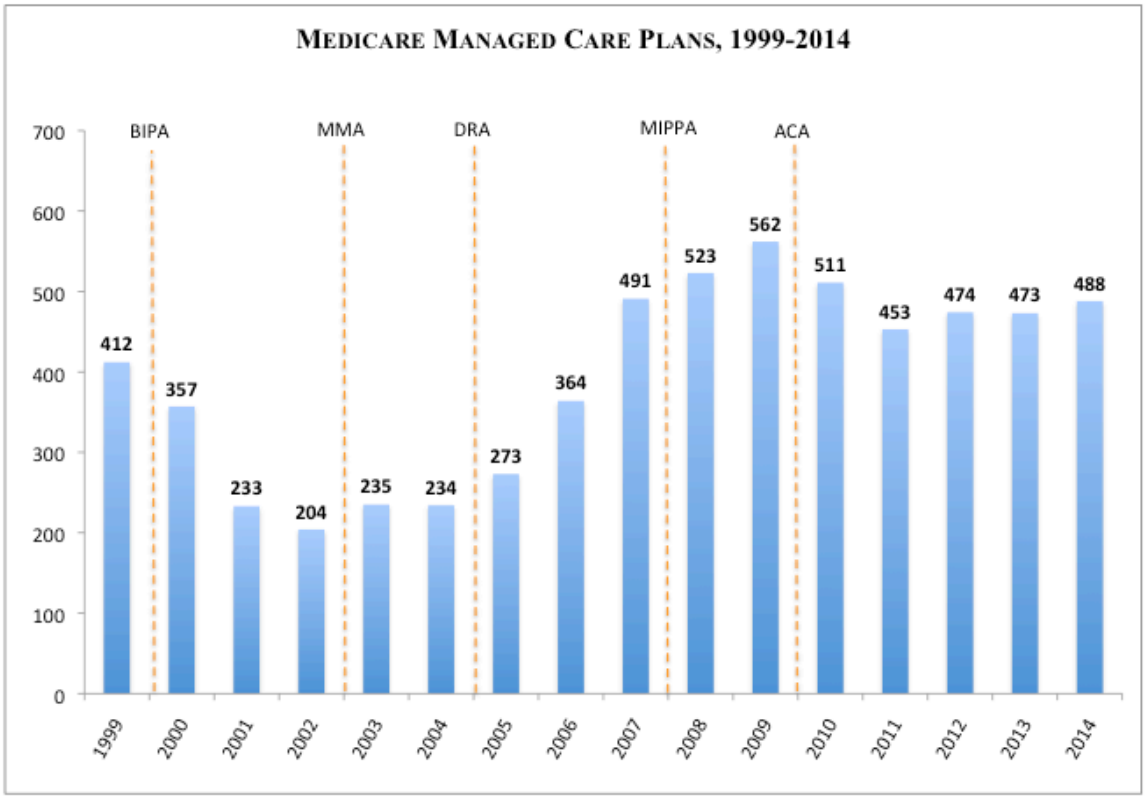
In addition to the above provisions, revisions to the MA risk adjustment methodology were implemented in order to account for differences in risk score reporting between MA plans and the traditional fee-for-service program. This also can impact plan payments.[29]

MEDICARE ADVANTAGE PLAN PARTICIPATION. Plan participation in the MA program is complex and requires extensive advance planning on the part of health care organizations. Almost a year ahead of time, health insurance companies must decide whether to participate (or continue to participate) in the MA program in the following year. If a company elects to participate in MA, they then must make decisions regarding the types of plans they will offer and the bids they will make. Specifically, by March of

each year, all organizations must submit contract applications to CMS for each type of plan they will offer. In early April, CMS releases finalized information on the benchmark rates and risk adjustment factors for all counties in the United States for the next year. By June, health insurance companies must decide on the counties in which they will offer MA plans and submit bids that represent the projected cost of providing Medicare Part A and Part B benefits to an enrollee in the next calendar year. If an organization fails to submit plan bids by June, they will not be allowed to offer MA plans the following year.[30]

Although health insurance companies must make overall participation decisions well in advance of the actual plan year, they are subsequently well informed about benchmark rates in each county as they make strategic decisions about where specifically to offer plans. Figure 2.1 shows the total number of Medicare managed care plans offered between 1999 and 2014. Over the past 15 years, the number of MA plans offered across the United States has fluctuated widely. In 2002 there were as few as 204 MA plans offered, but following the passage of the MMA in 2003, the number of plans grew to a high of 562 in 2009. In 2014, 488 MA plans were offered.[31]

FIGURE 2.1



Source: Kaiser Family Foundation. Medicare Health and Prescription Drug Plan Tracker. Available at: http://healthplantracker.kff.org/ Accessed April 2015.
Notes: Chart includes dates of passage of key Medicare managed care legislation.
1) BIPA: Medicare, Medicaid and SCHIP Benefits Improvement and Protection Act of 2000 – Established urban floor payments for managed care plans;
2) MMA: Medicare Prescription Drug, Improvement and Modernization Act of 2003 – Established the Medicare Advantage Program, introduced benchmark-based bidding, and increased payments to all plans;
3) DRA: Deficit Reduction Act of 2005 – Phased out the budget-neutral provision for risk adjustment of Medicare Advantage plans;
4) MIPPA: Medicare Improvements for Patients and Providers Act of 2008 – Removed a duplicative payment for Indirect Medical Education and instituted significant changes to the rules governing private fee-for-service (PFFS) plans;
5) ACA: Patient Protection and Affordable Care Act – Reduced benchmark rates and instituted a new system of quality-related bonuses.

REVIEW OF THE LITERATURE

PRIOR STUDIES. Several studies have examined the effects of Medicare managed care plan payments on market participation, but most were conducted using data from the period prior to the implementation of the MMA. The majority of these studies examined

the association between changes in payment rates and plan participation prior to, and just following, the implementation of the BBA in 1997. Though the Medicare managed care market has changed significantly over the past decade, these earlier studies are still valuable as they point to areas warranting further investigation.

Early research on plan participation. The earliest research on the determinants of Medicare managed care plan participation was primarily focused on examining the impact of the passage of the Tax Equity and Fiscal Responsibility Act in 1982 (which established a risk-based prospective payment system for HMOs) on market participation. Adamache and Rossiter (1986) examined the factors affecting plan participation in the Medicare HMO competition demonstrations and found that an increase in plan capitation rates of one standard deviation above the mean was associated with an 8 percent increase in the probability of market participation.[32] In a cross-sectional analysis of 1986 data, Porrell and Wallack (1990) found that higher plan payment rates, greater Medicare managed care market concentration (as measured by the Herfindahl-Hirschman Index) and lower market share in the non-Medicare managed care market were all associated with a greater probability of plan participation.[33]

Abraham et al. (2000) used InterStudy data to examine factors affecting Medicare HMO plan participation and enrollment for the years 1990 to 1995. Their results suggested that, although plan payment rates were found to be positively associated with participation in the Medicare managed care market, the magnitude of the impact of payment rates on market participation was smaller than that reported in the Adamache and Rossiter and Porrell and Wallack studies. Abraham et al. found that a $35 increase in a plan's monthly capitation rate was associated with a 3 percent increased probability of market

participation. Certain demographic factors, including the age structure of the population in a given market (proportion of the population 65-75 years and proportion of the population 75+ years), were also found to be associated with plan participation. [34]

Similarly, Pai and Clement (1999) examined new entry into Medicare managed care through a cross sectional analysis of market entry in 1995 and found that higher payment rates and overall growth in managed care enrollment were statistically significantly associated with an increased probability of a new plan entering a market.[35]

Factors affecting plan withdrawal. Following the passage of the BBA in 1997, which effectively reduced payments to plans in urban areas and increased payments to plans in rural areas, plan participation in the Medicare program decreased substantially. A number of studies conducted around that time examined the factors associated with plan withdrawal from the Medicare managed care market.

Using data from the Health Care Financing Administration (HCFA; the predecessor to CMS) on county-level enrollment, payments and market penetration, Glavin et al. (2002/2003) found that lower average Medicare managed care plan payment rates were associated with an increased probability of a plan exiting the Medicare+Choice program in 1998. Specifically, they found that a decrease in the average payment rate equal to one standard deviation below the mean increased the probability of a plan exiting the market by nearly 8 percent. They also found that plans with for-profit status and lower market share had a significantly higher predicted probability of exiting the market.[36]

The United States General Accounting Office (GAO) released a series of reports examining plan withdrawal between 1999 and 2001.[37] These reports were based on an

analysis of data files from HCFA as well as interviews with officials at HCFA regional offices and health plan representatives. The GAO's reports indicated that, despite many managed care plans' claims that payment rate changes were the main reason for withdrawal from the market, other factors were more important. Specifically, they reported that newer plans, plans with fewer enrollees, plans that struggled to establish adequate provider networks and plans locating in areas with larger competitors were more likely to exit the market following the implementation of the BBA.[38]

Halpern (2005) modeled the impact of payment policy changes on the probability of a Medicare managed care plan exiting a county between 1999 and 2001. Her results suggested that the introduction of payment floors (which increased plan payments in areas with lower average fee-for-service costs) in the BBA in 1997 were significantly associated with a lower likelihood of a plan exiting a county.[39]

Qualitative analysis of factors affecting plan participation. Although the majority of studies examining the factors affecting Medicare managed care plan participation (such as those presented above) are quantitative studies that primarily draw on economic theory and use complex modeling techniques to draw conclusions about firm decisions regarding market participation, qualitative research has also provided important insights into health plan decision-making.

In the late 1990s, Brown and Gold (1999) conducted case studies of four major Medicare managed care markets: Los Angeles, New York City, Portland (Oregon) and Tampa-St. Petersburg.[40] Through interviews with key health plan representatives and others, they identified a number of key market characteristics associated with plan participation in

these four markets, including Medicare managed care capitation payment rates, historic presence of non-Medicare managed care in the area, proportion of the over-65 population with Medicaid or employer-subsidized coverage, and presence of large physician groups in the county. Moreover, they reported that the wide variation in capitation rates across counties led some plans to "define their Medicare markets in odd ways, to drop counties from their Medicare market area and to offer different plan benefits and premiums based on beneficiaries' county of residence."[41]

Through a series of interviews conducted in 2004, Hurley et al. (2005) reinforced the notion that health plans carefully select the counties where they will offer Medicare managed care products by reporting that the ability to selectively enter counties with higher payment rates was viewed by health plan executives as a key factor enabling MA plans to be profitable. Provider consolidation, local health system capacity and health plan leverage in negotiating provider contracts were also reported as important factors to health plans as they consider where to locate.[42]

Post-MMA research. Frakt, Pizer and Feldman (2009) simulated the impact of hypothetical reductions in MA payment rates on MA private fee-for-service plan participation. Using CMS data on private fee-for-service plan participation, enrollment and payment rates for the years 2001-2008, the authors report that a reduction in MA benchmark rates to 100 percent of average fee-for-service costs would reduce private fee-for-service market entry by 85 percent.[43] However, the empirical approach of this study (and thus the magnitude of the findings) is questionable, as the benchmark variable that the authors use spans a time period both before and after the implementation of the

MMA. Prior to 2006, the payments simply equaled the benchmarks, but after 2006, the payments were determined by plan bids relative to the benchmarks.

Afendulis, Landrum and Chernew (2012) used CMS data on plan offerings and enrollment between 2010-2011 to estimate Poisson regression models for the association between MA payment rate "generosity" – defined as the expected payment rates resulting from the implementation of the ACA – and the number of plans and benefit packages offered in a county. They estimated that counties in the highest quartile of spending prior to the ACA – i.e. the counties that would be slated to experience payment rate reductions or, at the very least, the lowest payment rate increases following the ACA – experienced a greater decrease in the number of benefit packages offered. They did not find a similar relationship at the plan level.[44]

Song, Landrum and Chernew (2013) took a slightly different look at the MA market, examining the effect of benchmark changes on MA plan bids. Plan bids are supposed to represent the actual cost to the plan of providing Medicare Part A and B benefits to enrollees, however their results instead suggest that MA plans wield significant market power, as plan bids seemed to rise as benchmark rates rose. Using CMS data on county benchmarks and fee-for-service cost averages, they reported that an increase in county benchmark rates of $1 was associated with a $0.53 increase in plan bids, after controlling for other factors associated with bid levels.[45] This may suggest that plans operate more efficiently under payment constraints than they do when facing more generous benchmarks.

Taken together, these studies suggest that payment rates may, in fact, be a key determinant of health plan participation in the Medicare managed care market, though there continues to be significant uncertainty with respect to the magnitude of the impact. The above research has also identified a number of factors beyond payment rates that may be associated with health plan decisions to participate in the Medicare managed care market, including profit status, competition, participation in the non-Medicare managed care market, and age structure of the population in a given market, among other factors.

Given that the vast majority of the studies in this area were conducted prior to the passage of the MMA in 2003 (and, therefore, prior to the implementation of the new payment system), let alone prior to the passage of the ACA in 2010, it is evident that there is significant need for new research. Moreover, the more recent studies in this area have some critical limitations and draw upon narrow sets of data for their findings. This dissertation therefore examines benchmark rates and plan participation for 2008 through 2012 and uses more extensive data than these previous studies have used.

CHAPTER III: CONCEPTUAL APPROACH

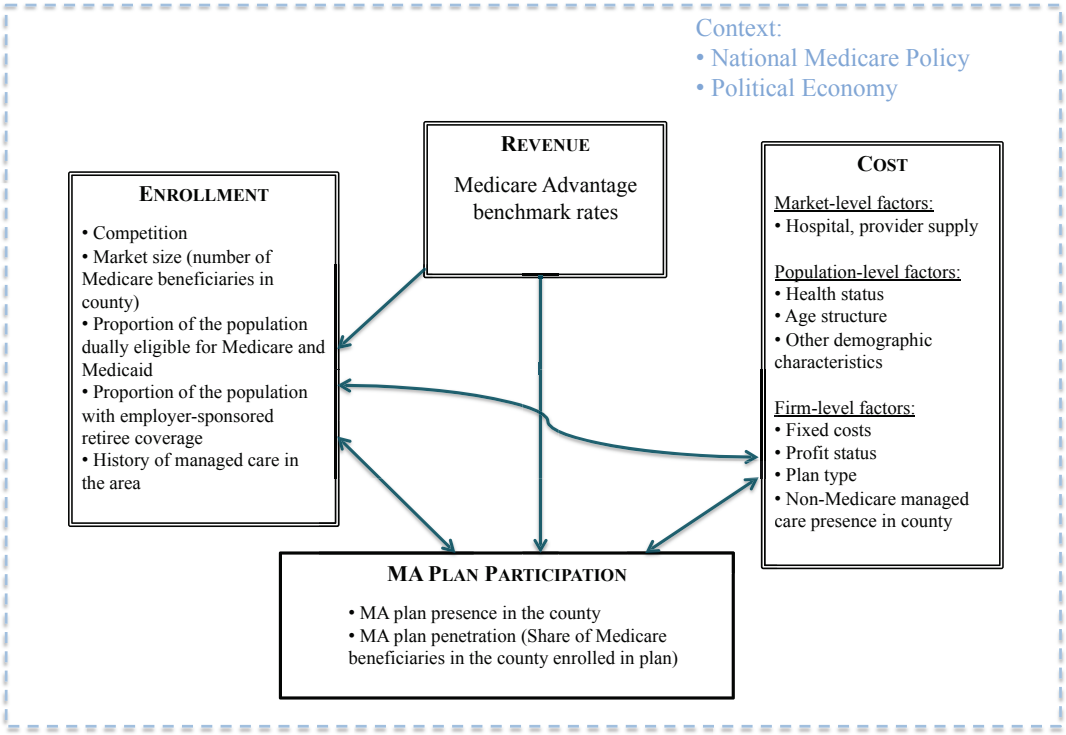
Payment and regulatory policy changes enacted by Congress can have important implications for private health insurance plans that participate or contemplate participating in Medicare. However, participation decisions also depend on a host of other factors and plan characteristics. This chapter describes the conceptual approach that forms the foundation for this research, and discusses in detail the specific factors that are the focus of the analyses presented in the next chapter.

CONCEPTUAL MODEL

Health insurance companies must make annual decisions about their participation in the MA program. Specifically, there are two key participation decisions that firms must make each year: 1) an overall decision regarding whether to participate (or continue to participate) in the MA program in general, and 2) a decision regarding where to offer their MA plans (i.e., whether to enter a new county, remain in an existing county, or exit an existing county). A health insurance company will likely choose to participate in the MA program – both overall and in a particular county – as long as doing so results in financial returns that meet the company's goals. The behavior of health insurance companies contemplating participation in the MA market can therefore be assumed to generally follow a profit maximization model, where participation is contingent on revenues exceeding costs at a projected level of enrollment. (The special case for less-common nonprofit insurers is considered below).

FIGURE 3.1

CONCEPTUAL MODEL



Given a profit-maximization framework, the research presented here is based on the assumption that there are three distinct types of factors health insurance companies consider when making decisions about whether and where to participate in the MA market: expected revenue per enrollee, projected enrollment, and expected costs (which has both cost per enrollee and fixed cost components). All three types of factors are hypothesized to have an impact on a firm's profitability in the MA market (see Figure 3.1). The principal factor affecting expected revenue per enrollee for a plan is the county-level MA benchmark rate.

Second, factors affecting projected enrollment include competition from other plans, the number of Medicare beneficiaries in the county, per capita income in the county, the

proportion of the elderly population with employer-sponsored retiree coverage, and the proportion of the elderly population dually eligible for Medicaid. Regarding the latter two factors, Medicare beneficiaries who already have supplemental coverage through a retiree health plan or though a state Medicaid program would have little incentive to enroll in an MA plan. All of these factors should have an impact on the level of beneficiary demand for an MA plan in a given county.

Third, factors affecting expected costs include certain market-level factors related to provider prices, population-level factors related to expected utilization, and firm-level factors related to the costs of operating a plan. Provider prices should be influenced by the supply of hospitals, doctors, and community health centers in the market. Patient utilization should be influenced by health status, race, age, and other demographic characteristics impacting an individual's propensity to utilize medical care. Not all of these factors will be perfectly incorporated in the risk-adjusted MA payments. Finally, firm-level factors relating to costs are also likely to be important. The fixed costs of establishing MA plans (including the costs associated with building provider networks, etc.) and whether a firm already offers similar non-Medicare managed care plans in that county or state are key factors that should also play into a firm's decision to participate in a particular MA market. Moreover, whether the firm is nonprofit may impact the firm's decision to participate because nonprofit firms will likely have a lower threshold for the required financial rate of return.

Although all of the above mentioned factors affecting plan participation in the MA market are important, certain factors warrant further discussion. Below, six key factors

are considered in greater detail, and testable hypotheses relating to each factor are presented.

MA benchmark rates. Plans may be attracted to participating in counties where MA benchmarks are higher relative to average fee-for-service costs for two potential reasons. One is that the plan's resulting bid may be higher than the underlying costs of providing that care and so the expected profit per enrollee is higher. The other is that, assuming a plan is relatively efficient and able to submit a bid that is close to, or even below, average fee-for-service costs in the county, there is potential to receive a larger rebate. The larger the rebate, the greater the extra benefits a plan can offer ("extra benefits" meaning benefits beyond what is typically covered under traditional Medicare Parts A and B) and the more likely a plan is to attract more enrollees and maximize their overall profits. Similarly, growth in the ratio of MA benchmark rates relative to average fee-for-service costs over time may indicate that a plan is able to offer more benefits over time, which may be associated with greater profits per enrollee and/or enrollment growth.

> **HYPOTHESIS 1A:** MA plan participation is positively associated with the ratio of county-level MA benchmark rates relative to average fee-for-service costs under traditional Medicare.
>
> **HYPOTHESIS 1B:** The change in MA plan participation over time is positively associated with the change in the ratio of county-level MA benchmark rates relative to average fee-for-service costs under traditional Medicare.

Plan profit status. There is ongoing debate about the role that nonprofit organizations can and should play in health care and whether public policy should support and/or preserve

the role of nonprofit health plans. The distinction between for-profit and nonprofit insurers is clearly an important philosophical and political issue both in the United States and around the world. However, rarely is evidence cited to support the notion that for-profit and nonprofit health insurance plans actually operate differently. For instance, economic theory regarding the profit status of hospitals has suggested that there is in fact little difference in the behavior of for-profit and nonprofit hospitals.[46]

Less work has been done in the area of health insurance plans. It is hypothesized here that for-profit plans may respond more readily to changes in benchmark rates because they have an obligation to their shareholders to remain profitable (thus making for-profit plans less likely to participate in counties with lower rates). It is also hypothesized that, because they have greater access to capital, for-profit plans may be better equipped to enter the market in counties with higher benchmark rates more quickly than nonprofit plans. In contrast, it is possible that nonprofit plans may continue to operate in counties with lower rates, viewing it as fulfillment of their obligation to serve the community.

> **HYPOTHESIS 2A:** MA plan participation will have a larger positive association with the relative benchmark rates (the ratio of county-level MA benchmark rates relative to average fee-for-service costs under traditional Medicare) among for-profit plans compared to nonprofit plans.
>
> **HYPOTHESIS 2B:** The change in MA plan participation over time will have a larger positive association with the change in the relative benchmark rates among for-profit plans compared to nonprofit plans.

Plan type. In 2014, the Medicare Payment Advisory Commission reported that the average MA plan bid (which reflects the cost to a plan of providing Medicare Part A and B benefits to enrollees) was 95 percent of average fee-for-service costs for HMO plans, 108 percent of average fee-for-service costs for local PPO plans and 110 percent of average fee-for-service costs for private fee-for-service plans.[47] These data suggest that there are vast differences in efficiency by plan type (from the perspective of CMS).

In addition, the rapid growth in private fee-for-service plan participation in the mid-2000s may point to differences in the relationship between MA payments and plan participation by plan type. Although private fee-for-service plans were first introduced as part of the BBA in 1997, they did not have a significant presence in the market until the mid-2000s. It is generally thought that the higher payment rates introduced through the MMA in 2003, coupled with the low start-up costs required to establish a PFFS plan – until the MIPPA was passed in 2008, PFFS plans were not required to have provider networks, making it significantly easier to establish a PFFS plan in a given county as compared to other plans that depend on provider networks to control costs – contributed to the rapid growth in these plans. The number of PFFS plans grew from just two in 2003 to 70 by 2008 and the Medicare Payment Advisory Commission (MedPAC) reported an eight-fold increase in enrollment in PFFS plans between December 2005 and November 2007.[48,49] Since the 2008 passage of the MIPPA, which introduced stricter regulations for PFFS plans, and the ACA, which reduced benchmarks for all plan types, the number of PFFS contracts fell to just 12 in 2014.[50]

It is hypothesized that less efficient plans may be more likely to locate in areas where MA benchmarks are significantly higher than average fee-for-service costs.

HYPOTHESIS 3A: Plan participation will be less strongly associated with the relative benchmark rate for more tightly managed plans, such as health maintenance organizations (HMOs), as compared to more loosely managed plans (PFFS).

HYPOTHESIS 3B: The change in MA plan participation over time among more tightly managed plans, such as health maintenance organizations (HMOs), will be less strongly associated with the change in relative benchmark rates, as compared to more loosely managed plans (PFFS).

Rates of retiree and Medicaid coverage. Employer-sponsored retiree coverage and Medicaid dual eligible coverage are two additional means by which a person over age 65's health care might be covered. Employer-sponsored retiree coverage is typically designed as a "wraparound" for Medicare Parts A and B, providing coverage for some of the cost sharing and uncovered benefits under traditional Medicare. Similarly, persons who are dually eligible for Medicare and Medicaid (Medicare beneficiaries with very low incomes and few assets) typically receive traditional Medicare Part A and B benefits with Medicaid coverage functioning as a wraparound to cover some or all of the cost sharing under Medicare as well as providing coverage for certain benefits that are not covered.[51] Medicare beneficiaries who already have supplemental coverage through a retiree health plan or though a state Medicaid program should have little incentive to enroll in an MA plan. Therefore, it is hypothesized that high levels of retiree and Medicaid coverage would deter MA plans from participating in a market as it would mean a smaller pool of potential enrollees.

HYPOTHESIS 4A: MA participation will be negatively associated with the proportion of the local population with retiree insurance and Medicaid coverage.

HYPOTHESIS 4B: The change in MA plan participation over time will be negatively associated with the change in the proportion of the local population with retiree insurance and Medicaid coverage.

Hospital Market Concentration. Theoretically, the greater the number of hospitals in a given market (i.e. the less concentrated the hospital market is in an area), the more likely hospitals are to have to compete on price and quality. Hospitals may lower their prices and/or work to improve quality in order to win contracts with private managed care plans in an area. Thus, private MA plans may be more likely to participate in areas with low hospital concentration because lower prices for hospital care will lead to lower per-enrollee costs and greater profits for the plan.

HYPOTHESIS 5A: MA participation will be negatively associated with hospital market concentration.

HYPOTHESIS 5B: The change in MA participation over time will be negatively associated with the change in hospital market concentration.

Non-Medicare Advantage Activity. A parent company's activity in the nonelderly commercial health insurance market for employment-based groups could be associated with a greater likelihood that they will participate in the MA market for a number of reasons. Chiefly, activity in the non-MA market can be an advantage to a company contemplating MA market participation because they will already have extensive experience with insurance regulations in that state and with the population in particular

market areas. They will have already established provider networks for the non-MA market that they can likely take advantage of in establishing provider networks for MA products. In addition, activity in the non-MA market can indicate a firm's ability to capture economies of scale, e.g. through the negotiation of greater discounts when contracting with providers and the ability to spread marketing costs across a wider variety of products. Finally, activity in the non-MA market in an area can also benefit a health insurance company through establishing name recognition. For example, Medicare beneficiaries may feel more comfortable enrolling in an MA plan offered by Humana if they were previously enrolled in a Humana plan through an employer.

> **HYPOTHESIS 6:** Health insurance organizations that offer non-MA plans in a market are more likely to participate in MA in that market, as compared to those organizations that do not offer non-MA plans.

The empirical methods presented in Chapter 4 are specified to examine the impact of each of these factors on MA plan participation.

CHAPTER IV: STUDY DESIGN AND ANALYTIC METHODS

OVERVIEW

Given the important role that managed care plans have come to play in the Medicare program, understanding the association between payment rate variations and plan participation in the Medicare managed care market is critical to the development of appropriate policies. Based on the conceptual framework presented in Chapter III, the overall aim of this dissertation research is to examine empirical models of MA plan participation, where participation is primarily a function of the MA benchmark rate, health plan profit status, plan type, local demand characteristics (the proportion of the Medicare population with retiree coverage, the proportion of the Medicare population dually eligible for Medicaid), hospital market concentration, and a health plan's activity in the non-Medicare managed care market.

The empirical methods presented here in Chapter IV will examine:

1) The association between variations in MA benchmark rates (and the other key factors) across counties and MA plan participation at one point in time, and

2) The association between changes in MA benchmark rates (and the other key factors) over time and changes in MA plan participation over time.

For both the cross-sectional and longitudinal regression models, plan participation is the dependent variable and the six factors of interest – MA benchmark rates, MA plan profit status, MA plan type, rates of retiree and Medicaid coverage among Medicare beneficiaries, hospital market concentration, and participation in the non-MA health

insurance market in an area – are the key independent variables. The explicit functional forms of these empirical models are presented below as equations, but first the data, dependent variables, and independent variables are described.

DATA

A key contribution of this research is that it involves the compilation of a large amount of data from an extensive variety of sources – data that have, to the author's knowledge, never before been compiled nor have they ever been used to examine the research questions at hand.

The research presented here predominantly draws upon a number of publicly available administrative datasets from the Centers for Medicare and Medicaid Services (CMS) (see Table 4.1). Data on MA benchmark rates and average fee-for-service expenditures by county were obtained from the CMS Medicare Advantage Rate Calculation data files.[52] These files contain data on the per-capita benchmark rates for MA plans and average per-capita fee-for-service costs for every county in the United States. These files are released annually and are usually made available at least six months prior to the contract year to which they apply.

TABLE 4.1 DATA SOURCES

SOURCE	DATA EXTRACTED	LINK
CMS Medicare Advantage contract data files	Health plan participation at the county level	http://cms.hhs.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/MCRAdvPartDEnrolData/Monthly-MA-Enrollment-by-State-County-Contract.html
CMS Medicare Advantage contract service area files	MA plan state and county service area data	http://cms.hhs.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/MCRAdvPartDEnrolData/MA-Contract-Service-Area-by-State-County.html
CMS Medicare Advantage enrollment data files	MA plan enrollment at the State/ County/ Contract level	http://cms.hhs.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/MCRAdvPartDEnrolData/Monthly-MA-Enrollment-by-State-County-Contract.html
CMS state/county penetration files	Medicare beneficiaries and total MA enrollees by county	http://cms.hhs.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/MCRAdvPartDEnrolData/MA-State-County-Penetration.html
CMS Medicare Advantage rate calculation data files.	MA benchmark rates	http://cms.hhs.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Ratebooks-and-Supporting-Data.html
CMS FFS data	Average per-capita expenditures under traditional fee-for-service Medicare by county	http://cms.hhs.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/FFS-Data.html and http://cms.hhs.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Ratebooks-and-Supporting-Data.html
CMS MA plan directory files	All approved MA contracts operating in a calendar year; specific plan- and firm-level characteristics, e.g. profit status, plan type	http://cms.hhs.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/MCRAdvPartDEnrolData/MA-Plan-Directory.html
CMS Part C and D performance data	MA health plan star ratings	http://www.cms.gov/Medicare/Prescription-Drug-Coverage/PrescriptionDrugCovGenIn/PerformanceData.html
Current Population Survey (CPS) March Supplement	Proportion of the population in each state with Medicaid supplemental insurance coverage, or retiree coverage	http://www.census.gov/apsd/techdoc/cps/cpsmar10.pdf
American Hospital Association Annual Survey	Hospital market concentration (HHI measure)	http://www.ahadataviewer.com/book-cd-products/AHA-Survey/
HealthLeaders-InterStudy Managed Market Surveyor-R_x datafile	Non-Medicare managed care plan presence in each county; health insurance plan participation by plan type broken down at the county level	http://www.hl-isy.com/Managed-Market-Surveyor
Area Health Resources File	Health care facilities, providers, hospital utilization, population characteristics and economic and environmental data by county, for every county in the United States	http://ahrf.hrsa.gov
Census	Population rates and characteristics	http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk

Information on health plan participation at the county level is obtained from the CMS Medicare Advantage Contract and Enrollment data files.[53] Data files with health plan participation and enrollment are released monthly, with new files published to the CMS website by the 15th of the month. Data on all approved MA contracts operating in a calendar year is obtained from the CMS MA Plan Directory files, which also include specific firm-level information including profit status. MA contract information is updated annually, as new organizations and plans enter the market.[54] Information on the number of Medicare beneficiaries per county is drawn from the State/County Penetration files, which are released monthly.[55] Finally, data on health plan star ratings, which affect the 2012 benchmarks for each plan, is drawn from the CMS Part C and D Performance Data, which is released annually.[56]

As described below, rates of retiree and Medicaid supplemental insurance coverage among Medicare beneficiaries, participation in the non-MA health insurance market in an area, county characteristics and other control variables are drawn from the Current Population Survey, the HealthLeaders-InterStudy Managed Market Surveyor-R_x datafile, the, Area Health Resources File and the United States Census.

Data on key demand characteristics – the proportion of the Medicare population in each state with Medicaid supplemental insurance coverage, or retiree coverage – is obtained from the Current Population Survey (CPS) March Supplement. The CPS March Supplement is an annual survey of approximately 112,000 non-institutionalized persons in the United States and contains detailed data on health insurance coverage, including Medicare, Medicaid, employer-sponsored group insurance and private individual health insurance coverage.[57] The sample size for the CPS is insufficient to produce county-level

estimates of insurance coverage, so state-level estimates for Medicare supplemental coverage had to be used instead.

Data for hospital market concentration is obtained from the American Hospital Association's Annual Survey. In order to calculate the Herfindahl-Hirschman Indices, the Office of Management and Budget's Core-Based Statistical Areas (with divisions therein for the largest cities) were used to define the geographic markets, and hospital system market shares were estimated using each hospital system's total annual Medicare days.

Data relating to participation in the non-MA health insurance market in an area is obtained from the proprietary HealthLeaders-InterStudy Managed Market Surveyor-R_x database. These plan-county level HealthLeaders-InterStudy data files are compiled annually and contain detailed data on health insurance plan participation and enrollment by plan type broken down at the county level. Plan participation in the employer-sponsored and individual health insurance markets in each county was isolated from the HealthLeaders-InterStudy files and matched to the CMS MA plan participation data to determine whether MA plans and non-MA plans with the same parent company operated in the same county level market. County level data were not compiled by HealthLeaders-InterStudy prior to 2008, which is why these analyses do not look at data prior to 2008.[58]

County characteristics and other control variables were drawn from the Area Health Resources File. The Area Health Resources File (formerly called the Area Resource File) is publicly available and is released annually by the Health Resources and Service Administration. The Area Health Resources File contains data on health care facilities, providers, hospital utilization, population characteristics and economic and

environmental data by county, for every county in the United States.[59] Provider measures which are calculated from these data include the county's hospital beds per capita, the county's physicians per capita, and whether a federally-qualified health center exists in the county.

Additional data on population rates and characteristics not included in the Area Health Resources File or the Current Population Survey are obtained from the United States Census.[60] Specifically, while the percent of the Medicare population reporting fair or poor health is estimated at the state level from the CPS, the county's population over age 65, percent black, and percent female come from the Census.

The unit of analysis is the plan/county for the primary analyses examining MA plan participation (i.e., plan X's participation in county 1, plan X's participation in county 2, plan Y's participation in county 1, plan Y's participation in county 2, etc.). The unit of analysis is the county for some secondary analyses examining MA plan penetration; the CMS Medicare Advantage Contract and Enrollment data files are the basis for these analyses. Because CMS sets benchmark rates at the county level (i.e. benchmark rates are uniform within each county, but vary significantly between counties), it is appropriate to use the county as the MA market area for these analyses. The rationale for using a year as the corresponding time at which data are collected for each plan is that CMS updates benchmark rates annually. Other county-level data used in this analysis, for example, data drawn from the Area Health Resources File, are also compiled annually.

DEPENDENT VARIABLES

MA plan participation is the main dependent variable of interest and has been defined in two ways: 1) individual plan presence for the primary analyses, and 2) aggregate plan penetration for secondary analyses.

Plan presence is defined as a health insurance company offering an MA plan in a specific county. For the cross-sectional analyses at a point in time (e.g., 2011), plan presence is a binary variable where 0 = plan is not offered in county and 1 = plan is offered in county. For the first difference analyses (e.g., 2011 compared to 2008), plan presence has four possible discrete outcomes: plan entered county, plan exited county, plan stayed in county, plan never entered county.

It is important to note that any given health insurance company may offer multiple plans in a county. A *plan* is defined here as a particular type of product offered by a health insurance company. Within each plan a health insurance company may offer a number of different benefit packages. (For instance, the company Humana could offer PPO and HMO plans, with one PPO benefit package having a low deductible and another PPO benefit package having a high deductible.) The data used here in these analyses is at the plan level, not at the benefit package level. A note about terminology: Some studies in this area instead differentiate between MA "contracts" and MA "plans", where contracts denote the types of plans offered in the county and plans denote the different benefit packages offered. This study uses the terms plans (not contracts) and benefit packages (not plans).

Using plan level data rather than benefit package level data is advantageous for a number of reasons. From one year to the next, insurers may eliminate certain benefit packages or consolidate benefit packages, which can be problematic for longitudinal analyses. It becomes particularly difficult as benefit packages that are merged from one year to the next may retain the identification number of one of those benefit packages, or a new identification number all together may be used.[61] Both scenarios make it difficult to monitor trends over time. For this reason, plan level data is much more consistent and stable over time.

When defining plan presence in a county, it is also important to carefully consider what might constitute the "potential" to participate in a given county. For example, should one assume that all plans with an MA contract could potentially operate in all counties in all states? This might be a reasonable assumption for a very large insurer such as United Healthcare, but for a small local insurer that only offers plans in one state, it is probably less reasonable to assume that they actually have the ability to offer a plan in every county in the United States.

There are a number of different ways to define whether a plan has the potential to be offered in a given county. As indicated above, in the loosest definition, all plans with a Medicare contract could be considered to have the potential to participate in any county in any state in the country. In a slightly more realistic definition, an MA plan could be considered to have the potential to participate in a county if that plan was offered in at least one county in the region. The Department of Health and Human Services defines ten regions for the U.S.[62] Finally, in the strictest definition, a plan could be considered to have the potential to participate in a county if the MA plan was offered in at least one

county in that state. In the analyses presented here, the second definition is used in which a plan was considered to have the potential to participate in a county if the MA plan was offered in at least one county in the region.

Plan penetration is defined here as the proportion of Medicare beneficiaries enrolled in MA plans in a county. It is important to consider both MA plan presence and MA plan penetration as measures of participation because, as is the case in many counties, plans may be made available to beneficiaries without ever attaining a meaningful level of enrollment; i.e. it is questionable whether a plan is actually "participating" in a county if there are no beneficiaries enrolled in that plan. Moreover, unlike plan presence, plan penetration may capture the extent to which insurers are actively marketing their MA plan, and/or offering enhanced benefits or lower premiums to attract enrollees.

However, looking at penetration for an individual MA plan in a county-level market can be problematic. In theory, more generous benchmarks and other favorable conditions could lead a plan to offer better benefits, thus attracting more enrollees and resulting in increased penetration for an individual MA plan. On the other hand, more generous benchmarks and other favorable conditions could also attract new MA plans to the market. If new MA plans are entering the MA market in a county, it would be possible for enrollment in a single MA plan to fall, even though overall MA plan penetration may be increasing, as enrollees are spread out across more plans. It is this problem – that increases or decreases in a single MA plan's penetration may mean more than one thing – that makes individual MA plan penetration a problematic measure of participation. Overall MA plan penetration in a county – that is, total enrollment in all MA plans in a

county as a proportion of total Medicare beneficiaries in the county – has the drawback that it does not allow for an examination of the association between plan-specific characteristics and enrollment, but overall it is a less problematic measure, as it avoids the issue of new plan entry or plan exit affecting enrollment in any given plan. Thus, the secondary analyses presented here will look at total plan penetration among all MA plans in a county.

KEY INDEPENDENT VARIABLES

As noted in Chapter III, the empirical analyses focus on six key independent variables, which follow from the conceptual model's six hypotheses: MA benchmark rates, MA plan profit status, MA plan type, rates of retiree and Medicaid coverage among Medicare enrollees, hospital market concentration and non-MA plan presence. More detail on how these independent variables are specified is presented below. Lastly, the relevant control variables are described.

KEY INDEPENDENT VARIABLE 1: MA BENCHMARK RATES. A central focus of the research presented here is to consider whether, and to what extent, there is an association between MA benchmark rates and MA plan participation. Therefore, the county-level MA benchmark rate is a key independent variable in the analyses presented here. The MA benchmark rate is operationalized as a ratio: the county-level benchmark rate relative to average per-capita costs under fee-for-service Medicare in the county (this ratio will be referred to here as the "relative benchmark rate"). Note that beginning in 2012, the MA benchmark rates, though still set at the county level, were modified according to each plan's quality (star) rating. Under this policy, a multiplier is applied to the county-level

benchmark rate depending on a given plan's overall quality rating in the prior year (e.g. for 2012 benchmarks, the multiplier was based on the plan's quality rating in 2011), thus, in 2012, the benchmark rate may potentially vary across plans within a county.

KEY INDEPENDENT VARIABLE 2: PROFIT STATUS, AND PROFIT STATUS INTERACTED WITH BENCHMARK RATES. A second aim of this research is to examine profit status (for-profit versus nonprofit designation) as a key independent variable. Specifically, the goal is to examine whether and how profit status modifies the relationship between county-level benchmark rates and plan participation in the MA program. For the plan presence analyses, plan profit status is specified as a binary variable (for-profit=1, nonprofit=0), and an interaction term is specified as the binary profit status variable multiplied by the relative benchmark rate. For the secondary plan penetration analyses, profit status is specified as the enrollment-weighted proportion of plans in a county that are designated as for-profit.

KEY INDEPENDENT VARIABLE 3: PLAN TYPE. A third aim of this research is to examine the impact of plan type (HMO, PPO, PFFS) on the relationship between benchmark rates and plan participation in the MA program. The plan types included in the analysis are HMO, local PPO, and PFFS. The other types of plans that participate in the MA program, including PACE, Cost, and regional PPO plans are excluded from the analysis as they are paid using a different methodology. SNP plans have also been excluded, as these plans are only available to specific populations within the Medicare program. The primary plan presence analyses include analyses that are stratified by plan type, as well as other analyses that use dummy variables for plan type (using PPO plans as the reference category). For the secondary plan penetration analyses, plan type is specified as two

variables: the enrollment-weighted proportion of plans in a county that are HMOs, and the enrollment-weighted proportion of plans in a county that are PFFS.

KEY INDEPENDENT VARIABLE 4: RATES OF SUPPLEMENTAL COVERAGE. A fourth set of key independent variables relate to the rates of employer-sponsored retiree coverage and Medicaid supplemental insurance coverage in a state. As noted above, Medicare beneficiaries who already have supplemental coverage through a retiree health plan or though a state Medicaid program would, in theory, have little incentive to enroll in an MA plan. These variables are defined as the proportion of the over-65 population in the state with retiree supplemental coverage and the proportion of the over-65 population in the state who are dually eligible for Medicaid.

KEY INDEPENDENT VARIABLE 5: HOSPITAL MARKET CONCENTRATION. A fifth aim of this research is to examine the association between hospital market concentration and MA plan participation. The Herfindahl-Hirschman Index (HHI) is used to calculate market concentration, using the Office of Management and Budget's Core-Based Statistical Areas (with divisions therein for the largest cities) to define the geographic markets, and using each hospital system's total annual Medicare days to estimate market shares. For greater ease of interpretation of coefficients, HHI is divided by 100 in the analyses presented here.

KEY INDEPENDENT VARIABLE 6: NON-MEDICARE ADVANTAGE PLAN PARTICIPATION. A sixth goal of this research is to examine the relationship between a firm's activity in the non-MA market on plan participation in the MA program. In this analysis, non-MA plan activity is defined as a parent company offering a non-MA plan in the county. For the

primary plan presence analyses, it is specified as a binary variable, where 1=parent company offers a non-MA plan in the county and 0=parent company does not offer a non-MA plan in the county. For the secondary plan penetration analyses, it is specified as the enrollment-weighted proportion of MA plans in a county that have a parent company that also offers a non-MA plan in the county. Non-MA plans include employer-sponsored health insurance plans of all types, as well as individual market health insurance plans for persons under 65 years of age.

CONTROL VARIABLES

In order to examine the association between MA plan participation and the relative benchmark rates, profit status, plan type, rates of retiree and Medicaid supplemental coverage, hospital market concentration and non-Medicare managed care plan presence, the analyses presented here control for other important factors affecting plan participation. County-level variables including hospital beds per 1,000 population, MDs per 1,000 population, proportion of the Medicare population in fair or poor health, median income in the county, whether the county has at least one federally qualified health center (FQHC), size of the elderly population in the county, proportion of the population that is female and proportion of the population that is black are included in the analyses.

STATISTICAL ANALYSES

The goal of this research is to model county-level plan participation in the MA program. This is done using two types of outcomes (plan presence and plan penetration) and using

two types of approaches: cross-sectional analyses ("Approach A") and longitudinal analyses ("Approach B"). Approach A corresponds to Hypotheses 1A, 2A, etc., while Approach B corresponds to Hypotheses 1B, 2B, etc. presented in Chapter III. The methods used for the plan presence analyses are presented first, followed by the methods used for the plan penetration analyses.

PLAN PRESENCE ANALYSES

APPROACH A: CROSS-SECTIONAL ANALYSES OF PLAN PRESENCE IN 2008, 2011, AND 2012

Multivariable logistic regression analysis is used to examine the odds of MA plan presence as a function of the benchmark rate, health plan profit status (along with its interaction with the benchmark), the proportion of the population over 65 years with retiree coverage, the proportion of the population over 65 years with Medicaid coverage, local hospital market concentration and whether an MA plan's parent company offers a non-MA plan in the county. Separate cross sectional analyses are run for the years 2008, 2011 and 2012.

The model is specified as follows:

$$(1A)\ \ln\left(Presence_{ic}/1\text{-}Presence_{ic}\right) = \beta_0 + \beta_1\, Bench_c + \beta_2\, Profit_i + \beta_3\, Profit_i{*}Bench_c + \beta_4\, Retiree + \beta_5\, Medicaid + \beta_6\, HospitalHHI_c + \beta_7\, NonMAplan_i + \beta_8\, County_c + \varepsilon_{ic}$$

where $Presence_{ic}$ is the probability of plan i operating in county c, $Bench_c$ is the relative benchmark rate in county c, $Profit_i$ is the profit status of plan i (for-profit or nonprofit), $Profit_i{*}Bench_c$ is an interaction term included to capture any differential impact of MA

benchmark rates on plan presence by profit status, *Retiree* is the proportion of the elderly population in the state with employer-sponsored retiree coverage, *Medicaid* is the proportion of the elderly population in the state with supplemental Medicaid coverage, *HospitalHHI* is a measure of hospital market concentration in county *c*, *NonMAplan* is an indicator of whether the parent company offers a non-MA plan in county *c*, $County_c$ represents a vector of county-level control variables for a given year, and ε_{ic} is the error term.

Returning to the hypotheses presented in Chapter III, Hypothesis 1A suggests that the coefficient β_1 should be positive, signifying a positive association between the relative benchmark and probability of plan presence. Hypothesis 2A implies that the coefficient β_3 should also be positive, indicating that the positive relationship between the relative benchmark rate and plan presence is stronger among for-profit plans than among nonprofit plans. Hypothesis 4A implies a negative value for coefficients β_4 and β_5, suggesting that high rates of retiree and Medicaid coverage among the over-65 population are associated with lower probability of plan presence in a county. Hypothesis 5A suggests that the coefficient β_6 should be negative, indicating that higher hospital concentration is associated with lower odds of MA plan presence in a county. Finally, Hypothesis 6 suggests that the coefficient β_7 should be positive, indicating that a parent company offering a non-MA plan in the county is associated with a greater probability of MA plan presence.

To examine Hypothesis 3A for the differential effects of the relative benchmark payment on participation across the different plans, an initial set of analyses that include plan type

indicators and exclude PFFS plans is run and then the analysis above is repeated for each plan type's subsamples.

Specifically, the models with the additional plan type indicators are specified as follows:

$$(2A)\ \ln\left(Presence_{ic}/1\text{-}Presence_{ic}\right) = \beta_0 + \beta_1\, Bench_c + \beta_2\, Profit_i + \beta_3\, Profit_i{*}Bench_c + \beta_4\, Retiree + \beta_5\, Medicaid + \beta_6\, HospitalHHI_c + \beta_7\, NonMAplan_i + \beta_8\, County_c + \beta_9\, HMO_i + \beta_{10}\, PFFS_i + \varepsilon_{ic}$$

where HMO_i is a dummy variable for plan type where 1=HMO plan and 0=other, and $PFFS_i$ is a dummy variable for plan type where 1=PFFS plan and 0=other. PPO plans are the reference category.

Analyses similar to (1A) that omitted PFFS plans are also run. One concern is that PFFS plans, which faced new regulations over the study period as a result of the 2008 MIPPA (including requirements that they adopt provider networks), were exiting the market to such a great extent after 2008 that overall results could be skewed. Thus, the analyses omitting PFFS plans is intended to be a sensitivity analysis. Since the functional form of these models is the same as the model under (1A), the equation is not presented here.

The models by plan type subsamples are specified as follows:

$$(3A_1)\ \ln\left(\text{HMO}Presence_{ic}/1\text{-HMO}Presence_{ic}\right) = \beta_0 + \beta_1\, Bench_c + \beta_2\, Profit_i + \beta_3\, Profit_i{*}Bench_c + \beta_4\, Retiree + \beta_5\, Medicaid + \beta_6\, HospitalHHI_c + \beta_7\, NonMAplan_i + \beta_8\, County_c + \varepsilon_{ic}$$

$$(3A_2)\ \ln(\text{LPPO}Presence_{ic}/1\text{-LPPO}Presence_{ic}) = \beta_0 + \beta_1 Bench_c + \beta_2 Profit_i + \beta_3 Profit_i{*}Bench_c + \beta_4 Retiree + \beta_5 Medicaid + \beta_6 HospitalHHI_c + \beta_7 NonMAplan_i + \beta_8 County_c + \varepsilon_{ic}$$

$$(3A_3)\ \ln(\text{PFFS}Presence_{ic}/1\text{-PFFS}Presence_{ic}) = \beta_0 + \beta_1 Bench_c + \beta_2 Profit_i + \beta_3 Profit_i{*}Bench_c + \beta_4 Retiree + \beta_5 Medicaid + \beta_6 HospitalHHI_c + \beta_7 NonMAplan_i + \beta_8 County_c + \varepsilon_{ic}$$

where HMO$Presence_{ic}$ represents the probability of HMO plan *i* operating in county *c*, LPPO$Presence_{ic}$ represents the probability of local PPO plan *i* operating in county *c* and PFFS$Presence_{ic}$ represents the probability of PFFS plan *i* operating in county *c.*

Hypothesis 3A implies that the relationship between plan presence and the relative benchmark rate (i.e., coefficient β_1) is expected to be largest among the PFFS plan subsample and smallest among the HMO plans subsample. In other words, HMO plan penetration is expected to be relatively less responsive to the benchmark payments, while PFFS plan penetration is expected to be relatively more responsive to the benchmark payments.

APPROACH B: FIRST DIFFERENCE REGRESSION ANALYSIS OF CHANGES IN PLAN PRESENCE FROM 2008-2011 AND 2011-2012

In Approach B, first difference multinomial logit regression analysis is used to examine the change in MA plan presence between 2008 and 2011 as a function of changes in the MA benchmark rates and other factors between 2008 and 2011. Similar analyses are run

for the years 2011 to 2012 in order to examine change in plan presence as a function of changes in the benchmark rate and other factors following the passage of the ACA.

The dependent variable of focus under this approach, *change in MA plan presence*, has four potential outcome categories:

- *Entry* (i.e. plan was not offered in the county in 2008, but was offered in the county in 2011),
- *Exit* (i.e. plan was offered in the county in 2008, but was not offered in the county in 2011),
- *Stayed in county* (i.e. plan was offered in the county in both years),
- *Never entered county* (i.e. plan was not offered in the county in either year).

Because these four outcome categories have no natural ordering, a multinomial logit regression, which is designed for use with outcome variables that have more than two unordered outcome categories, is used. Multinomial logit regression models are similar to traditional logit regression models, but they allow for multinomial probability distributions of the response variable, as opposed to the binomial probability distribution of traditional logit regression.

The basic functional form of multinomial logit is:

$$ln(Pr_{icj}/Pr_{icJ}) = \alpha_j + \beta_j X_{ic}$$

In this research, i represents plan i, c represents county c, j represents a specific outcome category j, α_j represents the constant, β_j represents a vector of regression coefficients for a specific outcome category j and J represents the base outcome category.

Under a multinomial logit model with four outcome categories, one category is selected as the base outcome category and then the remaining three outcome categories are regressed against that base outcome. In other words, with four outcome categories there are three equations. The base outcome can vary depending on what relationships are of interest. For ease of interpreting the results, the same basic model is run twice using two different base outcomes, as the primary interest is in examining a) the probability of a plan entering a county, as compared the probability of a plan never entering a county, and b) the probability of a plan exiting a county, as compared to the probability of a plan staying in a county. First, the base outcome is set as *never entered county*. The three equations are:

$$(1B_1)\ ln\ (Pr(\Delta participation=Entry)/Pr(\Delta participation=Never\ entered)) = \beta_0 + \beta_1 \Delta Bench_c + \beta_2\ Profit_i + \beta_3\ Profit_i * \Delta Bench_c + \beta_4\ \Delta Retiree + \beta_5\ \Delta Medicaid + \beta_6\ \Delta HospitalHHI_c + \beta_7\ NonMAplan_i + \beta_8\ \Delta County_c + \varepsilon_{ic}$$

$$(1B_2)\ ln\ (Pr(\Delta participation=Exit)/Pr(\Delta participation=Never\ entered)) = \beta_0 + \beta_1 \Delta Bench_c + \beta_2\ Profit_i + \beta_3\ Profit_i * \Delta Bench_c + \beta_4\ \Delta Retiree + \beta_5\ \Delta Medicaid + \beta_6\ \Delta HospitalHHI_c + \beta_7\ NonMAplan_i + \beta_8\ \Delta County_c + \varepsilon_{ic}$$

$$(1B_3)\ ln\ (Pr(\Delta participation=Stayed)/Pr(\Delta participation=Never\ entered)) = \beta_0 + \beta_1 \Delta Bench_c + \beta_2\ Profit_i + \beta_3\ Profit_i * \Delta Bench_c + \beta_4\ \Delta Retiree + \beta_5\ \Delta Medicaid + \beta_6\ \Delta HospitalHHI_c + \beta_7\ NonMAplan_i + \beta_8\ \Delta County_c + \varepsilon_{ic}$$

The primary equation of interest is the first one, ($1B_1$). In the above equations, $\Delta participation=Entry$ is the probability of plan *i* entering county *c* between 2008 and 2011, $\Delta participation=Never\ entered$ is the probability of plan *i* never entering county *c*,

Δparticipation=Exit is the probability of plan *i* exiting county *c* between 2008 and 2011, and *Δparticipation=Stayed* is the probability of plan *i* operating in county *c* in both 2008 and 2011. The other variables are defined in the same way as under equation (1A), except Δ indicates changes between 2008 and 2011 (e.g., $\Delta Bench_c$ is the net change in the relative MA benchmark rate in county *c* from 2008 to 2011).

For equation $1B_1$, positive values are expected on coefficient β_1, signifying a positive association between the change in the relative benchmark and the probability of a plan entering a county, relative to never entering a county (see Hypothesis 1B). Hypothesis 2B implies that the coefficient β_3 in equation $1B_1$ should be positive, indicating that the positive relationship between changes in the relative benchmark rate and the probability of a plan entering a county, relative to never entering a county, is stronger among for-profit plans than among nonprofit plans. Based on Hypothesis 4B, a negative value is expected for coefficients β_4 and β_5 in equation $1B_1$, suggesting that decreases in retiree and Medicaid coverage among the over-65 population are associated with an increased probability of a plan entering a county, relative to never entering a county. Hypothesis 5B suggests that coefficient β_6 in equation $1B_1$ will be negative, indicating that an increase in hospital market concentration is associated with a lower likelihood of a plan entering, relative to never entering a county. Finally, Hypothesis 6 implies that coefficient β_7 in equation $1B_1$ will be positive, indicating that non-MA managed care presence is associated with an increased probability of a plan entering a county, relative to never entering a county.

Next, the base outcome is switched to *stayed in county*. The three equations for the multinomial logit are then:

$$(2B_1)\ ln\ (Pr(\Delta participation=Exit)/Pr(\Delta participation=Stayed)) = \beta_0 + \beta_1\ \Delta Bench_c + \beta_2\ Profit_i + \beta_3\ Profit_i*\Delta Bench_c + \beta_4\ \Delta Retiree + \beta_5\ \Delta Medicaid + \beta_6\ \Delta HospitalHHI_c + \beta_7\ NonMAplan_i + \beta_8\ \Delta County_c + \varepsilon_{ic}$$

$$(2B_2)\ ln\ (Pr(\Delta participation=Entry)/Pr(\Delta participation=Stayed)) = \beta_0 + \beta_1\ \Delta Bench_c + \beta_2\ Profit_i + \beta_3\ Profit_i*\Delta Bench_c + \beta_4\ \Delta Retiree + \beta_5\ \Delta Medicaid + \beta_6\ \Delta HospitalHHI_c + \beta_7\ NonMAplan_i + \beta_8\ \Delta County_c + \varepsilon_{ic}$$

$$(2B_3)\ ln\ (Pr(\Delta participation=Never\ entered)/Pr(\Delta participation=Stayed)) = \beta_0 + \beta_1\ \Delta Bench_c + \beta_2\ Profit_i + \beta_3\ Profit_i*\Delta Bench_c + \beta_4\ \Delta Retiree + \beta_5\ \Delta Medicaid + \beta_6\ \Delta HospitalHHI_c + \beta_7\ NonMAplan_i + \beta_8\ \Delta County_c + \varepsilon_{ic}$$

The primary equation of interest is ($2B_1$), as the primary interest is in comparing the probability of a plan exiting a county, relative to the probability of a plan staying in a county. The variables are defined in the same way as under equation ($1B_1$).

For equation $2B_1$, negative values are expected on coefficient β_1, signifying a negative association between the change in the relative benchmark and the probability of a plan exiting a county, relative to staying in a county (see Hypothesis 1B). Hypothesis 2B implies that the coefficient β_3 in equation $2B_1$ should be negative, indicating that the negative relationship between changes in the relative benchmark rate and the probability of a plan exiting a county, relative to staying in a county, is stronger among for-profit plans than among nonprofit plans. Based on Hypothesis 4B, a positive value is expected

for coefficients β_4 and β_5 in equation $2B_1$, suggesting that increases in retiree and Medicaid coverage among the over-65 population are associated with an increased probability of a plan exiting a county, relative to staying in a county. Hypothesis 5B suggests that coefficient β_6 in equation $2B_1$ will be positive, indicating that an increase in hospital market concentration is associated with an increased likelihood of a plan exiting, relative to staying a county. Finally, Hypothesis 6 implies that coefficient β_7 in equation $2B_1$ will be negative, indicating that non-MA managed care presence is associated with a decreased probability of a plan exiting a county, relative to staying in a county.

As with the cross-sectional analyses described above, additional analyses that first included plan type indicators and then excluded PFFS observations are run. The analyses above are then also repeated for each plan type subsample.

Specifically, the models with plan type indicators are specified as follows (note: only the equations of interest are presented below; the additional two equations corresponding to each base outcome have been omitted for brevity):

$$(3B_1)\ ln\ (Pr(\Delta participation=Entry)/Pr(\Delta participation=Never\ entered)) = \beta_0 + \beta_1 \Delta Bench_c + \beta_2\ Profit_i + \beta_3\ Profit_i*\Delta Bench_c + \beta_4\ \Delta Retiree + \beta_5\ \Delta Medicaid + \beta_6\ \Delta HospitalHHI_c + \beta_7\ NonMAplan_i + \beta_8\ \Delta County_c + \beta_9\ HMO_i + \beta_{10}\ PFFS_i + \varepsilon_{ic}$$

$$(4B_1)\ ln\ (Pr(\Delta participation=Exit)/Pr(\Delta participation=Stayed)) = \beta_0 + \beta_1\ \Delta Bench_c + \beta_2\ Profit_i + \beta_3\ Profit_i*\Delta Bench_c + \beta_4\ \Delta Retiree + \beta_5\ \Delta Medicaid + \beta_6\ \Delta HospitalHHI_c + \beta_7\ NonMAplan_i + \beta_8\ \Delta County_c + \beta_9\ HMO_i + \beta_{10}\ PFFS_i + \varepsilon_{ic}$$

Again, as with the cross-sectional analyses presented above, analyses similar to ($1B_{1\text{-}3}$) and ($2B_{1\text{-}3}$) that omitted PFFS plans are also run.

The models by plan type are specified as follows (note: again, only the equations of interest are presented below; the additional two equations corresponding to the base outcome *never entered* and the additional two equations corresponding to the base outcome *stayed* are similar to the equations found above under ($1B_2$), ($1B_3$) and ($2B_2$), ($2B_3$), respectively):

($5B_1$) $ln\ (Pr(\Delta HMOparticipation=Entry)/Pr(\Delta HMOparticipation=Never\ entered)) = \beta_0 + \beta_1\ \Delta Bench_c + \beta_2\ Profit_i + \beta_3\ Profit_i*\Delta Bench_c + \beta_4\ \Delta Retiree + \beta_5\ \Delta Medicaid + \beta_6\ \Delta HospitalHHI_c + \beta_7\ NonMAplan_i + \beta_8\ \Delta County_c + \varepsilon_{ic}$

($6B_1$) $ln\ (Pr(\Delta HMOparticipation=Exit)/Pr(\Delta HMOparticipation=Stayed)) = \beta_0 + \beta_1\ \Delta Bench_c + \beta_2\ Profit_i + \beta_3\ Profit_i*\Delta Bench_c + \beta_4\ \Delta Retiree + \beta_5\ \Delta Medicaid + \beta_6\ \Delta HospitalHHI_c + \beta_7\ NonMAplan_i + \beta_8\ \Delta County_c + \varepsilon_{ic}$

($7B_1$) $ln\ (Pr(\Delta LPPOparticipation=Entry)/Pr(\Delta LPPOparticipation=Never\ entered)) = \beta_0 + \beta_1\ \Delta Bench_c + \beta_2\ Profit_i + \beta_3\ Profit_i*\Delta Bench_c + \beta_4\ \Delta Retiree + \beta_5\ \Delta Medicaid + \beta_6\ \Delta HospitalHHI_c + \beta_7\ NonMAplan_i + \beta_8\ \Delta County_c + \varepsilon_{ic}$

($8B_1$) $ln\ (Pr(\Delta LPPOparticipation=Exit)/Pr(\Delta LPPOparticipation=Stayed)) = \beta_0 + \beta_1\ \Delta Bench_c + \beta_2\ Profit_i + \beta_3\ Profit_i*\Delta Bench_c + \beta_4\ \Delta Retiree + \beta_5\ \Delta Medicaid + \beta_6\ \Delta HospitalHHI_c + \beta_7\ NonMAplan_i + \beta_8\ \Delta County_c + \varepsilon_{ic}$

(9B$_1$) $ln\ (Pr(\Delta PFFSparticipation=Entry)/Pr(\Delta PFFSparticipation=Never\ entered)) = \beta_0 + \beta_1\ \Delta Bench_c + \beta_2\ Profit_i + \beta_3\ Profit_i*\Delta Bench_c + \beta_4\ \Delta Retiree + \beta_5\ \Delta Medicaid + \beta_6\ \Delta HospitalHHI_c + \beta_7\ NonMAplan_i + \beta_8\ \Delta County_c + \varepsilon_{ic}$

(10B$_1$) $ln\ (Pr(\Delta PFFSparticipation=Exit)/Pr(\Delta PFFSparticipation=Stayed)) = \beta_0 + \beta_1\ \Delta Bench_c + \beta_2\ Profit_i + \beta_3\ Profit_i*\Delta Bench_c + \beta_4\ \Delta Retiree + \beta_5\ \Delta Medicaid + \beta_6\ \Delta HospitalHHI_c + \beta_7\ NonMAplan_i + \beta_8\ \Delta County_c + \varepsilon_{ic}$

where all variables are defined in the same way as above.

Drawing on Hypothesis 3B, the positive relationship between the change in the relative benchmark rate and the probability of a plan entering a county, relative to never entering a county is expected to be weaker among HMO plans, as compared to PPO plans. The positive relationship between the change in the relative benchmark and the probability of a plan entering a county, relative to never entering a county is expected to be stronger among PFFS plans, as compared to PPO plans. Similarly, the negative relationship between the change in the relative benchmark rate and the probability of a plan exiting a county, relative to staying in a county is expected to be weaker among HMO plans, as compared to PPO plans. The negative relationship between the change in the relative benchmark rate and the probability of a plan exiting a county, relative to staying in a county is expected to be stronger among PFFS plans, as compared to PPO plans.

PLAN PENETRATION ANALYSES

APPROACH A: CROSS-SECTIONAL ANALYSES OF PLAN PENETRATION IN 2008, 2011, AND 2012

As noted above, the primary analyses in this dissertation examine individual plan-level participation decisions, along with both individual plan entry and plan exit decisions, while the secondary analyses examine aggregate county-level MA penetration rates. Specifically, multivariable ordinary least squares (OLS) regression analysis is used to examine the aggregate MA penetration rate at the county level as a function of the relative benchmark rate, the enrollment-weighted percentage of for-profit plans offered in a county, the proportion of the population over 65 years with retiree coverage, the proportion of the population over 65 years with Medicaid coverage, hospital market concentration, and the enrollment-weighted percentage of MA plans in a county with a parent company that also offers a non-MA plan in the county. As with the earlier plan participation cross-sectional analyses, these plan penetration cross sectional analyses are run for the years 2008, 2011 and 2012 separately.

The cross sectional plan penetration model is specified as follows:

$$(4A)\ MApenetration_c = \beta_0 + \beta_1 Bench_c + \beta_2 PercProfit_c + \beta_3 Retiree + \beta_4 Medicaid + \beta_5 HospitalHHI_c + \beta_6 PercNonMAplan_c + \beta_7 County_c + \varepsilon_c$$

where $MApenetration_c$ is the proportion of Medicare beneficiaries enrolled in MA plans in county *c*, *PercProfit* is the enrollment-weighted percentage of for-profit MA plans in county *c*, *Retiree* is the proportion of the elderly population in the state with employer-sponsored retiree coverage, *Medicaid* is the proportion of the elderly population in the

state dually eligible for Medicaid, *HospitalHHI* is a measure of hospital market concentration in county *c*, *PercNonMAplan* is the enrollment-weighted percentage of MA plans in county *c* with a parent company that also offers a non-MA plan in the county, $County_c$ represents a vector of county-level control variables for a given year, and ε_c is the error term.

The hypotheses presented earlier indicate that the coefficient β_1 should be positive, signifying a positive relationship between MA plan penetration and the relative benchmark rate. The coefficient β_2 is expected to be positive, indicating that a higher proportion of for-profit plans in a county is associated with higher plan penetration and the coefficients β_3 and β_4 are expected to be negative, indicating that higher rates of retiree and Medicaid supplemental insurance coverage in a state are associated with lower levels of plan penetration. A negative coefficient is expected for β_5, indicating that higher hospital market concentration is associated with lower MA plan penetration. A positive coefficient is expected for β_6 indicating that a higher percentage of MA plans in the county with a parent company that also offers a non-MA plan in the county is associated with higher MA plan penetration.

In addition, an analysis adding measures of the enrollment-weighted percentage of HMO plans and PFFS plans in a county is also run. The model is specified as follows:

$$(5A)\ MApenetration_c = \beta_0 + \beta_1 Bench_c + \beta_2 PercProfit_c + \beta_3 Retiree + \beta_4 Medicaid + + \beta_5 HospitalHHI_c + \beta_6 PercNonMAplan_c + \beta_7 County_c + \beta_8 PercHMO_c + \beta_9 PercPFFS_c + \varepsilon_c$$

where *PercHMO* is the enrollment-weighted percentage of HMO plans in the county, and *PercPFFS* is the enrollment-weighted percentage of PFFS plans in the county.

APPROACH B: FIRST DIFFERENCE REGRESSION ANALYSES OF CHANGES IN PLAN PENETRATION FROM 2008-2011 AND 2011-2012

First difference multivariable OLS regression analyses are used to examine the change in MA plan penetration from 2008 to 2011 as a function of changes in the MA benchmark rates and other factors from 2008 to 2011. Similar analyses are run to examine changes from 2011 to 2012. The models are specified as follows:

$$(11B)\ \Delta MApenetration_c = \beta_0 + \beta_1\, \Delta Bench_c + \beta_2\, \Delta PercProfit + \beta_3\, \Delta Retiree + \beta_4\, \Delta Medicaid + \beta_5\, \Delta HospitalHHI_c + \beta_6\, \Delta PercNonMAplan_c + \beta_7\, \Delta County_c + \varepsilon_c$$

where $\Delta MApenetration_c$ is the change in the proportion of Medicare beneficiaries enrolled in MA plans in county *c* from 2008 to 2011 (or from 2011 to 2012). Δ*PercProfit* is the change in the enrollment-weighted percentage of for-profit MA plans in the county, *ΔRetiree* is the change in the proportion of the elderly population in the state with employer-sponsored retiree coverage from 2008 to 2011 (or from 2011 to 2012), *ΔMedicaid* is the change in the proportion of the elderly population in the state with supplemental Medicaid coverage from 2008 to 2011 (or from 2011 to 2012), Δ*HospitalHHI* is the change in hospital market concentration from 2008 to 2011 (or from 2011 to 2012), Δ*PercNonMAplan* is the change in the enrollment-weighted percentage of MA plans in the county with a parent company that also offered a non-MA plan in the county from 2008 to 2011 (or from 2011 to 2012), $\Delta County_c$ represents a the change in a

series of county-level control variables from 2008 to 2011 (or from 2011 to 2012), and ε_c is the error term.

For equation 11B, positive values are expected on coefficient β_1, signifying a positive association between the change in the relative benchmark and the change in plan penetration (see Hypothesis 1B). The β_2 coefficient should be positive, indicating that the change in the enrollment-weighted percentage of for-profit plans in a county is positively associated with plan penetration. Based on Hypothesis 4B, a negative value is expected for coefficients β_3 and β_4, suggesting that decreases in retiree and Medicaid coverage among the over-65 population are associated with increases in plan penetration in a county. Hypothesis 5B implies that coefficient β_5 will be negative, indicating that increases in hospital market concentration is associated with decreases in MA plan penetration. Hypothesis 6 implies that coefficient β_6 will be positive, indicating that non-MA managed care presence in a county is associated with increased MA plan penetration.

Finally, an analysis accounting for the change in the enrollment-weighted percentage of each type of MA plan in a county level MA market is run. The model is specified as follows:

$$(12B)\ \Delta MApenetration_c = \beta_0 + \beta_1 \Delta Bench_c + \beta_2 \Delta PercProfit + \beta_3 \Delta Retiree + \beta_4 \Delta Medicaid + \beta_5 \Delta HospitalHHI_c + \beta_6 \Delta PercNonMAplan_c + \beta_7 \Delta County_c + \beta_8 \Delta PercHMO_c + \beta_9 \Delta PercPFFS_c + \varepsilon_c$$

where $\Delta PercHMO$ is the change in the enrollment-weighted percentage of HMO plans in the county between 2008 and 2011(or between 2011 and 2012), and $\Delta PercPFFS$ is the

change in the enrollment-weighted percentage of PFFS plans in the county between 2008 and 2011 (or between 2011 and 2012).

HUMAN SUBJECTS CONSIDERATIONS

On January 4, 2012, the Johns Hopkins Institutional Review Board ruled this study to be not human subjects research, "NHSR", as defined by DHHS regulations 45 CFR 46.102, and thus was exempt from IRB review.

CHAPTER V: RESULTS

This chapter presents the results from the primary empirical models described in Chapter IV. The first part of this chapter presents the plan-county level analyses of plan presence, where the first set of empirical models uses a cross-sectional approach and the next set of models uses a longitudinal approach. The second part of this chapter then presents the county-level plan penetration models, where these models also include both cross-sectional and longitudinal sets of analyses.

PART I: PLAN PRESENCE

DESCRIPTIVE STATISTICS/CHARACTERISTICS OF THE STUDY SAMPLE

For all of the plan presence analyses, the unit of analysis is the plan-county. Each unique plan-county combination represents a plan that had the potential to be offered in a given county. As described in Chapter IV, if a plan is offered in at least one county in the ten CMS-defined Regions, it is considered to have the 'potential to be offered' in all counties in that region.

Descriptive Statistics for 2008: In 2008, there were a total of 388,593 plan-county combinations. Of those 388,593 plan-county combinations, plans were offered 53.2 percent of the time (Table 5.1). Among these plan-county combinations, 75.8 percent involved for-profit plans. Regarding plan type, 37.8 percent involved HMOs, 16.7 percent involved local PPOs and 45.5 percent involved PFFS plans. Among the full set of plan-county combinations, 30.8 percent involved plans whose parent company offered a non-MA plan in that county.

TABLE 5.1: DESCRIPTIVE STATISTICS, 2008, 2011, 2012[1]

	2008 Mean (SD)[5]	2011 Mean (SD)	2012 Mean (SD)	2008-2011 Change in mean	2011-2012 Change in mean
Relative benchmark rate[2]	116.2% (9.8%)	113.8% (9.9%)	114.7% (9.6%)	-2.4%	+0.9%
State percent Medicare with retiree coverage	29.3% (6.2%)	28.5% (5.8%)	27.5% (6.1%)	-0.8%	-1.0%
State percent Medicare with Medicaid (Duals)	13.7% (4.5%)	14.3% (3.8%)	13.3% (3.5%)	+0.6%	-1.0%
State percent Medicare reporting fair/poor health	39.5% (6.5%)	37.6% (6.8%)	37.0% (7.8%)	-1.9%	-0.6%
Hospital market concentration (HHI measure)[3]	37.8 (34.8)	38.5 (35.0)	39.0 (35.0)	+0.7	+0.5
County's median income in 1,000s	$44,356 ($11,599)	$43,704 ($11,115)	$44,629 ($11,411)	-$652	+$925
County's hospital beds per 1000 population	2.86 (3.76)	3.37 (3.76)	3.34 (3.78)	+0.51	-0.03
County's MDs per 1000 population	1.16 (1.30)	1.13 (1.34)	1.13 (1.35)	-0.03	no change
County's log population of those 65 years and over	16,047 (50,436)	15,573 (48,280)	15,934 (49,928)	-474	+361
County's percent population black	10.1% (15.0%)	9.9% (15.0%)	9.9% (15.0%)	-0.2%	no change
County's percent population female	50.3% (2.1%)	50.1% (2.2%)	50.0% (2.2%)	-0.2%	-0.1%
	No. (%)	**No. (%)**	**No. (%)**	**Change in No. (Change in %)**	**Change in No. (Change in %)**
MA plans offered[6]	207,043 (53.2%)	380,866 (68.9%)	372,658 (67.9%)	+173,823 (+15.7%)	-8,208 (-1.0%)
For-Profit plan	295,020 (75.8%)	443,691 (80.2%)	441,461 (80.5%)	+148,671 (+4.4%)	-2,230 (+0.3%)
Nonprofit plan	94,391 (24.2%)	109,352 (19.8%)	106,887 (19.5%)	+14,961 (-4.4%)	-2,465 (-0.3%)
HMO	147,167 (37.8%)	309,579 (56.0%)	286,932 (52.3%)	+162,412 (+18.2%)	-22,674 (-3.7%)
Local PPO	65,031 (16.7%)	201,578 (36.5%)	225,890 (41.2%)	+136,547 (+19.8%)	+24,312 (+4.7%)
PFFS	177,308 (45.5%)	41,886 (7.6%)	35,659 (6.5%)	-135,442 (-37.9%)	-6,227 (-1.1%)
Parent company offered non MA-plan in county	119,931 (30.8%)	232,984 (42.1%)	254,574 (46.4%)	+113,053 (+11.3%)	+21,590 (+4.3%)
County had at least one FQHC[4]	176,754 (45.4%)	274,047 (49.6%)	283,704 (51.7%)	+97,293 (+4.2%)	+9,657 (+2.1%)

[1] Descriptive statistics presented above are based on data where the unit of analysis is at the plan-county level.
[2] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county
[3] HHI = Herfindahl-Hirschman Index of competition. [4] FQHC = Federally Qualified Health Center [5] SD= Standard deviation
[6] A plan was considered to have the potential to be offered in a particular county if the plan was offered in at least one county in the region. Regions were defined using the 10 Department of Health and Human Services regions. See: http://www.hhs.gov/about/regionmap.html

In 2008, the mean benchmark rate of the sample was 116.2 percent of average per-capita costs under traditional Medicare. This fits with MedPAC's findings in 2008 that the average relative benchmark rate across all plans was 116 percent.[63] Among the sample, the mean proportion of the Medicare population in the state with supplemental retiree coverage was 29.3 percent and the mean proportion of the Medicare population that was dually eligible for Medicaid was 13.7 percent.

Among the 2008 plan-county combinations, the mean county-level HHI for hospitals was 3,780, indicating moderate to high hospital concentration. There was a mean of 2.86 county hospital beds per 1,000 population, and 1.16 county medical doctors per 1,000 population. The average county median income was $44,356, and 45.4 percent of the plan-county combinations were in a county with at least one Federally Qualified Health Center (FQHC). There was a mean of 16,047 persons over 65 years per county, the mean proportion of the county population that identified as black was 10.1 percent and the mean proportion of the county population that identified as female was 50.3 percent among the plan-county combinations in 2008.

Descriptive Statistics for 2011: In 2011, of the 443,523 plan-county combinations in which a plan had the potential to be offered in a county, plans were offered 68.9 percent of the time. Among these plan-county combinations, 80.2 percent involved for-profit plans. Regarding plan type, 56 percent involved HMO plans, 36.5 percent involved local PPO plans and 7.6 percent involved PFFS plans. Among the full set of plan-county combinations, 42.1 percent involved plans whose parent company also offered a non-MA plan in the county.

The mean benchmark rate of the sample was 113.3 percent of average costs under traditional Medicare, which is in line with MedPAC's estimate of 113 percent for 2011.[64] Among the sample, the mean proportion of the Medicare population in the state with supplemental retiree coverage was 28.5 percent and the mean proportion of the Medicare population in the state that was dually eligible for Medicaid was 14.3 percent.

In 2011, the mean county-level hospital HHI was 3,850, again indicating moderate to high hospital concentration. There was a mean of 3.37 county hospital beds per 1,000 population, and 1.13 county medical doctors per 1,000 population. Average county median income was $43,704, and 49.6 percent of the plan-county combinations were in a county with at least one Federally Qualified Health Center (FQHC). There was a mean of 15,573 persons over 65 years per county, the mean percentage of the county population that identified as black was 9.9 percent and the mean percentage of the county population that identified as female was 50.1 percent among the plan-county combinations in 2011.

Descriptive Statistics for 2012: In 2012, there were approximately 429,963 plan-county combinations in which a plan had the potential to be offered in a county, with plans being offered 67.9 percent of the time. Approximately 80.5 percent of plan-county combinations involved for-profit plans. Regarding plan type, 52.3 percent of plan-county combinations involved HMOs, 41.2 percent involved local PPOs and 6.5 percent involved PFFS plans. Among the full set of plan-county combinations, 46.4 percent involved plans whose parent company also offered a non-MA plan in the county.

In 2012, the mean benchmark rate of the sample was 114.7 percent of average costs under traditional Medicare. This figure most likely differs from MedPAC's estimate of

112 percent because the figures used here included the quality-related bonuses that increased the benchmark rates for some MA plans in 2012, whereas MedPAC's calculations did not include these bonuses.[65] Among the sample, the mean proportion of the Medicare population in the state with supplemental retiree coverage was 27.5 percent and the mean proportion of the Medicare population in the state that was dually eligible for Medicaid was 13.3 percent.

In 2012, the mean county-level hospital HHI was 3,900, indicating moderate to high hospital concentration. There was a mean of 3.34 county hospital beds per 1,000 population, and 1.13 medical doctors per 1,000 population. Average county median income was $44,629, and 51.7 percent of the plan-county combinations were in a county with at least one Federally Qualified Health Center (FQHC). There was a mean of 15,934 persons over 65 years per county, the mean percentage of the county population that identified as black was 9.9 percent and the mean percentage of the county population that identified as female was 50.0 percent among the plan-county combinations in 2012.

Descriptive Statistics for 2008-2011: From 2008 to 2011, there was a 15.7 percentage point increase in the proportion of plans that were offered out of all plan-county combinations in which a plan had the potential to be offered in a county. The mean relative benchmark rate of the sample fell by 2.4 percentage points between 2008 and 2011. The percentage of plan-county combinations involving for-profit plans increased by 4.4 percentage points and the percentage of plan-county combinations involving plans with a parent company that offered a non-MA plan in the county increased 11.1 percentage points. The mean proportion of the Medicare population in the state with supplemental retiree coverage fell 0.8 percentage points and the mean proportion of the

Medicare population dually eligible for Medicaid grew by 0.6 percentage points. The mean county-level hospital HHI increased by 700, indicating a slight increase in hospital concentration.

The most dramatic changes that were observed relate to plan type. From 2008 to 2011, the percentage of plan-county combinations involving PFFS plans fell 37.9 percentage points, while the percentage of plan-county combinations involving local PPO and HMO plans grew by 19.8 percentage points and 18.2 percentage points, respectively.

Slight changes in the county control variables from 2008 to 2011 were observed. These values are also provided in Table 5.1.

Descriptive Statistics for 2011-2012: From 2011 to 2012, the proportion of plans that were offered out of all plan-county combinations decreased by 1 percentage point. The mean relative benchmark rate of the sample increased by 0.9 percentage points. The percentage of plan-county combinations involving for-profit plans increased by 0.3 percentage points. The percentage of plan-county combinations involving HMO plans fell by 3.7 percentage points and the percentage of plan-county combinations involving PFFS plans fell by 1.1 percentage points. The percentage of plan-county combinations involving local PPO plans grew by 4.7 percentage points. The percentage of plan-county combinations involving plans with a parent company that offered a non-MA plan in the county increased by 4.3 percentage points. Both the mean proportion of the Medicare population in the state with supplemental retiree coverage and the mean proportion of the Medicare population in the state dually eligible for Medicaid fell 1.0 percentage point.

The mean county-level hospital HHI decreased by 100, indicating a slight decrease in hospital concentration.

Slight changes in the county control variables from 2011 to 2012 were observed. These values are also provided in Table 5.1.

CROSS SECTIONAL ANALYSES, 2008

Table 5.2a presents the results from various cross sectional regression analyses for 2008. Each model examines plan presence as a function of the benchmark rate, health plan profit status, the proportion of the population over 65 years with retiree coverage, the proportion of the population over 65 years with Medicaid coverage, hospital market concentration, and whether an MA plan's parent company offers a non-MA plan in the county (along with other county control variables).

Baseline Model: The first model uses the full sample and includes the relative benchmark rate without the profit status interaction. The results from this first model (see results column 1 of Table 5.2a) indicate that a one percentage point greater relative benchmark rate was associated with 39 percent greater odds of an MA plan being offered in a county in 2008 (odds ratio (OR) 1.39, 95% CI 1.30-1.49, $p<.001$), holding all else constant. This finding is consistent with Hypothesis 1A, that the relative benchmark rate would have a positive and statistically significant association with plan presence. For-profit designation was associated with 38 percent lower odds of a plan being offered in the county in 2008 (OR 0.62, 95% CI 0.61-0.63, $p<.001$), holding all else constant.

TABLE 5.2A: CROSS SECTIONAL ANALYSES SHOWING ODDS RATIOS WITH 95% CONFIDENCE INTERVALS
IMPACT OF RELATIVE BENCHMARK RATE AND OTHER FACTORS ON MA PLAN PRESENCE IN 2008[1]

	All Plans	All Plans	All Plans w/ Plan Type	Excluding PFFS plans	HMO Subsample	Local PPO Subsample	PFFS Subsample
Relative benchmark rate[2]	1.39 (1.30-1.49)***	1.30 (1.13-1.49)***	1.65 (1.32-2.06)***	1.64 (1.27-2.13)***	2.16 (1.56-2.98)***	1.72 (1.16-2.59)**	1.27 (0.86-1.89)
For-profit plan	0.62 (0.61-0.63)***	0.56 (0.47-0.68)***	0.66 (0.50-0.88)**	0.57 (0.40-0.80)**	3.00 (1.94-4.63)***	0.02 (0.01-0.04)***	0.78 (0.46-1.32)
For-profit x relative benchmark rate		1.09 (0.93-1.27)	0.70 (0.54-0.89)**	0.73 (0.54-0.98)*	0.40 (0.27-0.58)***	1.71 (1.03-2.82)*	0.81 (0.51-1.27)
State percent Medicare with retiree coverage	0.25 (0.22-0.28)***	0.25 (0.22-0.28)***	0.20 (0.16-0.24)***	0.12 (0.10-0.15)***	0.19 (0.14-0.25)***	0.16 (0.10-0.25)***	0.45 (0.32-0.64)***
State percent Medicare with Medicaid (Duals)	11.15 (9.28-13.39)***	11.16 (9.29-13.4)***	13.64 (10.40-17.88)***	13.52 (9.75-18.74)***	18.7 (12.50-28.0)***	0.21 (0.11-0.41)***	4.48 (2.61-7.69)***
Hospital market concentration (HHI measure)[3]	0.998 (0.997-0.998)***	0.998 (0.997-0.998)***	0.996 (0.995-0.996)***	0.997 (0.996-0.997)***	0.997 (0.997-0.998)***	0.995 (0.994-0.996)***	0.999 (0.998-0.999)*
Parent company offered non MA-plan in county	0.90 (0.89-0.91)***	0.90 (0.89-0.91)***	1.85 (1.81-1.89)***	1.60 (1.56-1.64)***	1.86 (1.80-1.91)***	1.85 (1.75-1.96)***	6.85 (6.31-7.44)***
State percent Medicare reporting fair/poor health	0.03 (0.02-0.03)***	0.03 (0.02-0.03)***	0.03 (0.03-0.04)***	0.05 (0.04-0.07)***	0.04 (0.03-0.05)***	0.04 (0.03-0.06)***	0.06 (0.04-0.09)***
County's median income in 1,000s	1.00 (1.00-1.00)***	1.00 (1.00-1.00)***	1.01 (1.00-1.01)***	1.01 (1.01-1.01)***	1.01 (1.01-1.01)***	1.00 (1.00-1.01)***	0.99 (0.99-0.99)***
County's hospital beds per 1000 population	1.01 (1.01-1.01)***	1.01 (1.01-1.01)***	1.00 (1.00-1.01)*	1.00 (0.99-1.01)	0.99 (0.99-1.00)	1.00 (0.99-1.01)	1.00 (0.99-1.00)
County's MDs per 1000 population	1.03 (1.03-1.04)***	1.03 (1.03-1.04)***	1.01 (1.00-1.02)**	1.00 (0.99-1.01)	0.99 (0.98-1.01)	0.99 (0.97-1.01)	0.99 (0.98-1.01)
County had at least one FQHC[4]	1.22 (1.20-1.23)***	1.22 (1.19-1.23)***	1.30 (1.27-1.33)***	1.32 (1.29-1.36)***	1.30 (1.26-1.35)***	1.18 (1.12-1.25)***	1.06 (1.01-1.10)*
County's log population of those 65 years and over	1.09 (1.08-1.09)***	1.09 (1.08-1.09)***	1.55 (1.53-1.57)***	1.76 (1.74-1.78)***	2.06 (2.02-2.09)***	1.54 (1.50-1.57)***	1.03 (1.01-1.05)**
County's percent population black	0.58 (0.55-0.61)***	0.58 (0.55-0.61)***	0.60 (0.55-0.64)***	0.62 (0.56-0.68)***	0.60 (0.53-0.68)***	0.29 (0.24-0.35)***	0.52 (0.45-0.59)***
County's percent population female	1.41 (1.03-1.94)*	1.41 (1.03-1.95)*	0.32 (0.19-0.54)***	0.13 (0.06-0.28)***	0.052 (0.02-0.13)***	0.51 (0.14-1.82)	3.67 (1.52-8.83)**
HMO			0.83 (0.81-0.85)***				
PFFS			94.04 (91.14-97.04)***				
Sample size	388,593	388,593	388,593	211,679	146,779	64,900	176,914
Pseudo R^2	0.029	0.029	0.512	0.155	0.198	0.272	0.048

*=p<.05 **=p<.01 ***=p<.001 Note: Odds ratios of less than 1.00 indicate a decrease in odds.

[1] Plan participation, the outcome (Y) variable, is operationalized as the log odds of a MA plan being offered in a county. A plan was considered to have the potential to be offered in a particular county if the plan was offered in at least one county in the region.

[2] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county

[3] HHI = Herfindahl-Hirschman Index of competition. [4] FQHC = Federally Qualified Health Center

A one percentage point greater state percentage of Medicare beneficiaries with retiree coverage was associated with 75 percent lower odds of an MA plan being offered in a county (OR 0.25, 95% CI 0.22-0.28, p<.001), which supports Hypothesis 4A. A one percentage point greater state percentage of Medicare beneficiaries dually eligible for Medicaid was associated with 11.2 greater odds of a plan being offered in a county (OR 11.15, 95% CI 9.28-13.39, p<.001), which does not support Hypothesis 4A.

A higher level of hospital market concentration, specifically, a 100 point greater hospital HHI, was associated with 0.2 percent lower odds of an MA plan being offered in a county in 2008 (OR 0.998, 95% CI 0.997-0.998, p<.001). This finding is consistent with Hypothesis 5, that the prospect of an MA plan negotiating payment rates with a hospital system with bargaining power would reduce profitability by increasing costs.

Having a parent company that offers a non-MA plan in the county was associated with 10 percent lower odds of a plan being offered in the county (OR 0.90, 95% CI 0.89-0.91, p<.001). This finding, which runs counter to Hypothesis 6, may appears to be due to the fact that PFFS plans dominated the MA market in 2008, as having a parent company that offers a non-MA plan in the county is associated with increased odds of a plan being offered in a subsequent analysis excluding PFFS plans (shown below); at the time, PFFS plans were not required to have provider networks, and thus may have been easier to implement without prior experience in a county.

Model with profit status interaction. A second model included an interaction term for profit status and the relative benchmark rate (results column 2 of Table 5.2a). Results for all non-interacted covariates under this model were very similar to the model discussed

above. Looking specifically at the effect of adding an interaction term, the results from this model show that among nonprofit plans, a one percentage point greater relative benchmark rate was associated with 30 percent greater odds of an MA plan being offered in a county, holding all else constant (OR 1.30, 95% CI 1.13-1.49, p<.001). Among for-profit plans, a one percentage point greater relative benchmark rate was associated with 42 percent greater odds of an MA plan being offered in a county (OR 1.42, 95% CI 1.05-1.89, p>.05), though this result was not significant.[66]

Bayseian Information Criterion (BIC) calculations, a measure of goodness-of-fit of regression models, indicated strong support for the original model without the interaction term, as compared to the model with the interaction term for 2008.

Sensitivity analysis: basic model without PFFS plans. One concern with the analyses above is the possibility that PFFS plans may operate differently from the other plan types, particularly as PFFS plans have not always been subject to the same regulatory policies as HMO and local PPO plans. For example, prior to the passage of the MIPPA in 2008, PFFS plans were not required to have provider networks, which, in theory, would indicate that there were fewer barriers to market entry for PFFS plans. Moreover, even after the passage of the MIPPA, plan participation decisions among PFFS plans may have reflected a response to the new regulatory policies they were faced with under the MIPPA, which would again indicate that the factors influencing their participation decisions differed from those influencing participation decisions for HMO or local PPO plans.

In order to account for this, a third model was run that excluded PFFS plans (Table 5.2a). The results of this model indicate that, when PFFS plans are excluded, a one percentage point greater relative benchmark rate was associated with 64 percent greater odds of plan participation among nonprofit plans (OR 1.64, 95% CI 1.27-2.13, p<.001), and 20 percent greater odds of plan participation among for-profit plans (OR 1.20, 95% CI 0.69-2.09, p>.05), though this result was not statistically significant for for-profit plans. Having a parent company that offered a non-MA plan in the county in 2008 was associated with 60 percent greater odds of an MA plan being offered in a county (OR 1.60, 95% CI 1.56-1.64, p<.001). With the exclusion of PFFS plans from the model, the coefficient on non-MA plan participation has gone from negative to positive, supporting the notion that PFFS plans may have been easier to implement without prior experience in a county.

Plan type models. In order to examine the association between plan type and plan presence, a fourth model was run that included plan type dummy variables (Table 5.2a). Results of this model indicate that, after accounting for plan type, a one percentage point greater relative benchmark rate was associated with 65 percent greater odds of an MA plan being offered in a county among nonprofit plans (OR 1.65, 95% CI 1.32-2.06, p<.001). Among for-profit plans, a one percentage point greater relative benchmark rate was associated with 16 percent greater odds of a plan being offered in a county (OR 1.16, 95% CI 0.71-2.09, p>.05), though this result was not statistically significant. After accounting for plan type, having a parent company that offers a non-MA plan in the area is associated with 85 percent greater odds of being offered in a county (OR 1.85, 95% CI 1.81-1.89, p<.001), all else held constant. In 2008, HMO plans were associated with 17

percent lower odds of plan participation in a county as compared to local PPO plans (OR 0.83, 95% CI 0.81-0.85, p<.001), whereas PFFS plans were associated with 94.0 times greater odds of plan participation in a county as compared to local PPO plans (OR 94.04, 95% CI 01.94-97.04, p<.001). Results for all other covariates are similar to those in the models above.

Models stratified by plan type (see Table 5.2a) indicate that a one percentage point greater relative benchmark rate was associated with 2.16 greater odds of a nonprofit HMO plan being offered in a county (OR 2.16, 95% CI 1.56-2.98, p<.001), 72 percent greater odds of a nonprofit local PPO plan being offered in a county (OR 1.72, 95% CI 1.16-2.59, p<.01) and 27 percent greater odds among nonprofit PFFS plans, though the results for PFFS plans was not statistically significant (OR 1.27, 95% CI 0.86-1.89, p>.05). Turning to for-profit plans, a one percentage point greater relative benchmark rate was associated with 14 percent lower odds of a for-profit HMO plan being offered in a county (OR 0.86, 95% CI 0.42-1.73, p>.05), though the result was not statistically significant, 2.94 greater odds of a for-profit local PPO plan being offered in a county (OR 2.94, 95% CI 1.19-7.13, p<.05) and 3 percent greater odds among for-profit PFFS plans, though the result for PFFS plans was not statistically significant (OR 1.03, 95% CI 0.44-2.40, p>.05).

Predicted probabilities. The first column of Table 5.2b shows predicted probabilities of plan participation at various levels of the relative benchmark rate using the model specification including all plans.

TABLE 5.2B: PREDICTED PROBABILITY OF PLAN PARTICIPATION, 2008

Relative benchmark rate[1]	**Predicted probability of MA plan participation (95% CI)** *All plans, no interaction*	**Predicted probability of MA plan participation (95% CI)** *For profit plans, from interaction*	**Predicted probability of MA plan participation (95% CI)** *Nonprofit plans, from interaction*	**Predicted probability of MA plan participation (95% CI)** *HMO plans*	**Predicted probability of MA plan participation (95% CI)** *LPPO plans*	**Predicted probability of MA plan participation (95% CI)** *PFFS plans*
96.6% = 2 SD below mean[2]	0.52 (0.51-0.52)***	0.49 (0.48-0.49)***	0.61 (0.60-0.62)***	0.14 (0.14-0.14)***	0.12 (0.11-0.13)***	0.95 (0.95-0.95)***
106.4% = 1 SD below mean	0.53 (0.52-0.53)***	0.50 (0.49-0.50)***	0.62 (0.61-0.62)***	0.14 (0.14-0.14)***	0.13 (0.13-0.13)***	0.95 (0.95-0.95)***
116.2% = Mean	0.53 (0.53-0.54)***	0.50 (0.50-0.51)***	0.62 (0.62-0.62)***	0.14 (0.14-0.14)***	0.14 (0.14-0.14)***	0.95 (0.95-0.95)***
126.0% = 1 SD above mean	0.54 (0.54-0.54)***	0.51 (0.51-0.52)***	0.63 (0.62-0.63)***	0.14 (0.14-0.14)***	0.15 (0.15-0.16)***	0.95 (0.95-0.95)***
135.8% = 2 SD above mean	0.55 (0.55-0.55)***	0.52 (0.52-0.53)***	0.63 (0.63-0.64)***	0.14 (0.14-0.15)***	0.17 (0.16-0.17)***	0.95 (0.95-0.95)***

***P<.001

[1] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county

[2] SD= Standard deviation

Note: Predicted probability of plan participation, with all other variables held at their means.

In 2008, the mean relative benchmark rate was 116.2 percent. At this benchmark rate, MA plans that had the potential to be offered in a county had a predicted probability of plan participation of 53 percent (predicted probability [PP] 0.53, 95% CI 0.53-0.54, p<.001). At a relative benchmark rate two standard deviations below the mean, 96.6 percent, the predicted probability of plan participation fell very slightly, to 52 percent (PP 0.52, 95% CI 0.51-0.52, p<.001). At a relative benchmark rate two standard deviations above the mean, 135.8 percent, the predicted probability of plan participation increased slightly, to 55 percent (PP 0.55, 95% CI 0.55-0.55, p<.001). Overall, these predicted probabilities indicate that variations in the relative benchmark rate – even relatively large variations – were not associated with dramatic differences in the overall predicted probability of plan participation.

Interestingly, an examination of predicted probabilities by profit status (Table 5.2b) indicates that nonprofit plans have a greater predicted probability of plan participation as compared to for-profit plans at all levels of the relative benchmark rate in 2008. Both nonprofit and for-profit plans had a slightly greater predicted probability of participation at higher levels of the relative benchmark rate, though the magnitude of the change in predicted probability was small: there was only a two percentage point greater predicted probability of plan participation among for-profit plans at a relative benchmark rate of 135.8 percent, two standard deviations above the mean rate (PP 0.52, 95% CI 0.52-0.53, p<.001), as compared to the predicted probability of plan participation among for-profits at the mean relative benchmark rate of 116.2 percent (PP 0.50, 95% CI 0.50-0.51, p<.001). Similarly, there was only a one percentage point greater predicted probability of plan participation among nonprofits at a relative benchmark rate two standard deviations

above the mean (PP 0.63, 95% CI 0.63-0.64 p<.001), as compared to the predicted probability of plan participation among nonprofits at the mean relative benchmark rate (PP 0.62, 95% CI 0.62-0.62, p<.001).

Next, predicted probabilities were examined by plan type (Table 5.2b). PFFS plans have a much higher predicted probability of plan participation at all levels of the relative benchmark rate, as compared to HMO and local PPO plans, consistent with the fact that PFFS plans dominated the market in 2008. However, while the predicted probability of participation among HMO plans and PFFS plans remained flat even at relative benchmark rates up to two standard deviations higher and lower than the 2008 mean, the predicted probability of plan participation among local PPO plans was higher at higher levels of the relative benchmark rate. Specifically, the predicted probability of participation among local PPO plans at a relative benchmark rate of 135.8 percent, two standard deviations above the mean rate was 3 percentage points higher (PP 0.17, 95% CI 0.16-0.17, p<.001), than the predicted probability of participation for local PPO plans at the mean relative benchmark rate of 116.2 percent (PP 0.14, 95% CI 0.14-0.14, p<.001).

CROSS SECTIONAL ANALYSES, 2011

Table 5.2c presents the results from the cross sectional regression analyses for 2011. As with the 2008 analyses, these models examine plan presence as a function of the benchmark rate, health plan profit status, the proportion of the population over 65 years with retiree coverage, the proportion of the population over 65 years with Medicaid coverage, hospital market concentration, and whether an MA plan's parent company offers a non-MA plan in the county (along with other county control variables).

TABLE 5.2C: CROSS SECTIONAL ANALYSES SHOWING ODDS RATIOS WITH 95% CONFIDENCE INTERVALS
IMPACT OF RELATIVE BENCHMARK RATE AND OTHER FACTORS ON MA PLAN PRESENCE IN 2011[1]

	All Plans	All Plans	All Plans w/ Plan Type	Excluding PFFS plans	HMO Subsample	Local PPO Subsample	PFFS Subsample
Relative benchmark rate[2]	1.60 (1.49-1.72)***	0.76 (0.65-0.89)**	0.75 (0.65-0.87)***	0.70 (0.59-0.83)***	0.89 (0.72-1.10)	0.40 (0.24-0.69)**	4.92 (1.29-18.81)*
For-profit plan	0.69 (0.68-0.70)***	0.24 (0.20-0.30)***	0.29 (0.24-0.35)***	0.21 (0.17-0.26)***	1.00 (0.77-1.31)	0.01 (0.01-0.02)***	24.79 (5.18-118.6)***
For-profit x relative benchmark rate		2.50 (2.10-2.98)***	2.57 (2.17-3.05)***	2.75 (2.28-3.31)***	1.73 (1.37-2.20)***	5.53 (3.20-9.56)***	0.42 (0.11-1.64)
State percent Medicare with retiree coverage	1.01 (0.90-1.14)	1.01 (0.90-1.14)	0.94 (0.83-1.06)	0.78 (0.69-0.89)***	0.84 (0.72-0.98)*	1.20 (0.95-1.52)	3.11 (2.01-4.81)***
State percent Medicare with Medicaid (Duals)	10.28 (8.55-12.36)***	10.37 (8.61-12.49)***	10.66 (8.84-12.87)***	11.29 (9.27-13.74)***	8.79 (6.89-11.23)***	20.31 (13.93-29.59)***	2.77 (1.40-5.51)**
Hospital market conc. (HHI measure)[3]	0.998 (0.998-0.999)***	0.998 (0.998-0.999)***	0.998 (0.998-0.999)***	0.998 (0.998-0.999)***	0.998 (0.998-0.998)***	0.999 (0.998-0.999)***	0.998 (0.998-0.999)***
Parent company offered non MA-plan in county	1.89 (1.86-1.91)***	1.89 (1.86-1.91)***	1.75 (1.72-1.77)***	1.96 (1.93-1.99)***	2.09 (2.06-2.13)***	1.76 (1.71-1.80)***	0.57 (0.54-0.60)***
State percent Medicare w/ fair/poor health	0.03 (0.03-0.04)***	0.03 (0.03-0.04)***	0.03 (0.03-0.04)***	0.04 (0.03-0.04)***	0.02 (0.02-0.02)***	0.05 (0.04-0.06)***	0.17 (0.11-0.26)
County's median income in 1,000s	1.00 (1.00-1.00)***	1.00 (1.00-1.00)***	1.00 (1.00-1.00)***	1.00 (1.00-1.01)***	1.00 (1.00-1.01)***	1.00 (1.00-1.01)***	0.99 (0.99-0.99)*
County's hospital beds per 1000 population	1.02 (1.02-1.02)***	1.02 (1.02-1.02)***	1.02 (1.02-1.02)***	1.02 (1.02-1.02)***	1.03 (1.02-1.03)***	1.01 (1.01-1.02)***	1.03 (1.02-1.03)***
County's MDs per 1000 population	0.99 (0.99-1.01)	0.99 (0.99-1.01)	0.99 (0.99-1.01)	1.00 (0.99-1.01)	1.00 (0.99-1.01)	0.99 (0.98-1.01)	0.97 (0.95-0.99)**
County had at least one FQHC[4]	1.16 (1.14-1.18)***	1.16 (1.14-1.18)***	1.17 (1.15-1.18)***	1.19 (1.17-1.21)***	1.20 (1.18-1.23)***	1.15 (1.11-1.18)***	0.96 (0.91-1.02)
County's log population of those 65 years and over	1.06 (1.05-1.06)***	1.06 (1.05-1.06)***	1.07 (1.06-1.08)***	1.04 (1.03-1.05)***	1.09 (1.08-1.10)***	1.04 (1.03-1.06)***	1.16 (1.13-1.20)***
County's percent population black	0.76 (0.73-0.80)***	0.76 (0.73-0.80)***	0.78 (0.74-0.82)***	0.79 (0.75-0.83)***	0.81 (0.76-0.86)***	0.64 (0.58-0.70)***	0.72 (0.61-0.86)***
County's percent population female	1.26 (0.89-1.80)	1.27 (0.89-1.82)	1.21 (0.84-1.74)	1.36 (0.93-1.98)	1.62 (1.00-2.61)*	0.63 (0.31-1.27)	1.24 (0.35-4.44)
HMO			0.49 (0.49-0.50)***				
PFFS			0.16 (0.16-0.17)***				
Sample size	443,523	443,523	443,523	410,447	249,888	160,559	33,076
Pseudo R^2	0.032	0.032	0.071	0.033	0.059	0.109	0.068

*=p<.05 **=p<.01 ***=p<.001 Note: Odds ratios of less than 1.00 indicate a decrease in odds.

[1] Plan participation, the outcome (Y) variable, is operationalized as the log odds of a MA plan being offered in a county. A plan was considered to have the potential to be offered in a particular county if the plan was offered in at least one county in the region.

[2] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county

[3] HHI = Herfindahl-Hirschman Index of competition. [4] FQHC = Federally Qualified Health Center

Baseline Model: The results from this first model indicate that a one percentage point greater relative benchmark rate was associated with 60 percent greater odds of an MA plan being offered in a county in 2011 (OR 1.60, 95% CI 1.49-1.72, p<.001), holding all else constant. For-profit plan designation was associated with 31 percent lower odds of a plan being offered (OR 0.69, 95% CI 0.68-0.70, p<.001). A one percentage point greater state percentage of Medicare beneficiaries with retiree coverage was not statistically significantly associated with plan presence (OR 1.01, 95% CI 0.90-1.14, p>.05). A one percentage point greater state percentage of Medicare beneficiaries dually eligible for Medicaid was associated with 10.3 greater odds of a plan being offered in a county (OR 10.28, 95% CI 8.55-12.36, p<.001). Again, this finding does not fit with Hypothesis 4A. An increase in hospital market concentration, specifically, a 100 point greater hospital HHI was associated with 0.2 percent lower odds of an MA plan being offered in a county in 2011, consistent with Hypothesis 5A (OR 0.998, 95% CI 0.998-0.999, p<.001). Having a parent company that offered a non-MA plan in the county in 2011 was associated with 89 percent greater odds of a plan being offered in a county (OR 1.89, 95% CI 1.86-1.91, p<.001), all else held constant, consistent with Hypothesis 6.

Model with profit status interaction. A second model that was run included an interaction term for profit status and the relative benchmark rate (see results column 2 of Table 5.2c). The results from this model show that among nonprofit plans, a one percentage point greater relative benchmark rate was associated with 24 percent lower odds of a plan being offered in a county (OR 0.76, 95% CI 0.65-0.89, p<.01), all else held constant. Among for-profit plans, a one percentage point greater relative benchmark rate was associated with 89 percent greater odds of a plan being offered in a county (OR 1.89, 95% CI 1.36-

2.65, p<.001). Results are very similar on all other non-interacted covariates, to the first 2011 model discussed above.

For the 2011 models, BIC goodness-of-fit calculations indicate strong support in favor of the model with interaction terms compared to the model without interaction terms. This may suggest that the association between the relative benchmark rate and plan presence may differ more by profit status in 2011 as compared to 2008.

Sensitivity analysis: basic model without PFFS plans. As with the 2008 data, a third model was run that excluded PFFS plans (see Table 5.2c). The results of this model indicate that, when PFFS plans are excluded, a one percentage point greater relative benchmark rate was associated with 30 percent lower odds of plan participation among nonprofit plans (OR 0.70, 95% CI 0.59-0.83, p<.001), but, in contrast, was associated with 92 percent greater odds of plan participation among for-profit plans (OR 1.92, 95% CI 1.34-2.75, p<.001). Excluding PFFS plans from the model, the percentage of Medicare beneficiaries in the state with retiree coverage was associated with 22 percent lower odds of plan participation (OR 0.78, 95% CI 0.69-0.89, p<.001).

Plan type models. Results from the model with plan type dummy variables (Table 5.2c) indicate that accounting for plan type does not dramatically alter the results for 2011. A one percentage point greater relative benchmark rate was associated with 25 percent lower odds of a nonprofit plan being offered in a county (OR 0.75, 95% CI 0.65-0.87, p<.001), and 92 percent greater odds of a for-profit plan being offered in a county (OR 1.92, 95% CI 1.41-2.65, p<.001). In 2011, HMO plans had 51 percent lower odds of being offered in a county, as compared to local PPO plans (OR 0.49, 95% CI 0.49-0.50,

p<.001), whereas PFFS plans had 84 percent lower odds of being offered in a county as compared to local PPO plans (OR 0.16, 95% CI 0.16-0.17, p<.001), all else held constant. Coefficients for all other covariates were similar to those seen in the models above.

The models by the plan type subsamples indicate that a one percentage point greater relative benchmark rate was associated with 11 percent lower odds of a nonprofit HMO plan being offered in a county (OR 0.89, 95% CI 0.72-1.10, p>.05) though this result was not statistically significant, 60 percent lower odds of a nonprofit local PPO plan being offered in a county (OR 0.40, 95% CI 0.24-0.69, p<.01) and 4.92 times greater odds of a nonprofit PFFS plan being offered in a county (OR 4.92, 95% CI 1.29-18.81, p<.05). Turning to for-profit plans, a one percentage point greater relative benchmark rate was associated with 54 percent greater odds of a for-profit HMO plan being offered in a county (OR 1.54, 95% CI 0.99-2.42, p>.05), 2.21 greater odds of a for-profit local PPO plan being offered in a county (OR 2.21, 95% CI 1.19-7.13, p>.05) and 2.07 greater odds of a for-profit PFFS plan being offered in a county (OR 2.07, 95% CI 0.14-30.80, p>.05), though none of these results were statistically significant.

Predicted probabilities. The first column of Table 5.2d shows predicted probabilities of plan participation for the full sample at various levels of the relative benchmark rate. The mean relative benchmark rate was 113.8 percent in 2011. At this benchmark rate, MA plans that had the potential to be offered in a county had a predicted probability of participation of 70 percent (PP 0.70, 95% CI 0.70-0.70, p<.001). At a relative benchmark rate two standard deviations below the 2011 mean, 94.0 percent, the predicted probability of plan participation fell very slightly, to 68 percent (PP 0.68, 95% CI 0.68-0.68, p<.001).

TABLE 5.2D: PREDICTED PROBABILITY OF PLAN PARTICIPATION, 2011

Relative benchmark rate[1]	**Predicted probability of MA plan participation (95% CI)** *All plans, no interaction*	**Predicted probability of MA plan participation (95% CI)** *For profit plans, from interaction*	**Predicted probability of MA plan participation (95% CI)** *Nonprofit plans, from interaction*	**Predicted probability of MA plan participation (95% CI)** *HMO plans*	**Predicted probability of MA plan participation (95% CI)** *LPPO plans*	**Predicted probability of MA plan participation (95% CI)** *PFFS plans*
94% = 2 SD below mean[2]	0.68 (0.68-0.68)***	0.65 (0.65-0.66)***	0.77 (0.76-0.77)***	0.66 (0.66-0.67)***	0.84 (0.83-0.84)***	0.31 (0.30-0.32)***
103.9% = 1 SD below mean	0.69 (0.69-0.69)***	0.67 (0.67-0.67)***	0.76 (0.76-0.77)***	0.67 (0.67-0.67)***	0.84 (0.84-0.84)***	0.33 (0.32-0.34)***
113.8% = Mean	0.70 (0.70-0.70)***	0.68 (0.68-0.68)***	0.76 (0.75-0.76)***	0.68 (0.68-0.68)***	0.84 (0.84-0.85)***	0.35 (0.34-0.35)***
123.7% = 1 SD above mean	0.71 (0.71-0.71)***	0.70 (0.69-0.70)***	0.75 (0.75-0.76)***	0.69 (0.68-0.69)***	0.85 (0.85-0.85)***	0.37 (0.36-0.37)***
133.6% = 2 SD above mean	0.72 (0.71-0.72)***	0.71 (0.71-0.71)***	0.75 (0.74-0.75)***	0.69 (0.69-0.70)***	0.85 (0.85-0.86)***	0.38 (0.37-0.40)***

***P<.001

[1] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county

[2] SD= Standard deviation

Note: Predicted probability of plan participation, with all other variables held at their means

At a relative benchmark rate two standard deviations above the mean, 133.6 percent, the predicted probability of plan participation increased slightly, to 72 percent (PP 0.72, 95% CI 0.72-0.72, p<.001). Again, there seems to be an indication here that variations in the relative benchmark rate – even somewhat large variations – are not associated with dramatic differences in the overall predicted probability of plan participation.

As seen with the 2008 data, nonprofit plans have a systematically greater predicted probability of plan participation as compared to for-profit plans at all levels of the relative benchmark rate in 2011 (Table 5.2d). In 2011, for-profit plans had a slightly greater predicted probability of participation at higher levels of the relative benchmark rate, but the predicted probability of participation among nonprofit plans was actually lower at higher levels of the relative benchmark rate. Among for-profit plans, the predicted probability of plan participation at a relative benchmark rate two standard deviations above the mean, 133.6 percent, was 71 percent (PP 0.71, 95% CI 0.71-0.71, p<.001), three percentage points higher than the predicted probability of plan participation among for-profits at the mean relative benchmark rate of 113.8 percent (PP 0.68, 95% CI 0.68-0.68, p<.001). Among nonprofit plans, there was a 75 percent predicted probability of plan participation at a relative benchmark rate two standard deviations above the mean (PP 0.75, 95% CI 0.74-0.75 p<.001), one percentage point lower than the predicted probability of plan participation among nonprofits at the mean relative benchmark rate (PP 0.76, 95% CI 0.75-0.76, p<.001).

Next, predicted probabilities of plan participation at varying levels of the relative benchmark rate were examined by plan type. Consistent with the make-up of the 2011

market, local PPO plans had a greater predicted probability of participation at all levels of the relative benchmark rate than either HMO plans or PFFS plans. The latter had the lowest predicted probability of participation of all plan types, consistent with the exodus of PFFS plans from the market following the 2008 MIPPA. The association between the relative benchmark rate and plan participation appears to have been strongest among PFFS plans in 2011: among PFFS plans there was a three percentage point greater predicted probability of plan participation at a relative benchmark rate of 133.6 percent, two standard deviations above the mean rate (PP 0.38, 95% CI 0.37-0.40, p<.001), as compared to the predicted probability of plan participation among PFFS plans at the mean relative benchmark rate of 113.8 percent (PP 0.35, 95% CI 0.34-0.35, p<.001). Among HMO and local PPO plans, the differential was just a one percentage point.

CROSS SECTIONAL ANALYSES, 2012

Table 5.2e presents the results from various cross sectional regression analyses for 2012. As with the analyses for 2008 and 2011 presented above, these models examine plan presence as a function of the benchmark rate, health plan profit status, the proportion of the population over 65 years with retiree coverage, the proportion of the population over 65 years with Medicaid coverage, hospital market concentration, and whether an MA plan's parent company offers a non-MA plan in the county (along with other county control variables).

TABLE 5.2E: CROSS SECTIONAL ANALYSES SHOWING ODDS RATIOS WITH 95% CONFIDENCE INTERVALS
IMPACT OF RELATIVE BENCHMARK RATE AND OTHER FACTORS ON MA PLAN PRESENCE IN 2012[1]

	All Plans	All Plans	All Plans w/ Plan Type	Excluding PFFS plans	HMO Subsample	Local PPO Subsample	PFFS Subsample
Relative benchmark rate[2]	1.73 (1.60-1.86)***	0.42 (0.36-0.50)***	0.42 (0.35-0.49)***	0.38 (0.32-0.45)***	0.35 (0.28-0.44)***	0.49 (0.33-0.74)**	11.41 (1.64-79.62)*
For-profit plan	0.56 (0.55-0.57)***	0.08 (0.06-0.09)***	0.09 (0.08-0.12)***	0.06 (0.05-0.07)***	0.11 (0.09-0.15)***	0.03 (0.02-0.04)***	194.28 (20.5-1,840.89)***
For-profit x relative benchmark rate		5.75 (4.79-6.89)***	5.68 (4.75-6.78)***	7.52 (6.24-9.06)***	7.56 (5.89-9.70)***	5.53 (3.59-8.52)***	0.03 (0.01-0.23)**
State percent Medicare with retiree coverage	0.22 (0.20-0.25)***	0.22 (0.20-0.25)***	0.22 (0.20-0.25)***	0.16 (0.15-0.18)***	0.14 (0.12-0.16)***	0.39 (0.32-0.48)***	2.43 (1.58-3.73)***
State percent Medicare with Medicaid (Duals)	17.46 (14.23-21.41)***	17.9 (14.6-22.0)***	19.86 (16.12-24.47)***	20.06 (16.17-24.87)***	13.49 (10.29-17.71)***	63.30 (43.05-93.08)***	1.30 (0.57-2.96)
Hospital market concentration (HHI measure)[3]	0.998 (0.998-0.999)***	0.998 (0.998-0.999)***	0.998 (0.998-0.998)***	0.998 (0.998-0.998)***	0.998 (0.997-0.998)***	0.999 (0.998-0.999)***	0.998 (0.998-0.999)**
Parent company offered non MA-plan in county	2.63 (2.59-2.67)***	2.63 (2.60-2.67)***	2.50 (2.46-2.54)***	2.67 (2.63-2.71)***	3.38 (3.32-3.45)***	1.91 (1.86-1.96)***	0.68 (0.64-0.72)
State percent Medicare reporting fair/poor health	0.04 (0.04-0.05)***	0.04 (0.04-0.05)***	0.04 (0.04-0.05)***	0.04 (0.04-0.05)***	0.02 (0.02-0.02)***	0.09 (0.08-0.11)***	0.16 (0.11-0.24)
County's median income in 1,000s	1.00 (1.00-1.00)***	1.00 (1.00-1.00)***	1.00 (1.00-1.00)***	1.00 (1.00-1.00)***	1.00 (1.00-1.01)***	1.00 (1.00-1.00)***	1.00 (0.99-1.00)
County's hospital beds per 1000 population	1.02 (1.02-1.02)***	1.02 (1.02-1.02)***	1.02 (1.02-1.02)***	1.02 (1.02-1.02)***	1.03 (1.02-1.03)***	1.01 (1.01-1.02)***	1.03 (1.02-1.03)***
County's MDs per 1000 population	1.00 (0.99-1.01)	1.00 (0.99-1.01)	1.00 (0.99-1.01)	1.00 (0.99-1.01)	0.99 (0.99-1.00)	0.99 (0.99-1.01)	1.00 (0.98-1.02)
County had at least one FQHC4	1.13 (1.11-1.15)***	1.13 (1.11-1.14)***	1.13 (1.11-1.14)***	1.14 (1.12-1.16)***	1.15 (1.13-1.18)***	1.10 (1.07-1.13)***	1.00 (0.95-1.06)
County's log population of those 65 years and over	1.06 (1.06-1.07)***	1.06 (1.06-1.07)***	1.09 (1.08-1.10)***	1.06 (1.05-1.07)***	1.12 (1.11-1.13)***	1.05 (1.03-1.06)***	1.12 (1.09-1.16)***
County's percent population black	0.78 (0.74-0.82)***	0.78 (0.74-0.82)***	0.79 (0.75-0.83)***	0.80 (0.76-0.84)***	0.86 (0.80-0.92)***	0.67 (0.61-0.73)***	0.58 (0.48-0.71)***
County's percent population female	0.95 (0.66-1.37)	0.96 (0.66-1.39)	0.82 (0.56-1.21)	0.88 (0.59-1.29)	0.80 (0.48-1.32)	0.75 (0.38-1.50)	1.25 (0.32-4.94)
HMO			0.36 (0.35-0.36)***				
PFFS			0.18 (0.17-0.18)***				
Sample size	429,963	429,963	429,963	402,370	226,469	175,901	27,593
Pseudo R^2	0.052	0.053	0.101	0.053	0.090	0.065	0.027

*=p<.05 **=p<.01 ***=p<.001 Note: Odds ratios of less than 1.00 indicate a decrease in odds.

[1] Plan participation, the outcome (Y) variable, is operationalized as the log odds of a MA plan being offered in a county. A plan was considered to have the potential to be offered in a particular county if the plan was offered in at least one county in the region.

[2] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county

[3] HHI = Herfindahl-Hirschman Index of competition. [4] FQHC = Federally Qualified Health Center

Baseline Model: As the results in column 1 of Table 5.2e show, a one percentage point greater relative benchmark rate was associated with 73 percent greater odds of an MA plan being offered in a county in 2012 (OR 1.73, 95% CI 1.60-1.86, p<.001), holding all else constant. Consistent with the findings from the 2008 and 2011 cross sectional analyses above, of plans with the potential to participate in a county, for-profit designation was associated with lower odds of a plan being offered in a county – here, 44 percent lower odds of being offered (OR 0.56, 95% CI 0.55-0.57, p<.001), all else held constant. A one percentage point greater state percentage of Medicare beneficiaries with retiree coverage was associated with 78 percent lower odds of a plan being offered in a county (OR 0.22, 95% CI 0.20-0.25, p<.001), consistent with Hypothesis 4A. A one percentage point greater state percentage of Medicare beneficiaries dually eligible for Medicaid was associated with 17.5 times greater odds of an MA plan being offered in a county (OR 17.46, 95% CI 14.23-21.41, p<.001), all else held constant. An increase in hospital market concentration, specifically, a 100 point greater hospital HHI was associated with 0.2 percent lower odds of an MA plan being offered in a county in 2012, consistent with Hypothesis 5A (OR 0.998, 95% CI 0.998-0.998, p<.001). Having a parent company that offered a non-MA plan in the county in 2012 was associated with 2.63 greater odds of an MA plan being offered in a county (OR 2.63, 95% CI 2.59-2.67, p<.001), consistent with Hypothesis 6.

Model with profit status interaction. The next model included an interaction term for profit status and the relative benchmark rate (see results column 2 in Table 5.2e). The results from this model show that among nonprofit plans, a one percentage point greater relative benchmark rate was associated with 58 percent lower odds of a plan being

offered in a county (OR 0.42, 95% CI 0.36-0.50, p<.001), all else held constant. Among for-profit plans, a one percentage point greater relative benchmark rate was associated with 2.41 times greater odds of a plan being offered in a county (OR 2.41, 95% CI 1.72-3.44, p<.001). Results are very similar on all other non-interacted covariates to the first 2012 model discussed above. BIC goodness-of-fit calculations indicate strong support in favor of the model with the interaction term compared to the model without the interaction term for 2012.

Sensitivity analysis: basic model without PFFS plans. Results from a third model that excluded PFFS plans (Table 5.2e) indicate that a one percentage point greater relative benchmark rate was associated with 30 percent lower odds of plan participation among nonprofit plans (OR 0.70, 95% CI 0.59-0.83, p<.001), but, in contrast, a one percentage point greater relative benchmark rate was associated with 92 percent greater odds of plan participation among for-profit plans (OR 1.92, 95% CI 1.34-2.75, p<.001). Excluding PFFS plans from the model, a one percentage point increase in the percentage of Medicare beneficiaries in the state with retiree coverage was associated with 22 percent lower odds of plan participation (OR 0.78, 95% CI 0.69-0.89, p<.001), a slightly weaker association than was seen in the basic model above.

Plan type models. A fourth model for 2012 included plan type dummy variables (Table 5.2e). Findings are similar to the interacted model just discussed, and indicate that a one percentage point greater relative benchmark rate was associated with 58 percent lower odds of a nonprofit plan being offered in a county (OR 0.42, 95% CI 0.35-0.49, p<.001), and 2.39 times greater odds of a for-profit plan being offered in a county (OR 2.39, 95% CI 1.66-3.32, p<.001). In 2012, HMO plans had 64 percent lower odds of being offered

in a county, as compared to local PPO plans (OR 0.36, 95% CI 0.35-0.36, p<.001), whereas PFFS plans had 82 percent lower odds of being offered in a county as compared to local PPO plans (OR 0.18, 95% CI 0.17-0.18, p<.001), all else held constant. Coefficients for all other covariates were similar to those seen in the models above.

The models by plan type (Table 5.2e) indicate that a one percentage point greater relative benchmark rate was associated with 65 percent lower odds of a nonprofit HMO plan being offered in a county (OR 0.35, 95% CI 0.28-0.44, p<.001), 51 percent lower odds of a nonprofit local PPO plan being offered in a county (OR 0.49, 95% CI 0.33-0.74, p<.01) and 11.41 times greater odds of a nonprofit PFFS plan being offered in a county (OR 11.41, 95% CI 1.64-79.62, p<.05). Turning to for-profit plans, a one percentage point greater relative benchmark rate was associated with 2.65 times greater odds of a for-profit HMO plan being offered in a county (OR 2.65, 95% CI 1.65-4.26, p<.001), 2.7 times greater odds of a for-profit local PPO plan being offered in a county (OR 2.71, 95% CI 1.18-6.03, p<.001) and 66 percent lower odds among for-profit PFFS plans (OR 0.34, 95% CI 0.02-18.30, p>.05), though this last result was not statistically significant.

Predicted probabilities. The first column of Table 5.2f shows predicted probabilities of plan participation for the full 2012 sample at various levels of the relative benchmark rate.

TABLE 5.2F: PREDICTED PROBABILITY OF PLAN PARTICIPATION, 2012

Relative benchmark rate[1]	**Predicted probability of MA plan participation (95% CI)** *All plans, no interaction*	**Predicted probability of MA plan participation (95% CI)** *For profit plans, from interaction*	**Predicted probability of MA plan participation (95% CI)** *Nonprofit plans, from interaction*	**Predicted probability of MA plan participation (95% CI)** *HMO plans*	**Predicted probability of MA plan participation (95% CI)** *LPPO plans*	**Predicted probability of MA plan participation (95% CI)** *PFFS plans*
95.5% = 2 SD below mean[2]	0.67 (0.67-0.68)***	0.63 (0.63-0.64)***	0.81 (0.80-0.81)***	0.61 (0.60-0.61)***	0.82 (0.81-0.82)***	0.40 (0.39-0.42)***
105.1% = 1 SD below mean	0.68 (0.68-0.69)***	0.65 (0.65-0.65)***	0.80 (0.79-0.80)***	0.62 (0.62-0.62)***	0.83 (0.82-0.83)***	0.38 (0.38-0.39)***
114.7% = Mean	0.70 (0.69-0.70)***	0.67 (0.67-0.67)***	0.78 (0.78-0.79)***	0.64 (0.63-0.64)***	0.83 (0.83-0.84)***	0.37 (0.36-0.37)***
124.3% = 1 SD above mean	0.71 (0.70-0.71)***	0.69 (0.69-0.69)***	0.77 (0.76-0.77)***	0.65 (0.65-0.65)***	0.84 (0.84-0.84)***	0.35 (0.34-0.36)***
133.9% = 2 SD above mean	0.72 (0.71-0.72)***	0.71 (0.70-0.71)***	0.75 (0.75-0.76)***	0.66 (0.66-0.67)***	0.85 (0.84-0.85)***	0.33 (0.32-0.35)***

***P<.001

[1] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county

[2] SD= Standard deviation

Note: Predicted probability of plan participation, with all other variables held at their means.

In 2012, there was a mean relative benchmark rate of 114.7 percent. At this benchmark level, MA plans that had the potential to be offered in a county had a predicted probability of plan participation of 70 percent (PP 0.70, 95% CI 0.69-0.70, p<.001). At a relative benchmark rate two standard deviations below the 2012 mean, 95.5 percent, the predicted probability of plan participation was 3 percentage points lower, at 67 percent (PP 0.67, 95% CI 0.67-0.68, p<.001). At a relative benchmark rate two standard deviations above the mean, 133.9 percent, the predicted probability of plan participation was two percentage points higher, at 72 percent (PP 0.72, 95% CI 0.71-0.72, p<.001). As with the 2008 and 2011 findings, there seems to be an indication here that variations in the relative benchmark rate – even somewhat large variations – are not associated with dramatic differences in the overall predicted probability of plan participation.

As seen with the 2008 and 2011 data, nonprofit plans have a systematically greater predicted probability of plan participation as compared to for-profit plans at all levels of the relative benchmark rate in 2012 (Table 5.2f). However, while higher levels of the relative benchmark rate were associated with a higher predicted probability of participation among for-profit plans, higher levels of the relative benchmark rate were actually associated with a lower predicted probability of participation among nonprofit plans. In 2012, the predicted probability of participation among for-profit plans at a relative benchmark rate of 133.9 percent, two standard deviations above the mean rate was 4 percentage points higher (PP 0.71, 95% CI 0.70-0.71, p<.001), than the predicted probability of participation for for-profit plans at the mean relative benchmark rate of 114.7 percent (PP 0.67, 95% CI 0.67-0.67, p<.001). In contrast, the predicted probability of participation among nonprofit plans was 3 percentage points lower at a relative

benchmark rate two standard deviations above the mean (PP 0.75, 95% CI 0.75-0.76, p<.001) as compared to at the mean relative benchmark rate (PP 0.78, 95% CI 0.78-0.79, p<.001).

Next, predicted probabilities of plan participation at various levels of the relative benchmark rate were examined by plan type (Table 5.2f). As in 2011, local PPO plans had a greater predicted probability of participation at all levels of the relative benchmark rate than either HMO plans or PFFS plans in 2012. The association between the relative benchmark rate and plan participation appears to have been slightly stronger among HMO plans in 2012: HMO plans had a 3 percentage point lower predicted probability of plan participation at a relative benchmark rate of 95.5 percent, two standard deviations below the mean (PP 0.61, 95% CI 0.60-0.61, p<.001), as compared to the predicted probability of participation among HMO plans at the mean relative benchmark rate of 114.7 percent (PP 0.64, 95% CI 0.63-0.64, p<.001). Among local PPO plans, the differential was just one percentage point. Among PFFS plans, the predicted probability of participation was actually negatively associated with the relative benchmark rate, with the predicted probability lower at higher levels of the relative benchmark rate.

FIRST DIFFERENCE MULTINOMIAL LOGIT ANALYSES, 2008-2011

Recall that Chapter IV described the use of multinomial logit models to examine MA plan entry and exit between 2008 and 2011. One of the key assumptions underlying multinomial logit analyses is that the outcome categories are "independent and irrelevant alternatives" (IIA). Essentially this means that the inclusion or exclusion of any one outcome category does not affect the relative probabilities of the other categories. The

Small-Hsiao diagnostic test is commonly used to check the IIA assumption.[67] Results of the Small-Hsiao tests for the 2008-2011 first difference data confirms that the relationship between any two of the four outcome categories – entry, exit, never entered county, stayed in county – were independent of the other outcomes, and therefore indicated that the IIA assumption is met.[68]

First Difference Multinomial Logit Analyses, 2008-2011. Tables 5.3a and 5.3b present the stepwise results of first difference multinomial logit regression analyses. The discussion presented here will focus on multinomial logit models V and VI of both tables (see results columns 5 and 6 of Table 5.3a and Table 5.3b). Note that, for the sake of clarity and brevity, only the key outcome comparisons of interest – entry relative to never entered, exit relative to stayed in county – are presented in the tables.

Basic Models: Entry vs. Never Entered County. Multinomial logit model V of Table 5.3a examines whether an MA plan enters a county relative to never entering a county between 2008 and 2011 as a function of the change in the relative benchmark rate, plan profit status, the change in the proportion of the population over 65 years with retiree coverage, the change in the proportion of the population over 65 years with Medicaid coverage, the change in hospital market concentration, and whether an MA plan's parent company offered a non-MA plan in the county in 2008 or 2011 (along with other county control variables). The results for these multinomial models are presented as relative risk ratios.

TABLE 5.3A: FIRST DIFFERENCE MULTINOMIAL LOGIT ANALYSES FOR 2011 VS. 2008

RISK RATIO OF PLAN ENTRY RELATIVE TO NEVER ENTERING COUNTY, AMONG FEASIBLE ENTRIES (PLANS WITH CONTRACTS IN 2011)

ENTRY RELATIVE TO NEVER ENTERED COUNTY	mlogit I RRR[4] (95% CI)	mlogit II RRR (95% CI)	mlogit III RRR (95% CI)	mlogit IV RRR (95% CI)	mlogit V RRR (95% CI)	mlogit VI RRR (95% CI)
Change in relative benchmark rate[1]	2.22 (2.20-2.23)***	3.74 (3.20-4.37)***	2.04 (1.41-2.94)***	1.64 (1.12-2.38)**	4.46 (3.66-5.43)***	1.92 (1.23-3.00)**
For-profit plan		0.98 (0.97-0.99)*	1.00 (0.98-1.02)	0.89 (0.87-0.91)***	0.89 (0.87-0.91)***	0.92 0.90-0.94)***
For-profit x change in relative benchmark rate			2.10 (1.40-3.15)***	2.24 (1.48-3.40)***		2.83 (1.73-4.63)***
Change in state percent Medicare with retiree coverage				1.15 (1.01-1.31)*	1.62 (1.39-1.89)***	1.62 (1.39-1.89)***
Change in state percent Medicare with Medicaid (Duals)				1.63 (1.38-1.92)***	3.08 (2.56-3.72)***	3.09 (2.56-3.72)***
Change in hospital market concentration (HHI measure)/100[2]				0.997 (0.996-0.998)***	0.996 (0.995-0.997)***	0.996 (0.995-0.997)***
Parent company offered non MA-plan in county in 2008 or 2011				1.46 (1.44-1.48)***	1.50 (1.48-1.53)***	1.50 (1.48-1.53)***
Change in state percent Medicare reporting fair/poor health					0.23 (0.19-0.28)***	0.23 (0.19-0.28)***
Change in county's median income in 1,000s					1.03 (1.02-1.03)***	1.03 (1.02-1.03)***
Change in county's hospital beds per 1000 population					0.99 (0.99-1.00)	0.99 (0.99-1.00)
Change in county's MDs per 1000 population					1.01 (0.97-1.05)	1.01 (0.97-1.05)
County had at least one FQHC in 2008 or 2011[3]					1.09 (1.07-1.11)***	1.09 (1.07-1.11)***
Change in county's log population of those 65 years and over					1.12 (1.02-1.22)*	1.12 (1.02-1.22)*
Change in county's percent population black					21.5 (9.62-47.87)***	21.4 (9.58-47.69)***
Change in county's percent population female					4.83 (2.29-10.18)***	4.82 (2.28-10.16)***
Sample size	581,522	581,522	581,522	581,522	467,602	467,602
Pseudo R^2	0.001	0.006	0.006	0.013	0.019	0.019

*=p<.05 **=p<.01 ***=p<.001 Note: Relative risk ratios of less than 1.00 indicate a decrease in relative risk.

[1] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county

[2] HHI = Herfindahl-Hirschman Index of competition. CBSD = Core Based Statistical Division.

[3] FQHC = Federally Qualified Health Center

[4] RRR = Relative risk ratio

In order to isolate the risk of a plan entering relative to never entering a county between 2008 and 2011, the data used for the entry analyses are restricted to "feasible entries". Here "feasible entries" have been defined as only those plans with MA contracts in 2011, in other words, plans that did not operate in Medicare at all in 2011 were excluded, but plans that were offered in at least one county in 2011 were included.

Results from multinomial logit V of Table 5.3a indicate that a net one percentage point increase in the relative MA benchmark rate from 2008-2011 was associated with a 4.5 times increased risk of entering, relative to never entering a county (relative risk ratio (RRR) 4.46, 95% CI 3.36-5.43, p<.001), holding all else constant. This result is consistent with what was expected under Hypothesis 1B. For-profit designation was associated with an 11 percent lower risk of a plan entering, relative to never entering a county (RRR 0.89, 95% CI 0.87-0.91, p<.001). A net one percentage point increase in the percentage of the Medicare population with retiree coverage in the state was associated with a 62 percent increased risk of an MA plan entering relative to never entering a county (RRR 1.62, 95% CI 1.39-1.89, p<.001). A net one percentage point increase in the percentage of the Medicare population in the state dually eligible for Medicaid was associated with a 3.08 increased risk of entering, relative to never entering a county (RRR 3.08, 95% CI 2.56-3.72, p<.001). An increase in hospital market concentration, specifically a 100 point increase in hospital HHI was associated with a 0.4 percent decreased risk of entering relative to never entering a county (RRR 0.996, 95% CI 0.995-0.997, p<.001), consistent with Hypothesis 5B. Having a parent company that offered a non-MA plan in the county in either 2008 or 2011 was associated with a 50 percent increased risk of entering relative to never entering a county (RRR 1.50, 95% CI 1.48-

1.53, p<.001), consistent with Hypothesis 6.

The next model builds on the previous model by including an interaction term for profit status and the change in the relative benchmark rate (see multinomial logit VI in results column 6 of Table 5.3a). Results of the interacted model indicate that, among nonprofit plans, a net one percentage point increase in the relative benchmark rate between 2008 and 2011 was associated with a 92 percent increased risk of an MA plan entering, relative to never entering a county among nonprofit plans (RRR 1.92 95% CI 1.23-3.00, p<.01). Among for profit plans, a net one percentage point increase in the relative benchmark rate from 2008-2011 was associated with a 5.4 times greater risk of an MA plan entering, relative to never entering a county (RRR 5.43 95% CI 2.12-13.89, p<.001), all else held constant. These findings are consistent with what was expected under Hypothesis 2B, suggesting that entry decisions for for-profit plans may be more sensitive to changes in the relative benchmark rate than entry decisions for nonprofit plans. Coefficients for all other covariates were similar to those seen in multinomial logit model V above.

Basic Models: Exit vs. Stayed in County. Multinomial logit model V of Table 5.3b examines the risk of a plan exiting a county relative to a plan staying in a county between 2008 and 2011 as a function of the change in the relative benchmark rate, health plan profit status, the change in the proportion of the population over 65 years with retiree coverage, the change in the proportion of the population over 65 years with Medicaid coverage, the change in hospital market concentration and whether an MA plan's parent company offered a non-MA plan in the county in 2008 or 2011 (along with other county control variables).

TABLE 5.3B: FIRST DIFFERENCE MULTINOMIAL LOGIT ANALYSES FOR 2011 VS. 2008
RISK RATIO OF PLAN EXIT RELATIVE TO STAYING IN COUNTY, AMONG FEASIBLE EXITS (PLANS WITH CONTRACTS IN 2008)

EXIT RELATIVE TO STAYED IN COUNTY	**mlogit I RRR[4] (95% CI)**	**mlogit II RRR (95% CI)**	**mlogit III RRR (95% CI)**	**mlogit IV RRR (95% CI)**	**mlogit V RRR (95% CI)**	**mlogit VI RRR (95% CI)**
Change in relative benchmark rate[1]	0.03 (0.02-0.04)***	0.03 (0.02-0.04)***	0.07 (0.04-0.13)***	0.09 (0.05-0.16)***	0.05 (0.03-0.08)***	0.21 (0.11-0.42)***
For-profit plan		1.54 (1.50-1.58)***	1.50 (1.46-1.55)***	2.33 (2.26-2.41)***	2.31 (2.25-2.39)***	2.22 (2.14-2.30)***
For-profit x change in relative benchmark rate			0.24 (0.12-0.49)***	0.26 (0.13-0.53)***		0.11 (0.05-0.24)***
Change in state percent Medicare with retiree coverage				0.71 (0.54-0.94)*	0.56 (0.41-0.77)***	0.56 (0.41-0.77)***
Change in state percent Medicare with Medicaid (Duals)				2.54 (1.80-3.57)***	0.97 (0.66-1.42)	0.97 (0.66-1.42)
Change in hospital market concentration (HHI measure)/100[2]				1.00 (0.99-1.00)	1.00 (0.99-1.00)	1.00 (0.99-1.00)
Parent company offered non MA-plan in county in 2008 or 2011				0.32 (0.31-0.33)***	0.33 (0.32-0.34)***	0.33 (0.32-0.34)***
Change in state percent Medicare reporting fair/poor health					3.75 (2.59-5.43)***	3.77 (2.60-5.46)***
Change in county's median income in 1,000s					1.06 (1.06-1.07)***	1.06 (1.06-1.07)***
Change in county's hospital beds per 1000 population					1.00 (0.99-1.01)	1.00 (0.99-1.01)
Change in county's MDs per 1000 population					0.69 (0.64-0.74)***	0.69 (0.64-0.74)***
County had at least one FQHC in 2008 or 2011[3]					0.69 (0.67-0.71)***	0.69 (0.67-0.71)***
Change in county's log population of those 65 years and over					0.96 (0.81-1.14)	0.95 (0.80-1.13)
Change in county's percent population black					0.002 (0.0003-0.008)***	0.002 (0.0003-0.008)***
Change in county's percent population female					0.000008 (0.000001-0.00005)***	0.000008 (0.000001-0.00005)***
Sample size	635,855	635,855	635,855	635,855	511,055	511,055
Pseudo R^2	0.0006	0.005	0.005	0.017	0.021	0.021

*=p<.05 **=p<.01 ***=p<.001 Note: Relative risk ratios of less than 1.00 indicate a decrease in relative risk.
[1] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county
[2] HHI = Herfindahl-Hirschman Index of competition. [3] FQHC = Federally Qualified Health Center [4] RRR = Relative risk ratio

In order to isolate the risk of a plan exiting relative to staying in a county between 2008 and 2011, the data used for the exit analyses are restricted to "feasible exits". Here "feasible exits" have been defined as only those plans with MA contracts in 2008, in other words, plans that did not operate in Medicare at all in 2008 were excluded, but plans that were offered in at least one county in 2008 were included.

Results from multinomial logit V of Table 5.3b indicate that a net one percentage point increase in the relative MA benchmark rate between 2008 and 2011 was associated with a 95% decreased risk of a plan exiting, relative to remaining in a county (RRR 0.05, 95% CI 0.03-0.08, p<.001), all else held constant. This finding is consistent with Hypothesis 1B. For-profit designation is associated with a 2.31 times greater risk of exiting, relative to staying in a county (RRR 2.31, 95% CI 2.25-2.39, p<.001). A net one percentage point increase in the percentage of the Medicare population in the state with retiree coverage is associated with a 44 percent lower risk of a plan exiting, relative to remaining in a county (RRR 0.56, 95% CI 0.41-0.77, p<.001). A net one percentage point increase in the percentage of the Medicare population dually eligible for Medicaid in the state is not statistically significantly associated with risk of exiting relative to staying in a county between 2008 and 2011 (RRR 0.97, 95% CI 0.66-1.42, p>.05). An increase in hospital market concentration, specifically, a 100 point increase in hospital HHI, was not statistically significantly associated with the risk of exiting relative to staying in a county (RRR 1.00, 95% CI 0.99-1.00, p>.05). Having a parent company that offered a non-MA plan in the county in either 2008 or 2011 is associated with a 67 percent lower risk of a plan exiting, relative to staying in a county (RRR 0.33, 95% CI 0.32-0.34, p<.001), consistent with Hypothesis 6.

Next, multinomial logit model VI builds on the basic model by including an interaction term for profit status and the change in the relative benchmark rate (see multinomial logit VI in results column 6 of Table 5.3b). Results of the interaction model indicate that, among nonprofit plans, a net one percentage point increase in the relative benchmark rate between 2008 and 2011 was associated with a 79 percent lower risk of a plan exiting, relative to remaining in a county (RRR 0.21, 95% CI: 0.11-0.42, p<.001). Among for profit plans, a net one percentage point increase in the relative MA benchmark rate between 2008 and 2011 was associated with a 98 percent lower risk of a plan exiting, relative to remaining in a county (RRR 0.02, 95% CI: 0.006-0.10, p<.001). This suggests that market exit decisions for for-profit plans may be more sensitive to changes in the relative benchmark rate than market exit decisions for nonprofit plans. Coefficients for all other covariates were similar to those seen in multinomial logit model V above.

BIC goodness-of-fit calculations indicated strong support for the models where profit status and the relative benchmark rate were interacted, as compared to the basic models without the interaction term, for both base outcomes.

Sensitivity Analysis: Entry vs. Never Entered County, Excluding PFFS plans. As with the cross sectional analyses presented above, in order to address the concern that PFFS plans may operate differently from the other two plan types due to changes in CMS regulations, a third model excludes these PFFS plans (results column 3 of Table 5.3c).

TABLE 5.3C: FIRST DIFFERENCE MULTINOMIAL LOGIT ANALYSES FOR 2011 VS. 2008, BY PLAN TYPE
RISK RATIO OF PLAN ENTRY RELATIVE TO NEVER ENTERING COUNTY, AMONG FEASIBLE ENTRIES (PLANS WITH CONTRACTS IN 2011)

ENTRY RELATIVE TO NEVER ENTERED COUNTY	All Plans RRR[4] (95% CI)	All Plans w/ Plan Type RRR (95% CI)	Excluding PFFS RRR (95%CI)	HMO RRR (95% CI)	Local PPO RRR (95% CI)	PFFS RRR (95% CI)
Change in relative benchmark rate[1]	1.92 (1.23-3.00)**	1.91 (1.21-3.01)**	2.16 (1.36-3.43)**	3.31 (1.80-6.09)***	0.37 (0.09-1.61)	11.16 (0.12-1,069)
For-profit plan	0.92 (0.90-0.94)***	1.06 (1.04-1.08)***	0.88 (0.86-0.91)***	2.18 (2.11-2.24)***	0.12 (0.12-0.13)***	12.24 (10.10-14.84)***
For-profit x change in relative benchmark rate	2.83 (1.73-4.63)***	2.79 (1.69-4.60)***	2.54 (1.52-4.24)***	1.52 (0.78-2.97)	15.15 (3.33-68.86)***	0.67 (0.01-69.21)
Change in state percent Medicare with retiree coverage	1.62 (1.39-1.89)***	1.63 (1.39-1.91)***	2.15 (1.83-2.52)***	2.00 (1.63-2.45)***	0.67 (0.50-0.89)**	0.13 (0.07-0.26)***
Change in state percent Medicare with Medicaid (Duals)	3.09 (2.56-3.72)***	3.05 (2.52-3.69)***	2.19 (1.80-2.66)***	2.76 (2.16-3.52)***	2.39 (1.68-3.41)***	213.76 (96.34-474.31)***
Change in hospital market concentration (HHI measure)/100[2]	0.996 (0.995-0.997)***	0.996 (0.995-0.997)***	0.995 (0.994-0.997)***	0.995 (0.993-0.997)***	0.99 (0.99-1.00)	0.99 (0.99-1.00)
Parent company offered non MA-plan in county in 2008 or 2011	1.50 (1.48-1.53)***	1.44 (1.42-1.46)***	1.41 (1.39-1.43)***	1.62 (1.59-1.65)***	1.15 (1.12-1.18)***	1.69 (1.55-1.85)***
Change in state percent Medicare reporting fair/poor health	0.23 (0.19-0.28)***	0.25 (0.21-0.30)***	0.28 0.23-0.34)***	0.20 (0.16-0.25)***	0.41 (0.29-0.57)***	0.10 (0.05-0.22)***
Change in county's median income in 1,000s	1.03 (1.02-1.03)***	1.03 (1.03-1.30)***	1.03 (1.03-1.03)***	1.03 (1.03-1.04)***	1.02 (1.01-1.02)***	0.99 (0.98-1.00)
Change in county's hospital beds per 1000 population	0.99 (0.99-1.00)	1.00 (0.99-1.00)	0.99 (0.99-1.00)	0.99 (0.99-1.00)	0.99 (0.99-1.01)	1.00 (0.99-1.01)
Change in county's MDs per 1000 population	1.01 (0.97-1.05)	1.00 (0.96-1.04)	0.99 (0.95-1.03)	1.02 (0.97-1.07)	0.99 (0.92-1.06)	1.28 (1.10-1.50)**
County had at least one FQHC in 2008 or 2011[3]	1.09 (1.07-1.11)***	1.09 (1.07-1.10)***	1.10 (1.08-1.11)***	1.11 (1.09-1.13)***	1.08 (1.05-1.11)***	1.07 (1.01-1.14)*
Change in county's log population of those 65 years and over	1.12 (1.02-1.22)*	1.13 (1.03-1.23)**	1.15 (1.05-1.26)**	1.14 (1.02-1.28)*	1.19 (1.01-1.40)*	0.91 (0.63-1.31)
Change in county's percent population black	21.4 (9.58-47.69)***	18.47 (8.17-41.78)***	16.43 (7.10-38.02)***	46.8 (16.29-134.30)***	15.97 (3.55-71.90)***	804.67 (28.83-22,458.83)***
Change in county's percent population female	4.82 (2.28-10.16)***	4.14 (1.93-8.86)***	4.08 (1.87-8.94)***	7.68 (2.85-20.69)***	5.13 (1.26-20.80)*	125.05 (5.13-3,046)**
HMO		0.49 (0.49-0.50)***				
PFFS		0.20 (0.20-0.21)***				
Sample size	467,602	467,602	419,020	257,418	161,602	48,582
Pseudo R^2	0.019	0.135	0.031	0.048	0.089	0.117

*=p<.05 **=p<.01 ***=p<.001 Note: Relative risk ratios of less than 1.00 indicate a decrease in relative risk.
[1] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county
[2] HHI = Herfindahl-Hirschman Index of competition [3] FQHC = Federally Qualified Health Center [4] RRR = Relative risk ratio

The results of this model indicate that, when PFFS plans are excluded, a net one percentage point increase in the relative benchmark rate between 2008 and 2011 was associated with a 2.16 times greater risk of a nonprofit plan entering, relative to never entering a county (RRR 2.16, 95% CI 1.36-3.43, p<.01), all else held constant. A net one percentage point increase in the relative benchmark rate between 2008 and 2011 was associated with a 5.5 times greater risk of a for-profit plan entering, relative to never entering a county (RRR 5.49, 95% CI 2.07-14.54, p<.001). The magnitude of both of these estimates is greater than that from the basic model including all plan types. This suggests that PFFS plan participation decisions between 2008 and 2011 had a weaker association with fluctuations in the relative benchmark rate than plan participation decisions made by HMO and local PPO plans.

Sensitivity Analysis: Exit vs. Stayed in County, Excluding PFFS plans. A model examining the risk of exit relative to the risk of staying in a county that excludes PFFS plans is also run (Table 5.3d). Results of this model indicate that a net one percentage point increase in the relative benchmark rate between 2008 and 2011 was not statistically significantly associated with the risk of a plan exiting relative to staying in a county for either nonprofit plans (RRR 1.60, 95% CI 0.42-6.11, p>.05) or for-profit plans (RRR 0.61, 95% CI 0.13-2.84, p>.05). The change in the proportion of the state Medicare population with retiree coverage was associated with a 79 percent lower risk of a plan exiting, relative to remaining in a county, (RRR 0.21, 95% CI 0.13-0.36, p<.001), a slightly greater magnitude of risk reduction than that observed under the basic model.

TABLE 5.3D: FIRST DIFFERENCE MULTINOMIAL LOGIT ANALYSES FOR 2011 VS. 2008, BY PLAN TYPE
RISK RATIO OF PLAN EXIT RELATIVE TO STAYING IN COUNTY, AMONG FEASIBLE EXITS (PLANS WITH CONTRACTS IN 2008)

EXIT RELATIVE TO STAYED IN COUNTY	All Plans RRR[4] (95% CI)	All Plans w/Plan Type RRR (95% CI)	Excluding PFFS RRR (95%CI)	HMO RRR (95% CI)	PFFS RRR (95% CI)	Local PPO RRR (95% CI)
Change in relative benchmark rate[1]	0.21 (0.11-0.42)***	0.35 (0.15-0.85)*	1.60 (0.42-6.11)	0.16 (0.03-0.81)*	0.02 (0.00-8.18)	11,393.7 (39.9-3,256,624)**
For-profit plan	2.22 (2.14-2.30)***	1.69 (1.61-1.77)***	4.09 (3.84-4.35)***	1.70 (1.59-1.83)***	0.06 (0.05-0.08)***	45.13 (36.28-56.13)***
For-profit x change in relative benchmark rate	0.11 (0.05-0.24)***	0.48 (0.17-1.36)	0.61 (0.13-2.84)	4.67 (0.75-28.9)	52.01 (0.09-28470.2)	0.001 (0.000002-0.24)*
Change in state percent Medicare with retiree coverage	0.56 (0.41-0.77)***	0.10 (0.07-0.15)***	0.21 (0.13-0.36)***	0.27 (0.15-0.50)***	0.004 (0.002-0.01)***	0.97 (0.31-3.03)
Change in state percent Medicare with Medicaid (Duals)	0.97 (0.66-1.42)	1.21 (0.75-1.94)	7.80 (4.16-14.62)***	4.50 (2.16-9.38)***	0.04 (0.01-0.11)***	38.1 (9.08-159.61)***
Change in hospital market concentration (HHI measure)/100[2]	1.00 (0.99-1.00)	1.00 (0.99-1.01)	0.99 (0.99-1.00)	0.99 (0.99-1.00)	1.01 (1.01-1.02)***	0.99 (0.98-1.00)
Parent company offered non MA-plan in county in 2008 or 2011	0.33 (0.32-0.34)***	0.77 (0.74-0.80)***	0.51 (0.48-0.53)***	0.46 (0.43-0.48)***	0.77 (0.72-0.82)***	0.74 (0.66-0.83)***
Change in state percent Medicare reporting fair/poor health	3.77 (2.60-5.46)***	0.71 (0.45-1.12)	0.57 (0.30-1.05)	3.64 (1.76-7.53)**	0.05 (0.02-0.12)***	0.004 (0.001-0.02)***
Change in county's median income in 1,000s	1.06 (1.06-1.07)***	1.01 (1.00-1.02)**	0.98 (0.97-0.99)***	1.02 (1.01-1.03)**	0.99 (0.98-1.01)	0.94 (0.92-0.96)***
Change in county's hospital beds per 1000 population	1.00 (0.99-1.01)	1.01 (0.99-1.02)	1.01 (0.99-1.03)	1.01 (0.99-1.03)	1.01 (0.99-1.02)	1.01 (0.98-1.04)
Change in county's MDs per 1000 population	0.69 (0.64-0.74)***	0.94 (0.87-1.03)	1.09 (0.98-1.21)	0.95 (0.84-1.08)	1.25 (1.05-1.50)*	1.13 (0.88-1.44)
County had at least one FQHC in 2008 or 2011[3]	0.69 (0.67-0.71)***	0.94 (0.91-0.97)**	1.25 (1.19-1.31)***	0.93 (0.88-0.98)**	1.11 (1.04-1.20)**	2.15 (1.92-2.40)***
Change in county's log population of those 65 years and over	0.95 (0.80-1.13)	1.26 (1.02-1.55)*	1.79 (1.37-2.33)***	1.60 (1.17-2.17)**	1.88 (1.23-2.86)**	1.75 (0.97-3.15)
Change in county's percent population black	0.002 (0.0003-0.008)***	1.29 (0.18-9.12)	252.22 (19.90-3,196.26)***	192.14 (10.21-3,614.3)***	0.12 (0.002-5.27)	1.04 (0.003-312.3)
Change in county's percent population female	0.000008 (0.000001-0.00005)***	0.02 (0.003-0.19)***	484.81 (23.22-10,122.25)***	0.64 (0.02-22.64)	4.08 (0.12-142.4)	148,619.7 (180.8-1,220,000,000)**
HMO		2.91 (2.76-3.07)***				
PFFS		117.50 (110.94-124.46)***				
Sample size	511,055	511,055	370,027	243,106	141,028	126,921
Pseudo R^2	0.021	0.361	0.034	0.052	0.052	0.128

*=p<.05 **=p<.01 ***=p<.001 Note: Relative risk ratios of less than 1.00 indicate a decrease in relative risk.
[1] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county
[2] HHI = Herfindahl-Hirschman Index of competition [3] FQHC = Federally Qualified Health Center [4] RRR = Relative risk ratio

The change in the proportion of the Medicare population dually eligible for Medicaid was associated with a 7.8 times greater likelihood of exiting, relative to staying in a county (RRR 7.80, 95% CI 4.16-14.62, p<.001) – a substantial change in magnitude from the initial model. The change in hospital market concentration (HHI) was not statistically significantly associated with the risk of a plan exiting relative to staying in a county between 2008-2011 (RRR 1.00, 95% CI 0.99-1.01, p>.05). Having a parent company that offered a non-MA plan in the county in either 2008 or 2011 was associated with a 49 percent lower risk of a plan exiting relative to staying in a county (RRR 0.51, 95% CI 0.48-0.53, p<.001), a less dramatic risk reduction as compared to the basic model with all three plan types.

Plan Type Models: Entry vs. Never Entered County. A fourth type of multinomial logit model includes plan type dummy variables. Results of this model indicate that the inclusion of plan type dummy variables does not dramatically alter the results of the model examining plan entry relative to never entering a county for 2008-2011 (see results column 2 of Table 5.3c above). Similar to the basic interacted model, a net one percentage point increase in the relative benchmark rate between 2008 and 2011 was associated with a 91 percent increased risk of a plan entering, relative to never entering a county among nonprofit plans (RRR 1.91, 95% CI 1.21-3.01, p<.01) and a 5.3 times greater risk of entering relative to never entering a county among for-profit plans (RRR 5.31, 95% CI 2.04-13.85, p<.001). HMO plans had a 51 percent lower risk of entering relative to never entering a county as compared to local PPO plans (RRR 0.49, 95% CI 0.49-0.50, p<.001) and PFFS plans had an 80 percent lower risk of entering, relative to never entering a county as compared to PPO plans (RRR 0.20, 95% CI 0.20-0.21,

p<.001). Coefficients for all other covariates were similar to those seen in the basic multinomial logit model VI from Table 5.2a.

Models stratified by plan type (results columns 4-6 of Table 5.3c) indicate that a net one percentage point increase in the relative benchmark rate between 2008 and 2011 was associated with a 3.3 times greater risk of a plan entering, relative to never entering a county among nonprofit HMO plans (RRR 3.31, 95% CI 1.80-6.09, p<.001), but was not statistically significantly associated with risk of entering, relative to never entering a county among nonprofit PFFS plans (RRR 11.16, 95% CI 0.12-1,069, p>.05) or among nonprofit local PPO plans (RRR 0.37, 95% CI 0.09-1.61, p>.05). A net one percentage point increase in the relative benchmark rate between 2008 and 2011 was associated with a 5 times greater risk of a plan entering, relative to never entering a county among for-profit HMO plans (RRR 5.00, 95% CI 1.40-18.08, p<.001), but was not statistically significantly associated with risk of entering, relative to never entering a county among for-profit PFFS plans (RRR 7.47, 95% CI 0.001-111,301, p>.05) or among for-profit local PPO plans (RRR 5.58, 95% CI 0.30-110.83, p>.05).

Plan Type Models: Exit vs. Stayed in County. The next model examines the introduction of plan type dummy variables into the basic model of plan exit relative to staying in a county for 2008-2011 (Table 5.3d above). Results indicate that a net one percentage point increase in the relative benchmark rate between 2008 and 2011 was associated with a 65 percent lower risk of a plan exiting, relative to staying in a county among nonprofit plans (RRR 0.35, 95% CI 0.15-0.85, p<.05) and an 83 percent lower risk of exiting, relative to staying in a county among for-profit plans (RRR 0.17, 95% CI 0.03-1.16, p>.05), though this was not statistically significant. HMO plans were 2.91 times more likely to exit,

relative to staying in a county, compared with local PPO plans (RRR 2.91, 95% CI 2.76-3.07, p<.001), and PFFS plans were 117 times more likely to exit, relative to staying in a county, compared with local PPO plans (RRR 117.50, 95% CI 110.94-124.46, p<.001). Coefficients for all other covariates were similar to those seen in the basic multinomial logit model VI from Table 5.3b.

Results of the models stratified by plan type indicate (results columns 4-6 of Table 5.3d) that a net one percentage point increase in the relative benchmark rate between 2008 and 2011 was associated with a 84 percent lower risk of a plan exiting, relative to staying a county among nonprofit HMO plans (RRR 0.16, 95% CI 0.03-0.81, p<.05), and an 11,394 times greater risk of exiting, relative to staying in a county among local PPO plans (RRR 11,394, 95% CI 39.9-3,256,624, p<.01) but was not statistically significantly associated with risk of exiting relative to staying in a county among nonprofit PFFS plans (RRR 11.16, 95% CI 0.12-1,069, p>.05). A net one percentage point increase in the relative benchmark rate between 2008 and 2011 was associated with a 5 times greater risk of a plan exiting relative to staying in a county among for-profit HMO plans (RRR 5.00, 95% CI 1.40-18.08, p<.001), but was not statistically significantly associated with risk of exiting relative to staying in a county among for-profit PFFS plans (RRR 7.47, 95% CI 0.001-111,301, p>.05) or among for-profit local PPO plans (RRR 5.58, 95% CI 0.30-110.83, p>.05).

Predicted Probabilities.

Tables 5.3e–5.3j show the predicted probabilities of entry, exit, staying in a county and never entering a county between 2008-2011.

TABLE 5.3E: PREDICTED PROBABILITIES OF PLAN PARTICIPATION BETWEEN 2008-2011, AMONG FEASIBLE ENTRIES (PLANS WITH CONTRACTS IN 2011)

No interaction term

Change in relative benchmark rate[1]	Entry	Exit	Stayed in county	Never entered county
-10.1% = 2 SD below mean[2]	0.60 (0.60-0.60)***	0.07 (0.06-0.07)***	0.04 (0.04-0.04)***	0.30 (0.29-0.30)***
-6.3% = 1 SD below mean	0.60 (0.60-0.61)***	0.07 (0.07-0.07)***	0.04 (0.04-0.04)***	0.28 (0.28-0.28)***
-2.5% = Mean change	0.61 (0.61-0.61)***	0.08 (0.07-0.08)***	0.05 (0.05-0.05)***	0.27 (0.27-0.27)***
+1.3% = 1 SD above mean	0.61 (0.61-0.61)***	0.08 (0.08-0.08)***	0.06 (0.05-0.06)***	0.25 (0.25-0.26)***
+5.1% = 2 SD above mean	0.61 (0.61-0.61)***	0.08 (0.08-0.09)***	0.06 (0.06-0.07)***	0.24 (0.24-0.24)***

***P<.001

[1] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county [2] SD= Standard deviation

Note: Predicted probability of plan participation, with all other variables held at their means.

In order to examine the predicted probability of plan entry relative to never entering a county between 2008 and 2011, Tables 5.3e–5.3g use data for all "feasible entries", i.e. only plans with MA contracts in 2011. The results from Table 5.3e show that, at the mean change in the benchmark rate from 2008 to 2011 equal to a 2.5 percentage point decrease, there was a 69 percent probability of a plan entering relative to never entering a county (PP 0.69, 95% CI 0.69-0.69, p<.001).[69] At a change in the relative benchmark rate of two standard deviations above the mean equal to a 5.1 percentage point increase, there was a 72 percent predicted probability of a plan entering relative to never entering a county (PP 0.72, 95% CI 0.72-0.72, p<.001). At a change in the relative benchmark rate of two standard deviations below the mean equal to a 10.1 percentage point decrease, predicted probability of a plan entering relative to never entering a county fell two percentage points, to 67 percent (PP 0.67, 95% CI 0.67-0.67, p<.001).

Table 5.3f shows the predicted probabilities both by different levels of the relative benchmark rate, and by profit status.

TABLE 5.3F: PREDICTED PROBABILITIES OF PLAN PARTICIPATION BETWEEN 2008-2011 BY PROFIT STATUS, AMONG FEASIBLE ENTRIES (PLANS WITH CONTRACTS IN 2011)

With interaction term

Change in relative benchmark rate[1]	Entry		Exit		Stayed in county		Never entered county	
	Non profit	For profit	Non profit	For Profit	Non profit	For Profit	Non profit	For Profit
-10.1% = 2 SD below mean[2]	0.57 (0.56-0.57)***	0.60 (0.60-0.61)***	0.08 (0.08-0.09)***	0.06 (0.06-0.06)***	0.10 (0.10-0.11)***	0.03 (0.03-0.03)***	0.24 (0.24-0.25)***	0.31 (0.30-0.31)***
-6.3% = 1 SD below mean	0.57 (0.57-0.58)***	0.61 (0.60-0.61)***	0.08 (0.08-0.09)***	0.07 (0.07-0.07)***	0.11 (0.11-0.11)***	0.03 (0.03-0.03)***	0.24 (0.23-0.24)***	0.29 (0.29-0.29)***
-2.5% = Mean change	0.57 (0.57-0.57)***	0.61 (0.61-0.61)***	0.09 (0.08-0.09)***	0.07 (0.07-0.07)***	0.12 (0.11-0.12)***	0.04 (0.04-0.04)***	0.23 (0.23-0.23)***	0.28 (0.27-0.28)***
+1.3% = 1 SD above mean	0.57 (0.56-0.57)***	0.62 (0.61-0.62)***	0.09 (0.08-0.09)***	0.08 (0.08-0.08)***	0.12 (0.12-0.13)***	0.05 (0.05-0.05)***	0.22 (0.22-0.23)***	0.26 (0.26-0.26)***
+5.1% = 2 SD above mean	0.56 (0.56-0.57)***	0.62 (0.61-0.62)***	0.09 (0.08-0.09)***	0.08 (0.08-0.09)***	0.13 (0.12-0.13)***	0.06 (0.05-0.06)***	0.22 (0.21-0.22)***	0.24 (0.24-0.25)***

***P<.001

[1] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county

[2] SD= Standard deviation

Note: Predicted probability of plan participation, with all other variables held at their means.

At the mean change in the benchmark rate from 2008 to 2011 equal to a 2.5 percentage point decrease, there was a 71 percent probability of a nonprofit plan entering relative to never entering a county (PP 0.71, 95% CI 0.71-0.71, p<.001), and a 68 percent probability of a for-profit plan entering relative to never entering a county (PP 0.68, 95% CI 0.68-0.69, p<.001). At a change in the relative benchmark rate of two standard deviations above the mean equal to a 5.1 percentage point increase, the predicted probability of a plan entering relative to never entering a county grew to 72 percent for non-profit plans (PP 0.72, 95% CI 0.72-0.73, p<.001) and, interestingly, also to 72 percent for for-profit plans (PP 0.72, 95% CI 0.71-0.72, p<.001). At a change in the relative benchmark rate of two standard deviations below the mean equal to a 10.1 percentage point decrease, the predicted probability of a plan entering relative to never entering a county fell to 70 percent for nonprofit plans (PP 0.70, 95% CI 0.69-0.70, p<.001) and to 66 percent for for-profit plans (PP 0.66, 95% CI 0.66-0.67, p<.001).

Table 5.3g shows predicted probabilities of plan entry relative to never entering a county by plan type. At the mean change in the benchmark rate, a 2.5 percentage point decrease, there was a 66 percent probability of a HMO plan entering relative to never entering a county (PP 0.66, 95% CI 0.65-0.66, p<.001), an 82 percent predicted probability of a local PPO plan entering relative to never entering a county (PP 0.82, 95% CI 0.82-0.83, p<.001) and a 40 percent probability of a PFFS plan entering relative to never entering a county (PP 0.40, 95% CI 0.39-0.40, p<.001).

TABLE 5.3G: PREDICTED PROBABILITIES OF PLAN PARTICIPATION BETWEEN 2008-2011 BY PLAN TYPE, AMONG FEASIBLE ENTRIES (PLANS WITH CONTRACTS IN 2011)

Change in relative benchmark rate[1]	Entry			Exit			Stayed in county			Never entered county		
	HMO	Local PPO	PFFS	HMO	Local PPO	PFFS	HMO	Local PPO	PFFS	HMO	Local PPO	PFFS
-10.1% = 2 SD below mean[2]	0.60 (0.59-0.60)***	0.79 (0.78-0.80)***	0.14 (0.13-0.15)***	0.02 (0.02-0.02)***	0.003 (0.002-0.003)***	0.56 (0.55-0.57)***	0.03 (0.03-0.03)***	0.03 (0.03-0.03)***	0.07 (0.06-0.08)***	0.35 (0.35-0.36)***	0.18 (0.17-0.18)***	0.24 (0.23-0.25)***
-6.3% = 1 SD below mean	0.60 (0.60-0.61)***	0.79 (0.79-0.80)***	0.14 (0.14-0.15)***	0.03 (0.02-0.03)***	0.004 (0.003-0.004)***	0.56 (0.55-0.57)***	0.03 (0.03-0.04)***	0.03 (0.03-0.03)***	0.07 (0.07-0.08)***	0.34 (0.33-0.34)***	0.17 (0.17-0.17)***	0.23 (0.22-0.23)***
-2.5% = Mean change	0.61 (0.60-0.61)***	0.79 (0.79-0.80)***	0.15 (0.14-0.15)***	0.03 (0.03-0.03)***	0.005 (0.004-0.005)***	0.56 (0.55-0.56)***	0.04 (0.04-0.04)***	0.04 (0.03-0.04)***	0.07 (0.07-0.08)***	0.32 (0.32-0.32)***	0.17 (0.16-0.17)***	0.22 (0.22-0.22)***
+1.3% = 1 SD above mean	0.61 (0.60-0.61)***	0.80 (0.79-0.80)***	0.15 (0.15-0.16)***	0.04 (0.04-0.04)***	0.01 (0.01-0.01)***	0.56 (0.55-0.56)***	0.05 (0.05-0.05)***	0.04 (0.04-0.04)***	0.08 (0.07-0.08)***	0.30 (0.30-0.30)***	0.16 (0.16-0.16)***	0.21 (0.21-0.22)***
+5.1% = 2 SD above mean	0.60 (0.60-0.61)***	0.80 (0.79-0.80)***	0.16 (0.15-0.17)***	0.05 (0.05-0.05)***	0.01 (0.01-0.01)***	0.56 (0.54-0.57)***	0.07 (0.06-0.07)***	0.04 (0.04-0.05)***	0.08 (0.07-0.08)***	0.28 (0.28-0.29)***	0.15 (0.15-0.16)***	0.20 (0.20-0.21)***

***P<.001

[1] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county

[2] SD= Standard deviation

Note: Predicted probability of plan participation, with all other variables held at their means.

At a change in the relative benchmark rate two standard deviations above the mean change, a 5.1 percentage point increase, the predicted probability of a HMO plan entering relative to never entering a county increased by 2 percentage points (PP 0.68, 95% CI 0.68-0.68, p<.001), the predicted probability of a local PPO plan entering relative to never entering a county also increased by 2 percentage points (PP 0.84, 95% CI 0.83-0.84, p<.001) and the predicted probability of a PFFS plan entering relative to never entering a county increased by 4 percentage points (PP 0.44, 95% CI 0.43-0.45, p<.001). This suggests that the association between the change in the relative benchmark rate and the predicted probability of plan entry relative to never entering a county was slightly stronger among PFFS plans as compared to PPO or HMO plans, consistent with Hypothesis 2B.

Next, Tables 5.3h–5.3j show results for all "feasible exits", i.e. only plans with MA contracts in 2008, in order to examine the predicted probability of plan exit between 2008 and 2011. The results from Table 5.3h show that, at the mean change in the benchmark rate from 2008 to 2011 equal to a 2.5 percentage point decrease, there was an 85 percent predicted probability of a plan exiting relative to staying in a county (PP 0.85, 95% CI 0.85-0.88, p<.001). At a change in the relative benchmark rate of two standard deviations above the mean equal to a 5.1 percentage point increase, the predicted probability of a plan exiting relative to staying in a county fell two percentage points, to 83 percent (PP 0.83, 95% CI 0.83-0.83, p<.001). At a change in the relative benchmark rate of two standard deviations below the mean equal to a 10.1 percentage point decrease, there was a 90 percent predicted probability of a plan exiting relative to staying in a county (PP 0.90, 95% CI 0.87-0.90, p<.001).

TABLE 5.3H: PREDICTED PROBABILITIES OF PLAN PARTICIPATION BETWEEN 2008-2011, AMONG FEASIBLE EXITS (PLANS WITH CONTRACTS IN 2008)

No interaction term

Change in relative benchmark rate	Entry	Exit	Stayed in county	Never entered county
-10.1% = 2 SD below mean[2]	0.43 (0.43-0.43)***	0.26 (0.26-0.27)***	0.03 (0.03-0.04)***	0.27 (0.27-0.27)***
-6.3% = 1 SD below mean	0.43 (0.43-0.43)***	0.27 (0.27-0.27)***	0.04 (0.04-0.04)***	0.26 (0.26-0.26)***
-2.5% = Mean change	0.43 (0.43-0.43)***	0.28 (0.28-0.28)***	0.05 (0.04-0.05)***	0.24 (0.24-0.25)***
+1.3% = 1 SD above mean	0.43 (0.43-0.44)***	0.28 (0.28-0.29)***	0.05 (0.05-0.05)***	0.23 (0.23-0.23)***
+5.1% = 2 SD above mean	0.43 (0.43-0.44)***	0.29 (0.29-0.29)***	0.06 (0.06-0.06)***	0.22 (0.22-0.22)***

***P<.001

[1] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county

[2] SD= Standard deviation

Note: Predicted probability of plan participation, with all other variables held at their means.

Table 5.3i shows the predicted probabilities both by different levels of the relative benchmark rate, and by profit status. At the mean change in the benchmark rate from 2008 to 2011, a 2.5 percentage point decrease, there was a 76 percent probability of a nonprofit plan exiting relative to staying in a county (PP 0.76, 95% CI 0.76-0.76, p<.001), and an 87 percent probability of a for-profit plan exiting relative to staying in a county (PP 0.87, 95% CI 0.87-0.87, p<.001). At a change in the relative benchmark rate of two standard deviations above the mean, a 5.1 percentage point increase, the predicted probability of a plan exiting relative to staying in a county fell to 74 percent for non-profit plans (PP 0.74, 95% CI 0.73-0.74, p<.001) and to 85 percent for for-profit plans (PP 0.85, 95% CI 0.85-0.85, p<.001).

TABLE 5.3I: PREDICTED PROBABILITIES OF PLAN PARTICIPATION BETWEEN 2008-2011 BY PROFIT STATUS, AMONG FEASIBLE EXITS (PLANS WITH CONTRACTS IN 2008)

With interaction term

Change in relative benchmark rate	Entry		Exit		Stayed in county		Never entered county	
	Non profit	For profit	Non profit	For Profit	Non profit	For Profit	Non profit	For Profit
-10.1% = 2 SD below mean	0.43 (0.42-0.44)***	0.43 (0.42-0.43)***	0.28 (0.28-0.29)***	0.26 (0.25-0.26)***	0.08 (0.07-0.08)***	0.03 (0.02-0.03)***	0.21 (0.20-0.21)***	0.29 (0.29-0.29)***
-6.3% = 1 SD below mean	0.43 (0.43-0.43)***	0.43 (0.43-0.43)***	0.28 (0.28-0.29)***	0.26 (0.26-0.27)***	0.08 (0.08-0.09)***	0.03 (0.03-0.03)***	0.20 (0.20-0.20)***	0.28 (0.27-0.28)***
-2.5% = Mean change	0.43 (0.43-0.43)***	0.43 (0.43-0.43)***	0.29 (0.28-0.29)***	0.27 (0.27-0.27)***	0.09 (0.09-0.09)***	0.04 (0.04-0.04)***	0.19 (0.19-0.20)***	0.26 (0.26-0.26)***
+1.3% = 1 SD above mean	0.43 (0.42-0.43)***	0.43 (0.43-0.43)***	0.29 (0.29-0.29)***	0.28 (0.28-0.28)***	0.10 (0.09-0.10)***	0.04 (0.04-0.04)***	0.18 (0.18-0.19)***	0.25 (0.24-0.25)***
+5.1% = 2 SD above mean	0.43 (0.42-0.43)***	0.43 (0.43-0.43)***	0.29 (0.29-0.30)***	0.29 (0.28-0.29)***	0.10 (0.10-0.11)***	0.05 (0.05-0.05)***	0.18 (0.17-0.18)***	0.23 (0.23-0.23)***

***P<.001

[1] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county

Note: Predicted probability of plan participation, with all other variables held at their means.

At a change in the relative benchmark rate of two standard deviations below the mean, a 10.1 percentage point decrease, the predicted probability of a plan exiting relative to staying in a county grew to 78 percent for nonprofit plans (PP 0.78, 95% CI 0.78-0.80, p<.001) and to 90 percent for for-profit plans (PP 0.90, 95% CI 0.90-0.93, p<.001). These results suggest that nonprofit plans may be less likely, overall, to exit a county, as compared to for-profit plans, supporting Hypothesis 2B.

These predicted probabilities of plan exit may seem quite high, but, again, the data here are restricted to plans with contracts in 2008 in order to really focus on those plans that could feasibly exit the market. In addition, given that a large number of PFFS plans were exiting the market over this time period, it is not entirely implausible that the probability of exit is so high relative to the probability of staying in a county. This notion is supported by predicted probability calculations stratified by plan type.

Table 5.3j shows predicted probabilities of plan exit relative to staying in a county between 2008-2011 by plan type. At the mean change in the benchmark rate, a 2.5 percentage point decrease, there was a 47 percent predicted probability of a HMO plan exiting relative to staying in a county (PP 0.47, 95% CI 0.47-0.47, p<.001), an 18 percent predicted probability of a local PPO plan exiting relative to staying in a county (PP 0.18, 95% CI 0.17-19, p<.001) and a 98 percent probability of a PFFS plan exiting relative to staying in a county (PP 0.98, 95% CI 0.98-0.98, p<.001).

TABLE 5.3J: PREDICTED PROBABILITIES OF PLAN PARTICIPATION BETWEEN 2008-2011 BY PLAN TYPE, AMONG FEASIBLE EXITS (PLANS WITH CONTRACTS IN 2008)

Change in relative benchmark rate[1]	Entry			Exit			Stayed in county			Never entered county		
	HMO	Local PPO	PFFS	HMO	Local PPO	PFFS	HMO	Local PPO	PFFS	HMO	Local PPO	PFFS
-10.1% = 2 SD below mean[2]	0.58 (0.57-0.58)***	0.74 (0.73-0.74)***	0.00002 (0.00-0.01)	0.03 (0.02-0.03)***	0.01 (0.01-0.01)***	0.93 (0.93-0.94)***	0.03 (0.03-0.03)***	0.04 (0.04-0.04)***	0.01 (0.01-0.02)***	0.37 (0.37-0.38)***	0.22 (0.21-0.22)***	0.05 (0.05-0.06)***
-6.3% = 1 SD below mean	0.58 (0.58-0.58)***	0.73 (0.73-0.74)***	0.00001 (0.00-0.01)	0.03 (0.03-0.03)***	0.01 (0.01-0.01)***	0.93 (0.93-0.94)***	0.04 (0.03-0.04)***	0.05 (0.04-0.05)***	0.02 (0.01-0.02)***	0.35 (0.35-0.35)***	0.21 (0.21-0.22)***	0.05 (0.05-0.05)***
-2.5% = Mean change	0.59 (0.58-0.59)***	0.73 (0.73-0.73)***	0.00001 (0.00-0.01)	0.04 (0.04-0.04)***	0.01 (0.01-0.01)***	0.93 (0.93-0.94)***	0.05 (0.04-0.05)***	0.05 (0.05-0.05)***	0.02 (0.02-0.02)***	0.33 (0.33-0.33)***	0.21 (0.21-0.21)***	0.05 (0.05-0.05)***
+1.3% = 1 SD above mean	0.59 (0.58-0.59)***	0.72 (0.72-0.73)***	0.00001 (0.00-0.01)	0.05 (0.05-0.05)***	0.01 (0.01-0.02)***	0.93 (0.93-0.94)***	0.06 (0.06-0.06)***	0.06 (0.05-0.06)***	0.02 (0.02-0.02)***	0.31 (0.30-0.31)***	0.20 (0.20-0.21)***	0.05 (0.05-0.05)***
+5.1% = 2 SD above mean	0.58 (0.58-0.59)***	0.72 (0.71-0.73)***	0.00001 (0.00-0.01)	0.06 (0.06-0.06)***	0.02 (0.02-0.02)***	0.93 (0.93-0.94)***	0.07 (0.07-0.07)***	0.06 (0.06-0.07)***	0.02 (0.02-0.02)***	0.29 (0.28-0.29)***	0.20 (0.19-0.21)***	0.05 (0.05-0.05)***

***P<.001

[1] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county

[2] SD= Standard deviation

Note: Predicted probability of plan participation, with all other variables held at their means.

At a change in the relative benchmark rate two standard deviations above the mean change, a 5.1 percentage point increase, the predicted probability of a HMO plan exiting relative to staying in a county decreased by 1 percentage point (PP 0.47, 95% CI 0.47-0.47, p<.001), whereas the predicted probability of a local PPO plan exiting relative to staying in a county actually increased by 5 percentage points (PP 0.23, 95% CI 0.22-0.23, p<.001) and the predicted probability of a PFFS plan exiting relative to staying in a county remained the same (PP 0.98, 95% CI 0.98-0.98, p<.001).

These plan type findings are likely complicated by the low number of HMO and local PPO plans exiting the market – only 3.7 percent of HMO plans and 1.1 percent of local PPO plans exited a county between 2008 and 2011 – and the extremely high number of PFFS plans exiting the market – 80.3 percent of PFFS plans exited a county between 2008-2011 (see Table 5.4a). Moreover, exit decisions by PFFS plans may have been driven by factors other than the relative benchmark rate, (namely new regulations resulting from the MIPPA).

TABLE 5.4A: PLAN PARTICIPATION BETWEEN 2008-2011, BY PLAN TYPE

	HMO	PFFS	Local PPO
Entered county between 2008-2011	189,626 (56.6%)	10,447 (5.2%)	149,604 (67.8%)
Exited county between 2008-2011	12,304 (3.7%)	161,058 (80.3%)	2,514 (1.1%)
Stayed in county	15,615 (4.7%)	4,919 (2.5%)	10,676 (4.8%)
Never entered county	117,404 (35.0%)	24,072 (12.0%)	57,885 (26.2%)
Total plan/county combinations	334,949	200,496	220,679

FIRST DIFFERENCE MULTINOMIAL LOGIT ANALYSES, 2011-2012

First difference multinomial logit analyses similar to those presented above were run using data for the years 2011-2012, originally intended to capture changes following the implementation of the ACA. However, relatively few plans entered and exited the market between 2011 and 2012: 7 percent of plans entered a new county in 2012, and 8 percent exited a county after 2011; the remaining 85 percent of plans made no changes (they either stayed in a county or never entered a county). Because there was so little variation in plan participation, the findings from these analyses look somewhat erroneous. The results from these analyses are presented below, but they do need to be considered a preliminary examination, and interpreted with considerable caution.

First Difference Multinomial Logit Analyses, 2011-2012. First, Small-Hsiao tests were conducted to assess whether the 2011-2012 data met the IIA requirement. Results of the Small-Hsiao tests confirmed that the relationship between any two of the four outcome categories – entry, exit, never entered county, stayed in county – were independent of the other outcomes, and therefore indicated that the IIA assumption is met.

Tables 5.5a and 5.5b present the stepwise results of first difference multinomial logit regression analyses. The discussion presented here will focus on multinomial logit models V and VI of both tables (see results columns 5 and 6 of Table 5.5a and 5.5b). Once again, for the sake of clarity and brevity, only the key outcome comparisons of interest – entry relative to never entered county, exit relative to stayed in county – are presented in the tables.

TABLE 5.5A: FIRST DIFFERENCE MULTINOMIAL LOGIT ANALYSES FOR 2012 VS. 2011

RISK RATIO OF PLAN ENTRY RELATIVE TO NEVER ENTERING COUNTY, AMONG FEASIBLE ENTRIES (PLANS WITH CONTRACTS IN 2012)

ENTRY RELATIVE TO NEVER ENTERED COUNTY	**mlogit I RRR[4] (95% CI)**	**mlogit II RRR (95% CI)**	**mlogit III RRR (95% CI)**	**mlogit IV RRR (95% CI)**	**mlogit V RRR (95% CI)**	**mlogit VI RRR (95% CI)**
Change in relative benchmark rate[1]	1,255.34 (689.29-2,286.22)***	1,696.95 (932.27-3,088.85)***	1,095.44 (237.03-5,062.66)***	303.45 (63.92-1,440.63)***	459.19 (225.62-934.55)***	156.27 (26.29-928.78)***
For-profit plan		1.50 (1.44-1.56)***	1.53 (1.46-1.61)***	0.99 (0.94-1.04)	1.02 (0.97-1.07)	1.04 (0.98-1.10)
For-profit x change in relative benchmark rate			2.67 (0.51-14.07)	2.48 (0.45-13.49)		5.84 (0.84-40.60)
Change in state percent Medicare with retiree coverage				0.44 (0.29-0.67)***	0.96 (0.61-1.49)	0.96 (0.62-1.50)
Change in state percent Medicare with Medicaid (Duals)				7.21 (4.70-11.06)***	14.31 (8.80-23.29)***	14.39 (8.84-23.42)***
Change in hospital market concentration (HHI measure)/100[2]				1.01 (1.00-1.01)***	1.00 (1.00-1.01)*	1.00 (1.00-1.01)*
Parent company offered non MA-plan in county in 2011 or 2012				2.94 (2.85-3.03)***	2.66 (2.57-2.75)***	2.65 (2.56-2.74)***
Change in state percent Medicare reporting fair/poor health					0.16 (0.11-0.25)***	0.16 (0.11-0.25)***
Change in county's median income in 1,000s					1.02 (1.01-1.03)***	1.02 (1.01-1.03)***
Change in county's hospital beds per 1000 population					0.99 (0.97-1.03)	0.99 (0.97-1.03)
Change in county's MDs per 1000 population					1.14 (1.05-1.25)**	1.14 (1.05-1.25)**
County had at least one FQHC in 2011 or 2012[3]					1.74 (1.68-1.80)***	1.74 (1.68-1.80)***
Change in county's log population of those 65 years and over					41.96 (22.67-77.68)***	41.66 (22.50-77.14)
Change in county's percent population black					3,030,825 (201.58-4.56e+10)**	3,077,322 (205.02 - 4.62e+10)**
Change in county's percent population female					0.11 (0.00004-297.88)	0.12 (0.00004-310.57)
Sample size	553,971	553,971	553,971	553,971	433,953	433,953
Pseudo R^2	0.0008	0.009	0.011	0.037	0.038	0.040

*=p<.05 **=p<.01 ***=p<.001 Note: Relative risk ratios of less than 1.00 indicate a decrease in relative risk.

[1] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county

[2] HHI = Herfindahl-Hirschman Index of competition [3] FQHC = Federally Qualified Health Center [4] RRR = Relative risk ratio

Basic Models: Entry vs. Never Entered County. Multinomial logit model V of Table 5.5a examines the risk of a plan entering a county relative to never entering a county between 2011 and 2012 as a function of the change in the relative benchmark rate, health plan profit status, the change in the proportion of the population over 65 years with retiree coverage, the change in the proportion of the population over 65 years with Medicaid coverage, the change in hospital market concentration, and whether an MA plan's parent company offered a non-MA plan in the county in 2011 or 2012 (along with other county control variables). The data used for the 2011-2012 entry analyses are restricted to "feasible entries", i.e. only plans with MA contracts in 2012 are included in the analysis.

Results from multinomial logit V of Table 5.5a indicate that a net one percentage point increase in the relative MA benchmark rate between 2011 and 2012 was associated with a 459 times increased risk of entering, relative to never entering a county (RRR 459.19, 95% CI 225.62-934.55, $p<.001$), holding all else constant. For-profit designation was not statistically significantly associated with risk of a plan entering, relative to never entering a county between 2011 and 2012 (RRR 1.02, 95% CI 0.97-1.07, $p>.05$). A net one percentage point increase in the percentage of the Medicare population with retiree coverage in the state was not statistically significantly associated with risk of an MA plan entering relative to never entering a county (RRR 0.96, 95% CI 0.61-1.49, $p>.05$). A net one percentage point increase in the percentage of the Medicare population in the state dually eligible for Medicaid was associated with a 14.3 times increased risk of entering, relative to never entering a county (RRR 14.31, 95% CI 8.80-23.29, $p<.001$). An increase in hospital market concentration, specifically a 100 point increase in the hospital HHI was associated with a negligible (less than 0.1 percent) increase in the risk of a plan

entering relative to never entering a county (RRR 1.00, 95% CI 1.00-1.01, p<.05). Having a parent company that offered a non-MA plan in the county in either 2011 or 2012 was associated with a 2.66 times increased risk of entering relative to never entering a county (RRR 2.66, 95% CI 2.57-2.75, p<.001).

The next model builds on the previous model by including an interaction term for profit status and the change in the relative benchmark rate (see multinomial logit VI in results column 6 of Table 5.5a). Results of the interacted model indicate that, among nonprofit plans, a net 1 percentage point increase in the relative benchmark rate between 2011 and 2012 was associated with a 156.3 times increased risk of an MA plan entering, relative to never entering a county among nonprofit plans (RRR 156.27 95% CI 26.29-928.78, p<.001). Among for profit plans, a net one percentage point increase in the relative benchmark rate from 2011-2012 was associated with 912.3 times greater risk of an MA plan entering, relative to never entering a county (RRR 912.33 95% CI 22.09-37,421.47, p>.05), though the association of the change in the relative benchmark rate and plan participation did not statistically significantly differ by profit status in this model. Coefficients for all other covariates were similar to those seen in multinomial logit model V above.

Basic Models: Exit vs. Stayed in County. Multinomial logit model V of Table 5.5b examines the risk of a plan exiting a county relative to a plan staying in a county between 2011 and 2012 as a function of the change in the relative benchmark rate, health plan profit status, the change in the proportion of the population over 65 years with retiree coverage, the change in the proportion of the population over 65 years with Medicaid coverage, the change in hospital market concentration, and whether an MA plan's parent

company offered a non-MA plan in the county in 2011 or 2012 (along with other county control variables). The data used for the 2011-2012 exit analyses are restricted to "feasible exits", i.e. only plans with MA contracts in 2011 are included in the analysis.

Results from multinomial logit V of Table 5.5b indicate that a net one percentage point increase in the relative MA benchmark rate between 2011 and 2012 was associated with a 99 percent decreased risk of a plan exiting, relative to remaining in a county (RRR 0.0001, 95% CI 0.00004-0.0001, $p<.001$), all else held constant. For-profit designation is associated with a 3.45 times greater risk of exiting, relative to staying in a county (RRR 3.45, 95% CI 3.34-3.57, $p<.001$). A net one percentage point increase in the percentage of the Medicare population in the state with retiree coverage is associated with a 2.8 times greater risk of a plan exiting, relative to remaining in a county (RRR 2.82, 95% CI 2.07-3.85, $p<.001$). A net one percentage point increase in the percentage of the Medicare population dually eligible for Medicaid in the state is not statistically significantly associated with risk of exiting relative to staying in a county between 2011-2012 (RRR 1.70, 95% CI 1.22-2.38, $p>.05$). An increase in hospital market concentration, specifically a 100 point increase in the hospital HHI, was not statistically significantly associated with risk of exiting relative to staying in a county between 2011-2012 (RRR 0.99, 95% CI 0.99-1.00, $p>.05$). Having a parent company that offered a non-MA plan in the county in either 2011 or 2012 is associated with an 81 percent lower risk of a plan exiting, relative to staying in a county (RRR 0.19, 95% CI 0.19-0.20, $p<.001$), consistent with Hypothesis 5.

TABLE 5.5B: FIRST DIFFERENCE MULTINOMIAL LOGIT ANALYSES FOR 2012 VS. 2011
RISK RATIO OF PLAN EXIT RELATIVE TO STAYING IN COUNTY, AMONG FEASIBLE EXITS (PLANS WITH CONTRACTS IN 2011)

EXIT RELATIVE TO STAYED IN COUNTY	**mlogit I RRR[4] (95% CI)**	**mlogit II RRR (95% CI)**	**mlogit III RRR (95% CI)**	**mlogit IV RRR (95% CI)**	**mlogit V RRR (95% CI)**	**mlogit VI RRR (95% CI)**
Change in relative benchmark rate[1]	0.00002 (0.00001-0.00002)***	0.00003 (0.00002-0.00003)***	7.66e-15 (2.68e-15 – 2.19e-14)***	2.24e-14 (7.81e-15 – 6.41e-14)***	0.0001 (0.00004-0.0001)***	4.47e-16 (1.27e-16 – 1.57e-15)***
For-profit plan		2.17 (2.11-2.24)***	2.36 (2.29-2.44)***	3.83 (3.71-3.96)***	3.45 (3.34-3.57)***	3.67 (3.54-3.80)***
For-profit x change in relative benchmark rate			6.92e+10 (2.23e+10 – 2.14e+11)***	1.73e+11 (5.60e+10 – 5.37e+11)***		3.87e+12 (1.01e+12 – 1.49e+13)***
Change in state percent Medicare with retiree coverage				2.54 (1.92-3.36)***	2.82 (2.07-3.85)***	3.24 (2.38-4.42)***
Change in state percent Medicare with Medicaid (Duals)				1.11 (0.83-1.49)	1.70 (1.22-2.38)	1.56 (1.12-2.19)**
Change in hospital market concentration (HHI measure)/100[2]				0.99 (0.99-1.00)	0.99 (0.99-1.00)	0.99 (0.99-1.00)
Parent company offered non MA-plan in county in 2011 or 2012				0.18 (0.17-0.18)***	0.19 (0.19-0.20)***	0.19 (0.18-0.19)***
Change in state percent Medicare reporting fair/poor health					0.75 (0.55-1.03)	0.77 (0.57-1.05)
Change in county's median income in 1,000s					1.01 (1.00-1.01)**	1.01 (1.00-1.01)**
Change in county's hospital beds per 1000 population					1.01 (0.99-1.03)	1.02 (0.99-1.04)
Change in county's MDs per 1000 population					1.08 (1.02-1.15)*	1.08 (1.01-1.15)*
County had at least one FQHC in 2011 or 2012[3]					1.29 (1.26-1.32)***	1.29 (1.26-1.32)***
Change in county's log population of those 65 years and over					14.62 (9.65-22.15)***	14.66 (9.68-22.21)***
Change in county's percent population black					4.81 (0.01-3,211.44)	4.55 (0.01-3,047)
Change in county's percent population female					503.73 (2.83-89,643.96)*	434.15 (2.44-77,289)*
Sample size	575,265	575,265	575,265	575,265	450,546	450,546
Pseudo R^2	0.006	0.009	0.012	0.037	0.037	0.041

*=p<.05 **=p<.01 ***=p<.001 Note: Relative risk ratios of less than 1.00 indicate a decrease in relative risk.
[1] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county
[2] HHI = Herfindahl-Hirschman Index of competition.
[3] FQHC = Federally Qualified Health Center
[4] RRR = Relative risk ratio

Next, multinomial logit model VI builds on the basic model by including an interaction term for profit status and the change in the relative benchmark rate (see multinomial logit VI in results column 6 of Table 5.5b). Results of the interaction model indicate that, among nonprofit plans, a net one percentage point increase in the relative benchmark rate between 2011 and 2012 was associated with a 99 percent lower risk of a plan exiting, relative to remaining in a county (RRR 4.47e-16, 95% CI 1.27e-16 - 1.57e-15, p<.001). Among for profit plans, a net one percentage point increase in the relative MA benchmark rate between 2011 and 2012 was also associated with a 99 percent lower risk of a plan exiting, relative to remaining in a county (RRR 0.002, 95% CI 0.001-0.02, p<.001). Coefficients for all other covariates were similar to those seen in multinomial logit model V above.

BIC goodness-of-fit calculations indicate strong support for the models where profit status and the relative benchmark rate are interacted, as compared to the basic models without the interaction term, for both base outcomes for the 2011-2012 analyses.

Sensitivity Analysis: Entry vs. Never Entered County, Excluding PFFS plans. Next, a third model excludes PFFS plans (Table 5.5c, below). The results of this model indicate that, when PFFS plans are excluded, a net one percentage point increase in the relative benchmark rate between 2011 and 2012 was associated with a 114.8 times greater risk of a nonprofit plan entering, relative to never entering a county (RRR 114.80, 95% CI 19.09-690.4, p<.001), all else held constant. A net one percentage point increase in the relative benchmark rate between 2011 and 2012 was associated with a 2,143 times greater risk of a for-profit plan entering, relative to never entering a county (RRR 2,143.08, 95% CI 49.90-91,126.14, p<.01).

Sensitivity Analysis: Exit vs. Stayed in County, Excluding PFFS plans. A model excluding PFFS plans was also run using 'stayed in county' as the base outcome (Table 5.5d, below). Results of this model indicate that a net one percentage point increase in the relative benchmark rate between 2011 and 2012 was associated with a 99 percent lower risk of a plan exiting relative to staying in a county for nonprofit plans (RRR 2.13e-17, 95% CI 5.55e-18 – 8.19e-17, p<.001) and was associated with a 99 percent lower risk of a plan exiting relative to staying in a county for for-profit plans (RRR 0.002, 95% CI 0.0001-0.03, p<.001).

Plan Type Models: Entry vs. Never Entered County. A fourth type of multinomial logit model includes plan type dummy variables (Table 5.5c). Results of this model indicate that a net one percentage point increase in the relative benchmark rate between 2011 and 2012 was associated with a 421 times increased risk of a plan entering, relative to never entering a county among nonprofit plans (RRR 421.28, 95% CI 69.66-2,546.62, p<.001) and a 804 times greater risk of entering relative to never entering a county among for-profit plans (RRR 804.32, 95% CI 18.73-34,544.37, p>.05), though there was not a statistically significant difference by profit status. HMO plans had a 73 percent lower risk of entering relative to never entering a county as compared to local PPO plans (RRR 0.27, 95% CI 0.26-0.27, p<.001) and PFFS plans had an 82 percent lower risk of entering, relative to never entering a county as compared to PPO plans (RRR 0.18, 95% CI 0.17-0.20, p<.001). Coefficients for all other covariates were similar to those seen in the basic multinomial logit model above.

TABLE 5.5C: FIRST DIFFERENCE MULTINOMIAL LOGIT ANALYSES FOR 2012 VS. 2011, BY PLAN TYPE
RISK RATIO OF PLAN ENTRY RELATIVE TO NEVER ENTERING COUNTY, AMONG FEASIBLE ENTRIES (PLANS WITH CONTRACTS IN 2012)

ENTRY RELATIVE TO NEVER ENTERED COUNTY	All plans RRR[4] (95% CI)	All Plans w/ Plan Type RRR (95% CI)	Excluding PFFS RRR (95%CI)	HMO only RRR (95% CI)	PFFS only RRR (95% CI)	LPPO only RRR (95% CI)
Change in relative benchmark rate[1]	156.27 (26.29-928.78)***	421.18 (69.66-2,546.62)***	114.80 (19.09-690.4)***	26.03 (2.67-253.68)**	0.0004 (1.10e-11 – 15,079)	86,384.03 (3,792-1,967,549)***
For-profit plan	1.04 (0.98-1.10)	1.29 (1.22-1.37)***	1.08 (1.02-1.15)*	1.42 (1.32-1.53)***	1.49 (1.04-2.16)*	0.46 (0.41-0.50)***
For-profit x change in relative benchmark rate	5.84 (0.84-40.60)	1.91 (0.27-13.57)	18.68 (2.62-132.92)**	3.24 (0.25-41.99)	70,178 (0.001-3.52e+12)	0.20 (0.01-5.66)
Change in state percent Medicare with retiree coverage	0.96 (0.62-1.50)	0.99 (0.64-1.57)	0.67 (0.42-1.06)	1.73 (0.90-3.34)	2.60 (0.36-18.97)	0.76 (0.39-1.48)
Change in state percent Medicare with Medicaid (Duals)	14.39 (8.84-23.42)***	15.77 (9.66-25.75)***	16.71 (10.11-27.6)***	22.72 (10.76-47.97)***	2.33 (0.27-20.26)	13.39 (6.57-27.30)***
Change in hospital market concentration (HHI measure)/100[2]	1.00 (1.00-1.01)*	1.00 (1.00-1.01)*	1.00 (1.00-1.01)*	1.01 (0.99-1.01)	1.01 (0.99-1.03)	1.00 (0.99-1.01)
Parent company offered non MA-plan in county in 2011 or 2012	2.65 (2.56-2.74)***	2.64 (2.55-2.73)***	2.60 (2.51-2.69)***	1.14 (1.09-1.20)***	1.14 (0.96-1.35)	5.23 (4.95-5.53)***
Change in state percent Medicare reporting fair/poor health	0.16 (0.11-0.25)***	0.16 (0.10-0.25)***	0.17 (0.11-0.27)***	0.26 (0.13-0.50)***	0.17 (0.02-1.15)	0.12 (0.06-0.22)***
Change in county's median income in 1,000s	1.02 (1.01-1.03)***	1.02 (1.01-1.03)***	1.02 (1.02-1.03)***	1.03 (1.02-1.04)***	0.99 (0.96-1.03)	1.02 (1.00-1.03)**
Change in county's hospital beds per 1000 population	0.99 (0.97-1.03)	0.99 (0.97-1.03)	0.99 (0.97-1.03)	1.01 (0.96-1.06)	1.07 (0.94-1.21)	0.98 (0.94-1.02)
Change in county's MDs per 1000 population	1.14 (1.05-1.25)**	1.16 (1.06-1.26)**	1.14 (1.05-1.25)**	1.18 (1.06-1.32)**	1.13 (0.78-1.63)	1.05 (0.91-1.22)
County had at least one FQHC in 2011 or 2012[3]	1.74 (1.68-1.80)***	1.78 (1.72-1.84)***	1.76 (1.70-1.82)***	3.05 (2.88-3.22)***	1.48 (1.28-1.72)***	1.23 (1.17-1.29)***
Change in county's log population of those 65 years and over	41.66 (22.50-77.14)	52.87 (28.46-98.23)***	46.36 (24.56-87.52)***	6,251.76 (2,411.12-16,210.13)***	9.50 (0.66-136.57)	4.30 (1.78-10.39)**
Change in county's percent population black	3,077,322 (205.02 - 4.62e+10)**	4,452,861 (2.72-7.29e+10)**	3.83e+7 (1,853.42-7.9e+11)**	8.34e+09 (3,890-1.79e+16)**	1.33e-07 (4.56e-25 – 3.85e+10)	1,561,366 (0.96-2.54e+12)
Change in county's percent population female	0.12 (0.00-310.57)	0.14 (0.00-372.22)	0.11 (0.00-364.37)	0.44 (1.45e-06 – 133,423.20)	0.003 (9.34e-18 – 1.51e+12)	0.11 (1.52e-06 – 7,440.61)
HMO		0.27 (0.26-0.27)***				
PFFS		0.18 (0.17-0.20)***				
Sample size	433,953	433,953	406,191	244,464	27,762	161,727
Pseudo R^2	0.040	0.089	0.044	0.077	0.043	0.060

*=p<.05 **=p<.01 ***=p<.001 Note: Relative risk ratios of less than 1.00 indicate a decrease in relative risk.
[1] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county
[2] HHI = Herfindahl-Hirschman Index of competition. [3] FQHC = Federally Qualified Health Center [4] RRR = Relative risk ratio

Models stratified by plan type (see results columns 4-6, Table 5.5c) indicate that a net one percentage point increase in the relative benchmark rate between 2011 and 2012 was associated with a 26 times greater risk of a plan entering, relative to never entering a county among nonprofit HMO plans (RRR 26.03, 95% CI 2.67-253.68, p<.001), and a 86,384 times greater risk of entering, relative to never entering a county among nonprofit local PPO plans (RRR 86,384.03, 95% CI 3,792-1,967,549, p<.001), but was not statistically significantly associated with risk of entering, relative to never entering a county among nonprofit PFFS plans (RRR 0.0004, 95% CI 1.10e-11 – 15,079, p>.05). A net one percentage point increase in the relative benchmark rate between 2011 and 2012 was not statistically significantly associated with risk of entering, relative to never entering a county among for-profit HMO plans (RRR 83.93, 95% CI 0.66-10,614.75, p>.05), for-profit PFFS plans (RRR 27.94, 95% CI 1.10e-14 – 5.3e+16, p>.05) or among for-profit local PPO plans (RRR 17,274, 95% CI 37.7-11,072,775, p>.05).

Plan Type Models: Exit vs. Stayed in County. Results of the multinomial logit model that included plan type dummy variables indicate that a net one percentage point increase in the relative benchmark rate between 2011 and 2012 was associated with a 99 percent lower risk of a plan exiting, relative to staying in a county among nonprofit plans (RRR 3.76e-17, 95% CI 1.02e-17 - 1.38e-16, p<.001) and a 99 percent lower risk of exiting, relative to staying in a county among for-profit plans (RRR 0.0004, 95% CI 2.78e-5 – 0.001, p<.001) (Table 5.5d).

TABLE 5.5D: FIRST DIFFERENCE MULTINOMIAL LOGIT ANALYSES FOR 2012 VS. 2011, BY PLAN TYPE
RISK RATIO OF PLAN EXIT RELATIVE TO STAYING IN COUNTY, AMONG FEASIBLE EXITS (PLANS WITH CONTRACTS IN 2011)

EXIT RELATIVE TO STAYED IN COUNTY	All plans RRR (95% CI)	All Plans w/ Plan Type RRR (95% CI)	Excluding PFFS RRR (95%CI)	HMO only RRR (95% CI)	PFFS only RRR (95% CI)	LPPO only RRR (95% CI)
Change in relative benchmark rate[1]	4.47e-16 (1.27e-16 – 1.57e-15)***	3.76e-17 (1.02e-17-1.38e-16)***	2.13e-17 (5.55e-18-8.19e-17)***	359,801.90 (43,948-2,945,815)***	7.83e-16 (7.73e-20 – 7.93e-12)***	2.71e-46 (1.29e-47 – 5.70e-45)***
For-profit plan	3.67 (3.54-3.80)***	3.03 (2.92-3.15)***	3.98 (3.84-4.13)***	7.58 (7.13-8.06)***	0.20 (0.15-0.27)***	0.70 (0.64-0.77)***
For-profit x change in relative benchmark rate	3.87e+12 (1.01e+12 – 1.49e+13)***	1.1e+13 (2.73e+12-4.4e+13)***	9.47e+13 (2.25e+13-3.99e+14)***	7.46e-10 (8.45e-11 – 6.59e-9)***	4.37e+18 (3.41e+14 – 5.60e+22)***	2.25e+41 (6.08e+39 – 8.31e+42)***
Change in state percent Medicare with retiree coverage	3.24 (2.38-4.42)***	2.74 (1.99-3.77)***	3.94 (2.86-5.44)***	3.38 (2.34-4.88)***	0.02 (0.01-0.08)***	22.33 (8.50-58.67)***
Change in state percent Medicare with Medicaid (Duals)	1.56 (1.12-2.19)**	1.37 (0.96-1.93)	1.45 (1.02-2.05)*	1.27 (0.85-1.90)	13.76 (3.42-55.29)***	2.52 (0.90-7.03)
Change in hospital market concentration (HHI measure)/100[2]	0.99 (0.99-1.00)	0.99 (0.99-1.00)	0.99 (0.99-1.00)	0.99 (0.99-1.00)	0.99 (0.99-1.01)	0.99 (0.99-1.01)
Parent company offered non MA-plan in county in 2011 or 2012	0.19 (0.18-0.19)***	0.18 (0.17-0.18)***	0.15 (0.15-0.16)***	0.09 (0.09-0.10)***	5.14 (4.64-5.69)***	1.36 (1.25-1.47)***
Change in state percent Medicare reporting fair/poor health	0.77 (0.57-1.05)	0.75 (0.55-1.03)	0.87 (0.63-1.20)	0.92 (0.63-1.32)	0.02 (0.004-0.06)***	0.71 (0.28-1.81)
Change in county's median income in 1,000s	1.01 (1.00-1.01)**	1.01 (1.00-1.01)**	1.01 (1.00-1.01)**	1.01 (1.00-1.01)**	1.00 (0.98-1.02)	1.02 (1.00-1.03)*
Change in county's hospital beds per 1000 population	1.02 (0.99-1.04)	1.02 (0.99-1.04)	1.02 (1.00-1.04)*	1.02 (0.99-1.04)	0.97 (0.90-1.05)	1.11 (1.04-1.18)**
Change in county's MDs per 1000 population	1.08 (1.01-1.15)*	1.07 (0.99-1.14)	1.07 (1.00-1.14)*	1.06 (0.98-1.14)	1.15 (0.91-1.45)	1.18 (0.98-1.41)
County had at least one FQHC in 2011 or 2012[3]	1.29 (1.26-1.32)***	1.25 (1.23-1.28)***	1.31 (1.27-1.34)***	1.22 (1.19-1.26)***	1.22 (1.11-1.34)***	2.00 (1.87-2.15)***
Change in county's log population of those 65 years and over	14.66 (9.68-22.21)***	9.98 (6.50-15.33)***	17.16 (11.15-26.41)***	15.14 (9.21-24.9)***	9.86 (1.74-55.75)*	24.69 (6.86-88.80)***
Change in county's percent population black	4.55 (0.01-3,047)	8.56 (0.01-6,998.93)	58.32 (0.07-50,543)	300.93 (0.12-747,484)	2.15e-12 (5.07e-24 – 0.91)*	410,872.20 (0.001-1.97e+14)
Change in county's percent population female	434.15 (2.44-77,289)*	204.48 (1.00-41,786.69)	330.29 (1.55-70,355.06)*	276.63 (0.59-129,996)	412,100.20 (0.0001-2.58e+15)	18,207.73 (0.001-2.91e+11)
HMO		6.99 (6.76-7.22)***				
PFFS		4.34 (4.11-4.59)***				
Sample size	450,546	450,546	417,056	249,403	33,490	167,653
Pseudo R^2	0.041	0.088	0.048	0.081	0.059	0.102

*=p<.05 **=p<.01 ***=p<.001 Note: Relative risk ratios of less than 1.00 indicate a decrease in relative risk.
[1] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county
[2] HHI = Herfindahl-Hirschman Index of competition [3] FQHC = Federally Qualified Health Center [4] RRR = Relative risk ratio

HMO plans were 7 times more likely to exit, relative to staying in a county, compared with local PPO plans (RRR 6.99, 95% CI 6.76-7.22, p<.001), and PFFS plans were 4.34 times more likely to exit, relative to staying in a county, compared with local PPO plans (RRR 4.34, 95% CI 4.11-4.59, p<.001). Coefficients for all other covariates were similar to those seen in the basic multinomial logit model VI from Table 5.5b.

Results of the models stratified by plan type indicate (see results columns 4-6, Table 5.5d) that a net one percentage point increase in the relative benchmark rate between 2011 and 2012 was associated with a 359,801 times greater risk of a plan exiting, relative to staying a county among nonprofit HMO plans (RRR 359,801, 95% CI 43,948-2,945,815, p<.001), a 99 percent lower risk of exiting relative to staying a county among nonprofit PFFS plans (RRR 7.83e-16, 95% CI 7.73e-20 – 7.93e-12, p<.001) and a 99 percent lower risk of exiting, relative to staying in a county among nonprofit local PPO plans (RRR 2.71e-46, 95% CI 1.29e-47 – 5.70e-45, p<.01). The change in the relative benchmark rate between 2011 and 2012 was not statistically significantly associated with associated the risk of a plan exiting relative to staying in a county among for-profit HMO plans (RRR 2.67, 95% CI 0.02-3.72, p>.05), or for-profit PFFS plans (RRR 3,428.92, 95% CI 0.00003-4.44e+11, p>.05), but a net one percent increase in the relative benchmark rate between 2011 and 2012 was associated with a 99 percent lower risk of exiting relative to staying in a county among for-profit local PPO plans (RRR 6.10e-5, 95% CI 7.93e-8 – 0.05, p<.001).

TABLE 5.5E: PREDICTED PROBABILITIES OF PLAN PARTICIPATION BETWEEN 2011-2012, AMONG FEASIBLE ENTRIES (PLANS WITH CONTRACTS IN 2012)

Change in relative benchmark rate[1]	Entry	Exit	Stayed in county	Never entered county
-4.3% = 2 SD below mean[2]	0.03 (0.03-0.03)***	0.05 (0.05-0.05)***	0.60 (0.60-0.61)***	0.32 (0.31-0.32)***
-1.8% = 1 SD below mean	0.03 (0.03-0.04)***	0.05 (0.05-0.05)***	0.61 (0.61-0.61)***	0.30 (0.30-0.31)***
+0.9% = Mean change	0.04 (0.04-0.04)***	0.06 (0.06-0.06)***	0.62 (0.61-0.62)***	0.29 (0.29-0.29)***
+3.2% = 1 SD above mean	0.04 (0.04-0.04)***	0.06 (0.06-0.06)***	0.62 (0.62-0.62)***	0.27 (0.27-0.28)***
+5.7% = 2 SD above mean	0.05 (0.05-0.05)***	0.07 (0.07-0.07)***	0.62 (0.62-0.63)***	0.26 (0.26-0.26)***

***P<.001

[1] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county

[2] SD= Standard deviation

Predicted Probabilities.

Tables 5.5e and 5.5f show the predicted probabilities of entry, exit, staying in a county and never entering a county between 2011-2012. As with the multinomial logit results above, these predicted probabilities are likely affected by the small numbers of plans entering and exiting the market over the time period, and should be interpreted with caution. Note that because of this issue, predicted probabilities stratified by profit status and plan type have been omitted for 2011-2012.

Table 5.5e uses data for all "feasible entries", i.e. only plans with MA contracts in 2012. The results show that, at the mean change in the relative benchmark rate from 2011 to 2012 equal to a 1 percentage point increase, there was a 12 percent probability of a plan entering relative to never entering a county (PP 0.12, 95% CI 0.12-0.12, p<.001).[70] At a change in the relative benchmark rate of two standard deviations above the mean equal to a 5.7 percentage point increase, there was a 16 percent predicted probability of a plan entering relative to never entering a county (PP 0.16, 95% CI 0.13-0.16, p<.001). At a

change in the relative benchmark rate of two standard deviations below the mean equal to a 4.3 percentage point decrease, predicted probability of a plan entering relative to never entering a county fell 3 percentage points, to 9 percent (PP 0.09, 95% CI 0.09-0.09, p<.001).

Next, Table 5.5f uses data for all "feasible exits", i.e. only plans with MA contracts in 2011, in order to examine the predicted probability of a plan exiting relative to a plan staying in a county between 2011 and 2012.

TABLE 5.5F: PREDICTED PROBABILITIES OF PLAN PARTICIPATION BETWEEN 2011-2012, AMONG FEASIBLE EXITS
(PLANS WITH CONTRACTS IN 2011)

Change in relative benchmark rate[1]	Entry	Exit	Stayed in county	Never entered county
-4.3% = 2 SD below mean	0.03 (0.02-0.03)***	0.11 (0.10-0.11)***	0.49 (0.49-0.49)***	0.38 (0.38-0.38)***
-1.8% = 1 SD below mean	0.03 (0.03-0.04)***	0.09 (0.09-0.09)***	0.54 (0.54-0.54)***	0.34 (0.34-0.34)***
+0.9% = Mean change	0.04 (0.04-0.04)***	0.07 (0.07-0.07)***	0.59 (0.59-0.59)***	0.30 (0.30-0.30)***
+3.2% = 1 SD above mean	0.04 (0.04-0.04)***	0.06 (0.05-0.06)***	0.64 (0.63-0.64)***	0.27 (0.26-0.27)***
+5.7% = 2 SD above mean	0.05 (0.05-0.05)***	0.04 (0.04-0.04)***	0.68 (0.67-0.68)***	0.23 (0.23-0.23)***

***P<.001
[1] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county
[2] SD= Standard deviation

The results show that, at the mean change in the relative benchmark rate from 2011 to 2012 equal to a 1 percentage point increase, there was an 11 percent predicted probability of a plan exiting relative to staying in a county (PP 0.11, 95% CI 0.11-0.11, p<.001). At a change in the relative benchmark rate of two standard deviations above the mean equal to a 5.7 percentage point increase, the predicted probability of a plan exiting relative to staying in a county fell 5 percentage points, to 6 percent (PP 0.06, 95% CI 0.06-0.06,

p<.001). At a change in the relative benchmark rate of two standard deviations below the mean equal to a 4.3 percentage point decrease, there was an 18 percent predicted probability of a plan exiting relative to staying in a county (PP 0.18, 95% CI 0.17-0.18, p<.001).

PART II: PLAN PENETRATION

DESCRIPTIVE STATISTICS/CHARACTERISTICS OF THE STUDY SAMPLE

Descriptive Statistics for 2008: In 2008, a county-level mean of 2,866 persons were enrolled in an MA plan, and the mean plan penetration in a county was 11.4 percent of Medicare beneficiaries (Table 5.6a). The mean relative benchmark rate in a county was 116.6 percent in this county-level sample, close to MedPAC's estimates of 116 percent.[71] The mean enrollment-weighted percentage of for-profit plans in a county was 87.4 percent. The mean percentage of Medicare beneficiaries in the state with retiree coverage was 28.9 percent and the mean percentage of Medicare beneficiaries in the state dually eligible for Medicaid was 13.7 percent. The mean Herfindahl-Hirschman index of hospital concentration was 3,690, indicating moderate to high hospital concentration on average. A mean of 50.5 percent of MA plans had a parent company that offered a non-MA plan in the county. The mean enrollment-weighted percentage of HMO plans in a county was 21.9 percent and the mean enrollment-weighted percentage of PFFS plans in a county was 72.3 percent.

TABLE 5.6A: PLAN PENETRATION ANALYSES - DESCRIPTIVE STATISTICS, 2008, 2011, 2012[1]

	2008 Mean (SD)[6]	2011 Mean (SD)	2012 Mean (SD)	2008-2011 Change in mean	2011-2012 Change in mean
Total MA enrollment in county	2,866 (12,268)	3,288 (13,887)	3,761 (15,436)	+422	+473
Total MA penetration in county	11.4% (10.4%)	11.7% (11.1%)	13.1% (11.6%)	+0.3	+1.4
Relative benchmark rate[2]	116.6% (10.0%)	114.0% (10.0%)	114.9% (9.7%)	-2.6	+0.9
Percent for-profit MA plans in county[4]	87.4% (24.7%)	80.9% (31.0%)	82.0% (30.1%)	-6.5	+1.1
State percent Medicare with retiree coverage	28.9% (6.2%)	28.4% (5.8%)	27.4% (6.0%)	-0.5	-1.0
State percent Medicare with Medicaid coverage (Duals)	13.7% (4.3%)	14.3% (3.9%)	13.3% (3.6%)	+0.6	-1.0
Hospital market concentration (HHI measure)//100[3]	36.9 (34.8)	37.9 (35.0)	38.4 (35.1)	+1.0	+0.5
Percent MA plans with parent company that offered a non MA-plan in county[4]	50.5% (35.0%)	64.8% (34.3%)	59.8% (36.1%)	+14.3	-5.0
State percent Medicare reporting fair/poor health	38.8% (6.6%)	37.1% (6.8%)	36.4% (7.8%)	-1.7	-0.7
County's median income	$44,169 ($11,462)	$43,863 ($11,108)	$44,825 ($11,398)	-306	+962
County's hospital beds per 1,000 population	3.0 (4.2)	3.5 (4.0)	3.5 (4.1)	+0.5	no change
County's MDs per 1,000 population	1.1 (1.3)	1.1 (1.3)	1.1 (1.4)	no change	no change
County's population 65 years and over	12,386 (35,985)	13,190 (37,561)	13,652 (39,260)	+804	+462
County's percent population black	9.2% (14.4%)	9.2% (14.5%)	9.2% (14.5%)	no change	no change
County's percent population female	50.3% (2.2%)	50.0% (2.2%)	50.0% (2.2%)	-0.3	no change
Percent MA plans in county that are HMOs[4]	21.9% (31.1%)	31.7% (36.1%)	31.8% (35.4%)	+9.8	+0.1
Percent MA plans in county that are PFFS[4]	72.3% (33.7%)	34.2% (39.3%)	26.6% (35.7%)	-38.1	-7.6
	No. (%)	**No. (%)**	**No. (%)**	**Change in No. (Change in %)**	**Change in No. (Change in %)**
County had at least one FQHC[5]	1,370 (43.7%)	1,513 (48.2%)	1,581 (50.4%)	+143 (+4.5)	+68 (+2.2)

[1] Descriptive statistics presented above are based on county-level data.
[2] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county
[3] HHI = Herfindahl-Hirschman Index of competition
[4] Percentages are enrollee-weighted at the county level
[5] FQHC = Federally Qualified Health Center
[6] SD= Standard deviation

A mean of 38.8 percent of Medicare beneficiaries in the state were in fair or poor health. Mean county median income was $44,169. The mean number of hospital beds per 1,000 population per county was 3.0, and the mean number of medical doctors per 1,000 population per county was 1.1. There was a county average of 12,386 persons over 65 years, a mean of 9.2 percent of the county population identified as black and a mean of 50.3 percent of the county population identified as female, and 43.7 percent of counties had at least one Federally Qualified Health Center.

Descriptive Statistics for 2011: In 2011, mean county-level MA enrollment was 3,288 persons and mean county-level plan penetration was 11.7 percent of Medicare beneficiaries. The mean relative benchmark rate in a county was 114 percent in the sample. This number is slightly above MedPAC's estimates of 113 percent, most likely because it is an average based on county-level figures, whereas MedPAC's estimate is an enrollment-weighted average.[72] The mean enrollment-weighted percentage of for-profit plans in a county was 80.9 percent. The mean percentage of Medicare beneficiaries in the state with retiree coverage was 28.4 percent and the mean percentage of Medicare beneficiaries in the state dually eligible for Medicaid was 14.3 percent. The mean Herfindahl-Hirschman index of hospital concentration was 3,790, indicating moderate to high hospital concentration on average. A mean of 64.8 percent of MA plans had a parent company that also offered a non-MA plan in the county. The mean enrollment-weighted percentage of HMO plans in a county was 31.7 percent and the mean enrollment-weighted percentage of PFFS plans in a county was 34.2 percent.

A mean of 37.1 percent of Medicare beneficiaries in the state were in fair or poor health. Mean county median income was $43,863. The mean number of hospital beds per 1,000

population per county was 3.5, and the mean number of medical doctors per 1,000 population per county was 1.1. There was a county average of 13,190 persons over 65 years, a mean of 9.2 percent of the county population identified as black and a mean of 50.0 percent of the county population identified as female, and 48.2 percent of counties had at least one Federally Qualified Health Center.

Descriptive Statistics for 2012: The mean county-level MA enrollment in 2012 was 3,761 persons and mean county-level plan penetration was 13.1 percent of Medicare beneficiaries. The mean relative benchmark rate in a county was 114.9 percent in the sample. This figure most likely differs from MedPAC's estimate of 112 percent because the 2012 values used here includes the quality-related bonuses that increased the benchmark rates that MA plans faced in 2012, whereas MedPAC's calculations do not include these bonuses.[73] The mean enrollment-weighted percentage of for-profit plans in a county was 82.0 percent. The mean percentage of Medicare beneficiaries in the state with retiree coverage was 27.4 percent and the mean percentage of Medicare beneficiaries in the state dually eligible for Medicaid was 13.3 percent. A mean of 59.8 percent of MA plans had a parent company that also offered a non-MA plan in the county. The mean Herfindahl-Hirschman index of hospital concentration was 3,840, indicating moderate to high hospital concentration on average. The mean enrollment-weighted percentage of HMO plans in a county was 31.8 percent and the mean enrollment-weighted percentage of PFFS plans in a county was 26.6 percent.

A mean of 36.4 percent of Medicare beneficiaries in the state were in fair or poor health. Mean county median income was $44,825. The mean number of hospital beds per 1,000 population per county was 3.5, and the mean number of medical doctors per 1,000

population per county was 1.1. There was a county average of 13,652 persons over 65 years, a mean of 9.2 percent of the county population identified as black and a mean of 50.0 percent of the county population identified as female, and 50.4 percent of counties had at least one Federally Qualified Health Center.

Descriptive Statistics for 2008-2011: Between 2008 and 2011, the mean county-level enrollment in MA plans grew by 422 enrollees and mean county-level MA plan penetration grew by 0.3 percentage points. The mean relative benchmark rate fell by 2.6 percentage points. The mean enrollment-weighted percentage of for-profit plans in a county fell by 6.5 percentage points. The mean percentage of Medicare beneficiaries in the state with retiree coverage fell by 0.5 percentage points and the mean percentage of Medicare beneficiaries in the state dually eligible for Medicaid grew by 0.6 percentage points. The mean percentage of MA plans had a parent company that also offered a non-MA plan in the county grew by 14.3 percent. The mean Herfindahl-Hirschman index of hospital concentration increased by 100 points, indicating a slight increase in hospital concentration on average. The mean enrollment-weighted percentage of HMO plans in a county grew 9.8 percentage points and the mean enrollment-weighted percentage of PFFS plans in a county fell by 38.1 percentage points between 2008 and 2011.

Between 2008 and 2011, there was a 1.7 percentage point decrease in the mean percentage of Medicare beneficiaries in the state in fair or poor health. Mean county median income fell by $306. The mean number of hospital beds per 1,000 population per county grew by 0.5, and there was no change in the mean number of medical doctors per 1,000 population per county. The county average number of persons over 65 years grew by 804, there was no change in the mean percentage of the county population that

identified as black and a 0.3 percentage point reduction in the mean percentage of the county population that identified as female. There was a 4.5 percentage point increase in the proportion of counties that had at least one Federally Qualified Health Center.

Descriptive Statistics for 2011-2012: Mean county-level enrollment in MA plans grew by 473 enrollees between 2011 and 2012 and mean county-level MA plan penetration grew by 1.4 percentage points. The mean relative benchmark rate grew by 0.9 percentage points. The mean enrollment-weighted percentage of for-profit plans in a county grew by 1.1 percentage points. The mean percentage of Medicare beneficiaries in the state with retiree coverage and the mean percentage of Medicare beneficiaries in the state dually eligible for Medicaid both fell by 1.0 percentage points. The mean Herfindahl-Hirschman index of hospital concentration increased by 50 points, indicating a very slight increase in hospital concentration on average. The mean percentage of MA plans had a parent company that also offered a non-MA plan in the county fell by 5.0 percent. The mean enrollment-weighted percentage of HMO plans in a county grew 0.1 percentage points and the mean enrollment-weighted percentage of PFFS plans in a county fell by 7.6 percentage points between 2011 and 2012.

Between 2011 and 2012 there was a 0.7 percentage point decrease in the mean percentage of Medicare beneficiaries in the state in fair or poor health. Mean county median income grew by $962. There was no change in the mean number of hospital beds per 1,000 population per county or in the mean number of medical doctors per 1,000 population per county. The county average number of persons over 65 years grew by 462. There was no change in the mean percentage of the county population that identified as black or in the mean percentage of the county population that identified as female. There

was a 2.2 percentage point increase in the proportion of counties that had at least one Federally Qualified Health Center between 2011 and 2012.

PLAN PENETRATION: CROSS SECTIONAL ANALYSES

Results for 2008: Table 5.6b presents the stepwise results of linear regression analyses for 2008. Model IV examines MA penetration as a function of the relative benchmark rate, the enrollment-weighted percentage of for-profit plans offered in a county, the proportion of the population over 65 years with retiree coverage, the proportion of the population over 65 years with Medicaid coverage, hospital market concentration, and the enrollment-weighted percentage of MA plans in a county with a parent company that also offers a non-MA plan in the county.

Results from Model IV show that a one percentage point higher relative benchmark rate is associated with a 36 percentage point greater rate of MA penetration in a county, holding all else constant (0.36, 95% CI 0.33-0.39, $p<.001$). This is consistent with Hypothesis 1A, that there is a positive association between plan penetration and the relative benchmark rate in a county. A one percentage point greater enrollment-weighted percentage of for-profit plans in a county was associated with a 13 percentage point lower rate of MA penetration in a county in 2008, all else held constant (-0.13, 95% CI -0.15 - -0.11, $p<.001$).

TABLE 5.6B: CROSS SECTIONAL ANALYSES
IMPACT OF RELATIVE BENCHMARK RATE AND OTHER FACTORS ON MA PLAN PENETRATION IN 2008

	I. β (95% CI)	II. β (95% CI)	III. β (95% CI)	IV. β (95% CI)	V. β (95% CI)
Relative benchmark rate[1]	0.30 (0.26-0.35)***	0.33 (0.29-0.37)***	0.34 (0.31-0.38)***	0.36 (0.33-0.39)***	0.37 (0.34-0.40)***
Percent for-profit MA plans in county		-0.16 (-0.18- -.15)***	-0.13 (-0.15- -0.12)***	-0.13 (-0.15- -0.11)***	-0.10 (-0.11- -0.08)***
State percent Medicare with retiree coverage			-0.05 (-0.11-0.01)	-0.17 (-0.23- -0.11)***	-0.01 (-0.06-0.05)
State percent Medicare with Medicaid (Duals)			-0.14 (-0.22- -0.06)**	-0.37 (-0.46- -0.28)***	-0.48 (-0.56- -0.40)***
Hospital market concentration (HHI measure)//100[2]			-0.00002 (-0.0001-0.0001)	-0.0002 (-0.0003- -0.0001)***	-0.0001 (-0.0002- -4.76e-06)*
Percent plans with parent company that offered non MA-plan in county			0.07 (0.06-0.08)***	0.05 (0.05-0.06)***	0.03 (0.03-0.04)***
State percent Medicare reporting fair/poor health				0.13 (0.08-0.19)***	0.13 (0.08-0.18)***
County's median income in 1,000s				-0.001 (-0.001- -0.0003)***	-0.001 (-0.001- -0.0008)***
County's hospital beds per 1000 population				-0.001 (-0.001-0.0001)	-0.001 (-0.001--0.0002)
County's MDs per 1000 population				-0.001 (-0.006-0.004)	-0.001 (-0.005-0.003)
County had at least one FQHC[3]				0.003 (-0.004-0.01)	-0.005 (-0.01-0.001)
County's log population 65 years and over				0.03 (0.02-0.03)***	0.02 (0.01-0.02)***
County's percent population black				-0.0001 (-0.02-0.02)	-0.002 (-0.02-0.02)
County's percent population female				-0.02 (-0.15-0.11)	0.07 (-0.07-0.20)
Percent MA HMO plans in county					0.14 (0.12-0.16)***
Percent MA PFFS plans in county					0.003 (-0.02-0.02)***
Sample size	3,137	2,933	2,933	2,927	2,927
R^2	0.084	0.089	0.306	0.405	0.515

*=p<.05 **=p<.01 ***=p<.001

[1] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county

[2] HHI = Herfindahl-Hirschman Index of competition

[3] FQHC = Federally Qualified Health Center

A one percentage point greater percentage of Medicare beneficiaries in the state with retiree coverage was associated with a 17 percentage point lower rate of MA penetration in a county (-0.17, 95% CI -0.23 - -0.11, p<.001), consistent with Hypothesis 4A. A one percentage point greater percentage of Medicare beneficiaries in the state dually eligible for Medicaid was associated with a 37 percentage point lower rate of MA plan penetration (-0.37, 95% CI -0.46 - -0.28, p<.001), also consistent with Hypothesis 4A. A more concentrated hospital market, specifically a 100 point greater hospital HHI, was associated with a 0.02 percentage point lower rate of MA plan penetration (0.0002, 95% CI -0.0003 - -0.0001, p<.001), consistent with Hypothesis 5A. A one percentage point greater percentage of MA plans in a county that had a parent company that offered a non-MA plan in the county was associated with 5 percent greater MA penetration (0.05, 95% CI 0.05-0.06, p<.001), consistent with Hypothesis 6.

Model V builds on the above model by adding two plan type variables: the enrollment-weighted percentage of HMO plans in a county, and the enrollment-weighted percentage of PFFS plans in a county. Results of Model V do not differ dramatically from those of Model IV. A one percentage point higher relative benchmark rate is associated with a 37 percentage point greater rate of MA penetration in a county, holding all else constant (0.37, 95% CI 0.34-0.40, p<.001). A one percentage point greater enrollment-weighted percentage of for-profit plans in a county was associated with a 10 percentage point lower rate of MA penetration in a county in 2008, all else held constant (-0.10, 95% CI -0.11 - -0.08, p<.001). A one percentage point greater percentage of Medicare beneficiaries in the state with retiree coverage was not statistically significantly associated with the MA penetration rate in a county (-0.01, 95% CI -0.06-0.05, p>.05), consistent with

Hypothesis 4A. A one percentage point greater percentage of Medicare beneficiaries in the state dually eligible for Medicaid was associated with a 48 percentage point lower rate of MA plan penetration (-0.48, 95% CI -0.56 - -0.40, p<.001). A more concentrated hospital market, specifically a 100 point greater hospital HHI, was associated with a 0.01 percentage point lower rate of MA plan penetration (-0.0001, 95% CI -0.0002 - -4.76e-06, p<.05). A one percentage point greater percentage of MA plans in a county that had a parent company that offered a non-MA plan in the county was associated with a 3 percentage point greater rate of MA penetration (0.03, 95% CI 0.03-0.04, p<.001).A one percentage point greater enrollment-weighted percentage of HMO plans in a county was associated with a 14 percentage point greater MA penetration rate in 2008, all else held constant (0.14, 95% CI 0.12-0.16, p<.001). A one percentage point greater enrollment-weighted percentage of PFFs plans in a county was not statistically significantly associated with the MA penetration rate (0.003, 95% CI -0.02-0.02, p>.05).

Results for 2011: Table 5.6c presents the stepwise results of linear regression analyses for 2011. Similar to the 2008 analysis above, Model IV for 2011 examines MA penetration as a function of the relative benchmark rate, the enrollment-weighted percentage of for-profit plans offered in a county, the proportion of the population over 65 years with retiree coverage, the proportion of the population over 65 years with Medicaid coverage, and the enrollment-weighted percentage of MA plans in a county with a parent company that also offers a non-MA plan in the county.

TABLE 5.6C: CROSS SECTIONAL ANALYSES
IMPACT OF RELATIVE BENCHMARK RATE AND OTHER FACTORS ON MA PLAN PENETRATION IN 2011

	I. β (95% CI)	II. β (95% CI)	III. β (95% CI)	IV. β (95% CI)	V. β (95% CI)
Relative benchmark rate[1]	0.38 (0.33-0.42)***	0.38 (0.34-0.42)***	0.40 (0.36-0.44)***	0.39 (0.33-0.42)***	0.39 (0.35-0.43)***
Percent for-profit MA plans in county		-0.10 (-0.11- -0.09)***	-0.09 (-0.10 - -0.08)***	-0.08 (-0.10- -0.07)***	-0.05 (-0.06- -0.04)***
State percent Medicare with retiree coverage			0.08 (0.03-0.13)**	-0.07 (-0.13- -0.02)*	0.06 (0.01-0.12)*
State percent Medicare with Medicaid (Duals)			-0.30 (-0.40- -0.21)***	-0.53 (-0.63- -0.43)***	-0.57 (-0.66- -0.48)***
Hospital market concentration (HHI measure)//100[2]			-0.0001 (-0.0002-4.71e-07)	-0.0004 (-0.0004- -0.0003)***	-0.0003 (-0.0004- -0.0002)***
Percent plans with parent company that offered non MA-plan in county			0.04 (0.03-0.05)***	0.02 (0.01-0.03)***	0.02 (0.01-0.03)***
State percent Medicare reporting fair/poor health				0.13 (0.06-0.20)***	0.11 (0.05-0.17)***
County's median income in 1,000s				-0.001 (-0.001- -0.0004)***	-0.001 (-0.002- -0.001)***
County's hospital beds per 1000 population				-0.001 (-0.0003-0.002)	0.001 (0.0002-0.002)*
County's MDs per 1000 population				-0.003 (-0.009-0.003)	-0.001 (-0.006-0.003)
County had at least one FQHC[3]				-0.003 (-0.01-0.01)	-0.005 (-0.01-0.002)
County's log population 65 years and over				0.05 (0.04-0.05)***	0.03 (0.03-0.04)***
County's percent population black				-0.03 (-0.06- -0.0005)*	-0.06 (-0.09- -0.04)***
County's percent population female				0.12 (-0.09-0.32)	0.18 (-0.01-0.38)
Percent MA HMO plans in county					0.10 (0.09-0.11)***
Percent MA PFFS plans in county					-0.01 (-0.02- -0.002)*
Sample size	3,138	2,895	2,895	2,362	2,362
R^2	0.115	0.199	0.228	0.411	0.493

*=p<.05 **=p<.01 ***=p<.001
[1] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county
[2] HHI = Herfindahl-Hirschman Index of competition
[3] FQHC = Federally Qualified Health Center

Results from Model IV show that a one percentage point higher relative benchmark rate is associated with a 39 percentage point greater rate of MA penetration in a county, holding all else constant (0.39, 95% CI 0.33-0.42, p<.001). This is also consistent with Hypothesis 1A. A one percentage point greater enrollment-weighted percentage of for-profit plans in a county was associated with an 8 percentage point lower rate of MA penetration in a county in 2011, all else held constant (-0.08, 95% CI -0.10 - -0.07, p<.001). A one percentage point greater percentage of Medicare beneficiaries in the state with retiree coverage was associated with a 7 percentage point lower rate of MA penetration in a county (-0.07, 95% CI -0.13 - -0.02, p<.05), consistent with Hypothesis 4A. A one percentage point greater percentage of Medicare beneficiaries in the state dually eligible for Medicaid was associated with a 53 percentage point lower rate of MA plan penetration (-0.53, 95% CI -0.63 - -0.43, p<.001), also consistent with Hypothesis 4A. A more concentrated hospital market, specifically a 100 point greater hospital HHI, was associated with a 0.04 percentage point lower rate of MA plan penetration (-0.0004, 95% CI -0.0004- -0.0003, p<.001). A one percentage point greater percentage of MA plans in a county that had a parent company that offered a non-MA plan in the county was associated with a 2 percentage point greater rate of MA penetration (0.02, 95% CI 0.01-0.03, p<.001), consistent with Hypothesis 6.

As with the 2008 analysis above, the next model (Model V) included two plan type variables: the enrollment-weighted percentage of HMO plans in a county, and the enrollment-weighted percentage of PFFS plans in a county. Results of Model V are similar to those found under Model IV. A one percentage point higher relative benchmark rate is associated with a 39 percentage point greater rate of MA penetration in a county,

holding all else constant (0.39, 95% CI 0.35-0.43, p<.001). A one percentage point greater enrollment-weighted percentage of for-profit plans in a county was associated with a 5 percentage point lower rate of MA penetration in a county in 2011, all else held constant (-0.05, 95% CI -0.06 - -0.04, p<.001). A one percentage point greater percentage of Medicare beneficiaries in the state with retiree coverage was associated with a 6 percentage point greater MA penetration rate in a county (0.06, 95% CI 0.01-0.12, p<.05), inconsistent with what was expected under Hypothesis 4A. A one percentage point greater percentage of Medicare beneficiaries in the state dually eligible for Medicaid was associated with a 57 percentage point lower rate of MA plan penetration (-0.57, 95% CI -0.66 - -0.48, p<.001). A more concentrated hospital market, specifically a 100 point greater hospital HHI, was associated with a 0.03 percentage point lower rate of MA plan penetration (-0.0003, 95% CI -0.0004- -0.0002, p<.001). A one percentage point greater percentage of MA plans in a county that had a parent company that offered a non-MA plan in the county was associated with a 2 percentage point greater rate of MA penetration (0.02, 95% CI 0.01-0.03, p<.001). A one percentage point greater enrollment-weighted percentage of HMO plans in a county was associated with a 10 percentage point greater MA penetration rate in 2011, all else held constant (0.10, 95% CI 0.09-0.11, p<.001). A one percentage point greater enrollment-weighted percentage of PFFS plans in a county was associated with a 1 percentage point lower MA penetration rate (-0.01, 95% CI -0.02 - -0.002, p<.05).

Results for 2012: Table 5.6d presents the stepwise results of linear regression analyses for 2012. Model IV for 2012 examines MA penetration as a function of the relative benchmark rate, the enrollment-weighted percentage of for-profit plans offered in a

county, the proportion of the population over 65 years with retiree coverage, the proportion of the population over 65 years with Medicaid coverage, and the enrollment-weighted percentage of MA plans in a county with a parent company that also offers a non-MA plan in the county.

Results from Model IV show that a one percentage point higher relative benchmark rate is associated with a 38 percentage point greater rate of MA penetration in a county, holding all else constant (0.38, 95% CI 0.33-0.43, p<.001). This is consistent with Hypothesis 1A, and the magnitude of the effect is similar to that seen in the 2008 and 2011 models. A one percentage point greater enrollment-weighted percentage of for-profit plans in a county was associated with an 8 percentage point lower rate of MA penetration in a county in 2012, all else held constant (-0.08, 95% CI -0.09 - -0.06, p<.001). A one percentage point greater percentage of Medicare beneficiaries in the state with retiree coverage was not statistically significantly associated with MA penetration (0.01, 95% CI -0.05-0.06, p<.05). A one percentage point greater percentage of Medicare beneficiaries in the state dually eligible for Medicaid was associated with a 12 percentage point lower rate of MA plan penetration (-0.12, 95% CI -0.23 - -0.01, p<.05). A more concentrated hospital market, specifically a 100 point greater hospital HHI, was associated with a 0.04 percentage point lower rate of MA plan penetration (-0.0004, 95% CI -0.0005- -0.0003, p<.001). A one percentage point greater percentage of MA plans in a county that had a parent company that offered a non-MA plan in the county was associated with a 1 percentage point greater rate of MA penetration (0.01, 95% CI 0.002-0.02, p<.05).

TABLE 5.6D: CROSS SECTIONAL ANALYSES
IMPACT OF RELATIVE BENCHMARK RATE AND OTHER FACTORS ON MA PLAN PENETRATION IN 2012

	I. β (95% CI)	II. β (95% CI)	III. β (95% CI)	IV. β (95% CI)	V. β (95% CI)
Relative benchmark rate[1]	0.43 (0.38-0.48)***	0.43 (0.38-0.47)***	0.42 (0.37-0.46)***	0.38 (0.33-0.43)***	0.39 (0.34-0.43)***
Percent for-profit MA plans in county		-0.10 (-0.12- -0.09)***	-0.08 (-0.10- -0.07)***	-0.08 (-0.09- -0.06)***	-0.04 (-0.05- -0.03)***
State percent Medicare with retiree coverage			0.14 (0.08-0.19)***	0.01 (-0.05-0.06)	0.16 (0.10-0.22)***
State percent Medicare with Medicaid (Duals)			0.21 (0.09-0.32)***	-0.12 (-0.23- -0.01)*	-0.20 (-0.20- -0.11)***
Hospital market concentration (HHI measure)//100[2]			-0.0001 (-0.0002-0.00002)	-0.0004 (-0.0005- -0.0003)***	0.0003 (-0.0004- -0.0002)***
Percent plans with parent company that offered non MA-plan in county			0.03 (0.02-0.04)***	0.01 (0.002-0.02)*	0.01 (-0.0004-0.02)
State percent Medicare reporting fair/poor health				0.10 (0.05-0.16)***	0.11 (0.06-0.17)***-
County's median income in 1,000s				-0.001 (-0.001- -0.0004)***	-0.001 (-0.002- -0.001)***
County's hospital beds per 1000 population				0.001 (-0.0001-0.002)	0.001 (0.0005-0.002)**
County's MDs per 1000 population				-0.003 (-0.01-0.002)	-0.002 (-0.01-0.003)
County had at least one FQHC[3]				-0.01 (-0.02-0.001)	-0.01 (-0.02- -0.001)*
County's log population 65 years and over				0.05 (0.05-0.06)***	0.04 (0.03-0.04)***
County's percent population black				-0.08 (-0.11- -0.05)***	-0.11 (-0.14- -0.08)***
County's percent population female				0.05 (-0.16-0.26)	0.10 (-0.09-0.29)
Percent MA HMO plans in county					0.11 (0.09-0.12)***
Percent MA PFFS plans in county					-0.02 (-0.03- -0.01)***
Sample size	3,138	2,938	2,938	2,330	2,330
R^2	0.128	0.206	0.222	0.414	0.492

*=p<.05 **=p<.01 ***=p<.001
[1] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county
[2] HHI = Herfindahl-Hirschman Index of competition
[3] FQHC = Federally Qualified Health Center

Model V includes the two plan type variables: the enrollment-weighted percentage of HMO plans in a county, and the enrollment-weighted percentage of PFFS plans in a county. Results of Model V are similar to those found under Model IV. A one percentage point higher relative benchmark rate is associated with a 39 percentage point greater rate of MA penetration in a county, holding all else constant (0.39, 95% CI 0.34-0.43, p<.001). A one percentage point greater enrollment-weighted percentage of for-profit plans in a county was associated with a 4 percentage point lower rate of MA penetration in a county in 2012, all else held constant (-0.04, 95% CI -0.05 - -0.03, p<.001).

A one percentage point greater percentage of Medicare beneficiaries in the state with retiree coverage was associated with a 16 percentage point greater MA penetration rate in a county (0.16, 95% CI 0.10-0.22, p<.001), inconsistent with what was expected under Hypothesis 4A. A one percentage point greater percentage of Medicare beneficiaries in the state dually eligible for Medicaid was associated with a 20 percentage point lower rate of MA plan penetration (-0.20, 95% CI -0.20 - -0.11, p<.001). A more concentrated hospital market, specifically a 100 point greater hospital HHI, was associated with a 0.03 percentage point lower rate of MA plan penetration (-0.0003, 95% CI -0.0004- -0.0002, p<.001). The percentage of MA plans in a county that had a parent company that offered a non-MA plan in the county was not statistically significantly associated with the rate of MA penetration (0.01, 95% CI -0.0004-0.02, p>.05). A one percentage point greater enrollment-weighted percentage of HMO plans in a county was associated with an 11 percentage point greater MA penetration rate in 2012, all else held constant (0.11, 95% CI 0.09-0.12, p<.001). A one percentage point greater enrollment-weighted percentage of

PFFS plans in a county was associated with a 2 percentage point lower rate of MA penetration (-0.02, 95% CI -0.03 - -0.01, p<.001).

PLAN PENETRATION: LONGITUDINAL FIRST DIFFERENCE ANALYSES

Results for 2008-2011: Table 5.6e presents the stepwise results of first difference linear regression analyses for 2008-2011. Model IV examines the change in MA penetration as a function of the change in the relative benchmark rate, the change in the enrollment-weighted percentage of for-profit plans offered in a county, the change in the proportion of the population over 65 years with retiree coverage, the change in the proportion of the population over 65 years with Medicaid coverage, the change in hospital market concentration, and the change in the enrollment-weighted percentage of MA plans in a county with a parent company that also offers a non-MA plan in the county.

Results from Model IV show that a one percentage point increase in the relative benchmark rate between 2008 and 2011 was associated with a 19 percentage point increase in the rate of MA penetration (0.19, 95% CI 0.14-0.24, p<.001), all else held constant. This finding is consistent with what was expected under Hypothesis 1B. A one percentage point increase in the percentage of for-profit MA plans in a county was associated with a 5 percentage point increase in the rate of MA penetration (0.05, 95% CI 0.04-0.06, p<001). A one percentage point increase in the percentage of Medicare beneficiaries in the state with retiree coverage was associated with a 4 percentage point increase in the rate of MA penetration (0.04, 95% CI 0.01-0.08, p<.05), all else held constant.

TABLE 5.6E: FIRST DIFFERENCE REGRESSION ANALYSES
IMPACT OF CHANGE IN RELATIVE BENCHMARK RATE AND OTHER FACTORS ON CHANGE IN MA PLAN PENETRATION, 2008-2011

	I. β (95% CI)	II. β (95% CI)	III. β (95% CI)	IV. β (95% CI)	V. β (95% CI)
Change in relative benchmark rate[1]	0.16 (0.12-0.20)***	0.18 (0.13-0.23)***	0.21 (0.16-0.25)***	0.19 (0.14-0.24)***	0.18 (0.13-0.23)***
Change percent for-profit MA plans in county		0.04 (0.03-0.06)***	0.05 (0.04-0.06)***	0.05 (0.04-0.06)***	0.04 (0.03-0.06)***
Change in state percent Medicare with retiree coverage			0.03 (-0.002-0.06)	0.04 (0.01-0.08)*	0.04 (0.01-0.08)*
Change in state percent Medicare with Medicaid (Duals)			-0.27 (-0.31- -0.23)***	-0.22 (-0.27- -0.18)***	-0.21 (-0.26- -0.16)***
Change in hospital market concentration (HHI measure)/100[2]			0.0001 (-0.0001-0.0003)	0.0002 (-0.00004-0.0004)	0.0002 (-0.00004-0.0004)
Change percent plans with parent company that offered non MA-plan in county			0.01 (0.01-0.02)***	0.01 (0.002-0.01)*	0.01 (0.004-0.02)**
Change in state percent Medicare reporting fair/poor health				-0.03 (-0.06-0.01)	-0.04 (-0.08- -0.0002)*
Change in county's median income (in 1,000s)				-0.0002 (-0.001-0.0003)	-0.0003 (-0.001-0.003)
Change in county's hospital beds per 1000 population				-0.001 (-0.0002-0.001)	0.001 (-0.0002-0.001)
Change in county's MDs per 1000 population				0.01 (-0.01-0.02)	0.01 (-0.005-0.02)
County had at least one FQHC in 2008 or 2011[3]				0.005 (0.001-0.008)**	0.004 (0.001-0.01)**
Change in county's log population 65 years and over				0.05 (0.03-0.07)***	0.05 (0.03-0.07)***
Change in county's percent population black				0.09 (-0.11-0.30)	0.11 (-0.09-0.31)
Change in county's percent population female				0.16 (-0.09-0.40)	0.15 (-0.09-0.40)
Change in percent MA HMO plans in county					0.001 (-0.01-0.01)
Change in percent MA PFFS plans in county					0.01 (0.003-0.01)**
Sample size	3,317	2,833	2,833	2,325	2,325
R^2	0.020	0.055	0.121	0.128	0.132

*=p<.05 **=p<.01 ***=p<.001
[1] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county
[2] HHI = Herfindahl-Hirschman Index of competition
[3] FQHC = Federally Qualified Health Center

A one percentage point increase in the percentage of Medicare beneficiaries in the state dually eligible for Medicaid was associated with a 22 percentage point decrease in the rate of MA penetration between 2008 and 2011 (-0.22, 95% CI -0.27 - -0.18, p<.001). An increase in hospital market concentration, specifically a 100 point increase in the hospital HHI in the county, was not statistically significantly associated with a change in MA plan penetration (0.0002, 95% CI -0.00004-0.0004, p>.05). A one percentage point increase in the percentage of MA plans with a parent company that offers a non-MA plan in the county was associated with a 1 percentage point increase in the rate of MA penetration (0.01, 95% CI 0.002-0.01, p<.05).

Model V builds on the above model by including two plan type variables: the change in the enrollment-weighted percentage of HMO plans offered in a county and change in the enrollment-weighted percentage of PFFS plans offered in a county. The addition of plan type variables does not dramatically alter the estimates produced by the model.

A one percentage point increase in the relative benchmark rate between 2008 and 2011 was associated with an 18 percentage point increase in the rate of MA penetration (0.18, 95% CI 0.13-0.23, p<.001), all else held constant. This finding is consistent with what was expected under Hypothesis 1B. A one percentage point increase in the percentage of for-profit MA plans in a county was associated with a 4 percentage point increase in the rate of MA penetration (0.04, 95% CI 0.03-0.06, p<001). A one percentage point increase in the percentage of Medicare beneficiaries in the state with retiree coverage was associated with a 4 percentage point increase in the rate of MA penetration (0.04, 95% CI 0.01-0.08, p<.05), all else held constant. A one percentage point increase in the percentage of Medicare beneficiaries in the state dually eligible for Medicaid was

associated with a 21 percentage point decrease in the rate of MA penetration between 2008 and 2011 (-0.21, 95% CI -0.26 - -0.16, p<.001). An increase in hospital market concentration, specifically a 100 point increase in the hospital HHI in the county, was not statistically significantly associated with a change in MA plan penetration (0.0002, 95% CI -0.00004-0.0004, p>.05). A one percentage point increase in the percentage of MA plans with a parent company that offers a non-MA plan in the county is associated with a 1 percentage point increase in the rate of MA penetration (0.01, 95% CI 0.004-0.06, p<.01). The change in the enrollment-weighted percentage of HMO plans offered in a county was not statistically significantly associated with a change in the rate of MA penetration (-0.04, 95% CI -0.06 - -0.03, p<.001). A one percentage point increase in the enrollment-weighted percentage of PFFS plans offered in a county was associated with a 1 percent increase in the rate of MA penetration (0.01, 95% CI 0.003-0.01, p<.01), all else held constant.

Results for 2011-2012: Table 5.6f presents the stepwise results of first difference linear regression analyses for 2011-2012. Model IV examines the change in MA penetration as a function of the change in the relative benchmark rate, the change in the enrollment-weighted percentage of for-profit plans offered in a county, the change in the proportion of the population over 65 years with retiree coverage, the change in the proportion of the population over 65 years with Medicaid coverage, the change in hospital market concentration, and the change in the enrollment-weighted percentage of MA plans in a county with a parent company that also offers a non-MA plan in the county.

TABLE 5.6F: FIRST DIFFERENCE REGRESSION ANALYSES

IMPACT OF CHANGE IN RELATIVE BENCHMARK RATE AND OTHER FACTORS ON CHANGE IN MA PLAN PENETRATION, 2011-2012

	I. β (95% CI)	II. β (95% CI)	III. β (95% CI)	IV. β (95% CI)	V. β (95% CI)
Change in relative benchmark rate[1]	0.01 (-0.02-0.05)	0.01 (-0.02-0.05)	0.01 (-0.03-0.05)	0.01 (-0.04-0.05)	0.01 (-0.04-0.05)
Change % for-profit MA plans in county		0.01 (-0.01-0.02)	0.004 (-0.01-0.02)	0.003 (-0.02-0.02)	-0.02 (-0.04-0.01)
Change in state Percent Medicare with retiree coverage			0.08 (0.06-0.11)***	0.11 (0.09-0.14)***	0.10 (0.07-0.12)***
Change in state Percent Medicare with Medicaid (Duals)			0.001 (-0.02-0.02)	-0.03 (-0.06- -0.01)**	-0.02 (-0.05- -0.002)*
Change in hospital market concentration (HHI measure)/100[2]			0.0001 (-0.0001-0.0003)	0.0001 (-0.0001-0.0002)	0.0001 (-0.0001-0.0003)
Change percent plans with parent company that offered non MA-plan in county			-0.01 (-0.01- -0.005)***	-0.01 (-0.01- -0.002)*	-0.01 (-0.02- -0.004)**
Change in state percent Medicare reporting fair/poor health				0.10 (0.08-0.12)***	0.09 (0.07-0.11)***
Change in county median income (in 1,000s)				-0.0004 (-0.001- -0.00001)*	-0.0005 (-0.001- -0.0001)*
Change in county hospital beds per 1000 population				-0.0002 (-0.002-0.001)	-0.0001 (-0.001-0.001)
Change in county MDs per 1000 population				0.001 (-0.003-0.004)	0.0003 (-0.003-0.004)
County had at least one FQHC in 2011 or 2012[3]				0.003 (0.001-0.005)**	0.003 (0.001-0.005)**
Change in county's log population 65 years and over				0.12 (0.08-0.15)***	0.11 (0.08-0.15)***
Change in county's percent population black				-0.34 (-0.84-0.17)	-0.35 (-0.87-0.17)
Change in county's percent population female				-0.08 (-0.47-0.31)	-0.12 (-0.53-0.29)
Change in percent MA HMO plans in county					-0.04 (-0.06- -0.03)***
Change in percent MA PFFS plans in county					-0.01 (-0.02-0.0001)
Sample size	3,138	2,859	2,859	2,281	2,281
R^2	0.0002	0.001	0.027	0.074	0.108

*=p<.05 **=p<.01 ***=p<.001

[1] Relative benchmark rate = Medicare Advantage benchmark rate in county/Average cost per-beneficiary in traditional fee-for-service Medicare in county

[2] HHI = Herfindahl-Hirschman Index of competition

[3] FQHC = Federally Qualified Health Center

Results from Model IV show that a one percentage point increase in the relative benchmark rate between 2011 and 2012 was not statistically significantly associated with the change in the rate of MA penetration (0.01, 95% CI -0.04-0.05, p>.05). The change in the percentage of for-profit MA plans in a county was not statistically significantly associated with the change in the rate of MA penetration between 2011 and 2012 (0.003, 95% CI -0.02-0.02, p>.05). A one percentage point increase in the percentage of Medicare beneficiaries in the state with retiree coverage was associated with an 11 percentage point increase in the rate of MA penetration (0.11, 95% CI 0.09-0.14, p<.001), all else held constant. A one percentage point increase in the percentage of Medicare beneficiaries in the state dually eligible for Medicaid was associated with a 3 percentage point decrease in the rate of MA penetration between 2011 and 2012 (-0.03, 95% CI -0.06 - -0.01, p<.01). An increase in hospital market concentration, specifically a 100 point increase in the hospital HHI in the county was not statistically significantly associated with a change in MA plan penetration (0.0001, 95% CI -0.0001-0.0002, p>.05). A one percentage point increase in the percentage of MA plans with a parent company that offers a non-MA plan in the county was associated with a 1 percentage point decrease in the rate of MA penetration (-0.01, 95% CI -0.01 - -0.002, p<.05).

Model V builds on the above model by including two plan type variables: the change in the enrollment-weighted percentage of HMO plans offered in a county and change in the enrollment-weighted percentage of PFFS plans offered in a county.

Results of Model V show that the change in the relative benchmark rate between 2011 and 2012 was not statistically significantly associated with the change in the rate of MA penetration (0.01, 95% CI -0.04-0.05, p>.05), all else held constant. The change in the

percentage of for-profit MA plans in a county was not statistically significantly associated with the change in the rate of MA penetration from 2011-2012 (-0.02, 95% CI -0.04-0.01, p<001). A one percentage point increase in the percentage of Medicare beneficiaries in the state with retiree coverage was associated with a 10 percentage point increase in the rate of MA penetration (0.10, 95% CI 0.07-0.12, p<.001), all else held constant. A one percentage point increase in the percentage of Medicare beneficiaries in the state dually eligible for Medicaid was associated with a 2 percentage point decrease in the rate of MA penetration between 2011and 2012 (-0.02, 95% CI -0.05 - -0.002, p<.001). An increase in hospital market concentration, specifically a 100 point increase in the hospital HHI in the county was not statistically significantly associated with a change in MA plan penetration (0.0001, 95% CI -0.0001-0.0003, p>.05). A one percentage point increase in the percentage of MA plans with a parent company that offers a non-MA plan in the county is associated with a 1 percentage point decrease in the rate of MA penetration (-0.01, 95% CI -0.02 - -0.004, p<.01). A one percentage point increase in the enrollment-weighted percentage of HMO plans offered in a county was associated with a 4 percentage point decrease in the rate of MA penetration (-0.04, 95% CI -0.06 - -0.03, p<.001). The change in the enrollment-weighted percentage of PFFS plans offered in a county was not statistically significantly associated with a change in the rate of MA penetration (-0.01, 95% CI -0.02-0.0001, p>.05).

CHAPTER VI: DISCUSSION

Changes in the payment and regulatory policies affecting Medicare managed care plans have often been based on political ideology rather than scientific evidence about how a given policy change might affect plan availability, enrollment, and Medicare costs. While there is likely some truth to Republicans' arguments that looser regulation and higher payments promote plan participation and beneficiary enrollment, just as there is likely some truth to Democrats' arguments that private Medicare managed care plans are capable of efficiently operating with lower payment rates, both of these characterizations oversimplify what is actually an incredibly complex matter. The analyses presented here are an effort to move beyond ideology and look at what data can tell us about the factors associated with plan participation and beneficiary enrollment in Medicare Advantage.

Six key factors were identified as potentially important to health insurance companies as they make decisions about whether to participate, or to continue to participate, in the Medicare program. These factors are: MA benchmark rates, plan profit status, plan type, rates of Medicare supplemental insurance coverage in an area, hospital market concentration, and whether the insurer participates in the non-MA health insurance market in an area. Findings with respect to each of these six elements will be presented in turn below.

MA BENCHMARK RATES. It was hypothesized that plans would be attracted to participating in counties where MA benchmark rates are higher relative to average fee-for-service costs for two reasons. The first is the potentially higher profit margin per enrollee. The second is that, if a plan is able to submit a bid that is close to average fee-

for-service costs in the county, there is potential to receive a larger rebate, which means that the plan could offer extra benefits, thus attracting more enrollees and maximizing their profits. The results presented here uniformly suggested that there was, in fact, a positive and statistically significant association between the relative benchmark rate and plan participation in the MA program during the period studied.

Cross sectional analyses for plan presence found that a one percentage point greater relative benchmark rate was associated with 39 percent greater odds of a plan participating in a market in 2008, 60 percent greater odds of a plan participating in a market in 2011, and 73 percent greater odds of a plan participating in a market in 2012. While these results seem large in magnitude, estimates of predicted probabilities told a slightly less dramatic story.

Predicted probabilities are useful in that they allow for the estimation of associations between different levels of a key variable for an 'average' plan in an 'average' county. Here, predicted probabilities were used to look at the probability of plan participation for an average plan in an average county at different levels of the relative benchmark rate. Findings suggested that a relative benchmark rate as high as two standard deviations above the mean was associated with only a 1.5 percentage point greater probability of plan participation in 2008, a 1.9 percentage point greater probability of plan participation in 2011, and a 2.1 percentage point greater probability of plan participation in 2012, as compared to the probability of plan participation at the mean relative benchmark rate in those years. Similarly, a relative benchmark rate two standard deviations below the mean was associated with only a 1.7 percentage point lower probability of plan participation in 2008, a 2 percentage point lower probability of plan participation in 2011 and a 2.3

percentage point lower probability of plan participation in 2012 as compared to the probability of plan participation at the mean relative benchmark rate in those years. While the odds ratios presented above might have indicated a strong association between the relative benchmark rate and plan participation, it seems that the underlying change in the probability of plan participation, even at very high or low values of the relative benchmark rate, is fairly small.

Longitudinal first difference analyses similarly found a positive and statistically significant association between changes in the relative benchmark rate and the relative risk of plan entry, and a negative and statistically significant association between changes in the relative benchmark rate and the relative risk of plan exit. A one percentage point increase in the relative benchmark rate was associated with a 4.5 times increased risk of a plan entering a county, relative to never entering the county between 2008 and 2011, and a 95 percent lower risk of a plan exiting a county, relative to remaining in the county between 2008 and 2011.

Predicted probability calculations for 2008-2011 showed that, despite the large relative risk ratios above, increases or decreases in the relative benchmark rate were associated with only relatively minor changes in the predicted probability of plan participation between 2008 and 2011. At a change in the relative benchmark rate of two standard deviations above the mean change – a 5.1 percentage point increase in the relative benchmark rate – the predicted probability of a plan entering relative to never entering a county grew just 3 percentage points relative to the predicted probability of a plan entering at the mean change in the benchmark rate, and the predicted probability of a plan exiting relative to staying in a county fell 2 percentage points relative to the predicted

probability of a plan exiting at the mean change in the benchmark rate. At a change in the relative benchmark rate of two standard deviations below the mean – a 10.1 percentage point decrease in the relative benchmark rate – the predicted probability of a plan entering relative to never entering a county fell 2 percentage points relative to the predicted probability of a plan entering at the mean change in the benchmark rate, and the predicted probability of a plan exiting relative to staying in a county grew 5 percentage points relative to the predicted probability of a plan exiting at the mean change in the benchmark rate.

Plan penetration analyses found a positive and statistically significant association between the relative benchmark rate in a county and the MA penetration rate. A one percentage point higher relative benchmark rate was associated with a 36 percentage point greater rate of MA penetration in a county in 2008, a 39 percentage point greater rate of MA penetration in a county in 2011, and a 38 percentage point greater rate of MA penetration in a county in 2012. First difference analyses indicated that a one percentage point increase in the relative benchmark rate was associated with a 19 percentage point increase in the rate of MA penetration between 2008 and 2011.

PLAN PROFIT STATUS. It is important to note that interaction effects cannot be reliably interpreted from the sign or magnitude of interaction term coefficients in nonlinear models, such as the logistic regression models used in the cross sectional plan presence analyses and the multinomial logit models used for the longitudinal plan presence analyses.[74] Given that a key aim of this research is to examine whether profit status modifies the association between the relative benchmark rate and plan participation, it

was critical to find another way to assess this. Predicted probabilities calculations are one solution.

It was hypothesized that for-profit plans may be more sensitive to changes in benchmark rates because they have an obligation to their shareholders to remain profitable. Following from this, for-profit plans would be less likely to participate in counties with lower relative benchmark rates, and both more likely to enter a county and less likely to exit a county in response to increases in the relative benchmark rate. Overall, the findings presented here provide support for the hypothesis that the association between plan participation and the relative benchmark rate was modified by profit status.

The predicted probabilities from the cross sectional analyses showed that nonprofit plans had a systematically greater predicted probability of plan participation as compared to for-profit plans at all levels of the relative benchmark rate. This finding held true in each of the three years: 2008, 2011, 2012. This may suggest that for-profit plans are more selective about participation generally than are nonprofit plans.

The association between changes in the relative benchmark rate and the predicted probability of participation was very slightly stronger among for-profit plans than for nonprofit plans in 2008. At a relative benchmark rate two standard deviations above the mean there was a two percentage point greater predicted probability of plan participation among for-profit plans and a one percentage point greater predicted probability of plan participation among nonprofit plans as compared to the predicted probability of plan participation at the mean relative benchmark rate.

In both 2011 and 2012, higher levels of the relative benchmark rate were associated with higher predicted probabilities of participation among for-profit plans, however, in those same years, higher levels of the relative benchmark rate were actually associated with lower predicted probabilities of participation among nonprofit plans. In 2011, the predicted probability of participation among for-profit plans at a relative benchmark rate two standard deviations above the mean rate was 3 percentage points higher among for-profit plans, but 1 percentage point lower among nonprofit plans as compared to the predicted probability of participation at the mean relative benchmark rate. Similarly, in 2012, the predicted probability of participation among for-profit plans at a relative benchmark rate two standard deviations above the mean rate was 4 percentage points higher among for-profit plans, but 3 percentage points lower among nonprofit plans as compared to the predicted probability of participation at the mean relative benchmark rate.

Taken together, these findings seem be consistent with Hypothesis 2A, and suggest that the positive association between the relative benchmark rate and plan participation is in fact stronger among for-profit plans, as compared to nonprofit plans.

Findings from the predicted probabilities calculations associated with the longitudinal first difference multinomial logit models examining the change from 2008 to 2011 reinforced the idea that the association between plan participation and the relative benchmark rate was modified by profit status. Between 2008 and 2011, a change in the relative benchmark rate of two standard deviations below the mean change, a 10.1 percentage point decrease, was associated with a one percentage point lower predicted probability of a plan entering relative to never entering a county among nonprofit plans

and a two percentage point lower predicted probability among for-profit plans. That same 10.1 percentage point decrease was associated with a two percentage point higher predicted probability of a plan exiting relative to staying in a county among nonprofit plans and a three percentage point higher predicted probability among for-profit plans, as compared to the predicted probability of exiting relative to staying in a county at the mean change in the relative benchmark rate.

These findings are consistent with Hypothesis 2B and suggest that the positive association between changes in the relative benchmark rate and probability plan entry, and the negative association between changes in the relative benchmark rate and plan exit are stronger among for-profit plans as compared to nonprofit plans.

Interestingly, results from the cross sectional plan penetration analyses suggest that markets dominated by for-profit plans were associated with lower MA penetration rates. Findings indicate that a one percentage point greater enrollment-weighted percentage of for-profit plans in a county was associated with a 13 percentage point lower rate of MA penetration in a county in 2008, an 8 percentage point lower rate of MA penetration in a county in 2011, and an 8 percentage point lower rate of MA penetration in a county in 2012. However, first difference analysis found that a one percentage point increase in the percentage of for-profit MA plans in a county was associated with a 5 percentage point increase in the rate of MA penetration between 2008 and 2011.

PLAN TYPE. It was hypothesized that less efficient PFFS plans would be more likely to locate in areas where MA benchmark rates were significantly higher than average fee-for-service costs. It was anticipated that the association between the relative benchmark rate

and plan participation would be weakest among more tightly managed HMO plans and strongest among loosely managed PFFS plans. Unfortunately, the analyses presented here were mostly inconclusive about whether the association between the relative benchmark rate and plan participation was systematically different across plan types.

The predicted probabilities from the cross sectional analyses in 2008, 2011 and 2012 did not yield any consistent results. In 2008, the predicted probability of participation among HMO plans and PFFS plans remained flat even at relative benchmark rates up to two standard deviations higher and lower than the 2008 mean, however, the predicted probability of plan participation among local PPO plans was higher at higher levels of the relative benchmark rate. In contrast, the association between the relative benchmark rate and plan participation was strongest among PFFS plans in 2011, with PFFS plans having a three percentage point greater predicted probability of plan participation at a relative benchmark rate two standard deviations above the mean rate as compared to the predicted probability at the mean relative benchmark rate. Among HMO and local PPO plans, the differential was just a one percentage point. In 2012, the association between the relative benchmark rate and plan participation appears to have been slightly stronger among HMO plans than among local PPO or PFFS plans.

Predicted probabilities from the longitudinal multinomial logit analyses were also somewhat contradictory. At a change in the relative benchmark rate between 2008-2011 of two standard deviations above the mean change, the predicted probability of an HMO plan entering relative to never entering a county increased by 2 percentage points, the predicted probability of a local PPO plan entering relative to never entering a county also increased by 2 percentage points and the predicted probability of a PFFS plan entering

relative to never entering a county increased by 4 percentage points, as compared to the predicted probability at the mean change in the relative benchmark rate. This suggests that the association between the change in the relative benchmark rate and the predicted probability of entry relative to never entering a county was slightly stronger among PFFS plans as compared to PPO or HMO plans, consistent with Hypothesis 2B.

However, at the same change in the relative benchmark rate of two standard deviations above the mean change, the predicted probability of an HMO plan exiting relative to staying in a county decreased by 1 percentage point, the predicted probability of a local PPO plan exiting relative to staying in a county actually increased by 5 percentage points and the predicted probability of a PFFS plan exiting relative to staying in a county remained the same.

The results of the plan type analyses are likely complicated by the fact that PFFS plans, which, in 2008, dominated the market, began exiting the market en masse after 2008. At the same time, the number of local PPO plans, which represented only a small fraction of all MA plans in 2008, entered the MA market at an incredibly high rate after 2008. HMO plan offerings grew quite a bit after 2008 as well (see Table 5.4a). The relatively small number of PFFS plans entering the market after 2008, and the relatively small number of PPO plans exiting the market after 2008 may be an indication that the plan type models may be unstable.

RATES OF RETIREE AND MEDICAID COVERAGE. High levels of retiree and Medicaid coverage in an area may deter MA plans from participating in that market as they would likely mean a smaller pool of potential enrollees. Following from this, it was

hypothesized that MA participation would be negatively associated with the proportion of the local population with retiree insurance and Medicaid coverage. Again, however, the evidence here was mixed.

Some of the results supported the hypothesis that MA participation is negatively associated with the proportion of the local population with retiree insurance or Medicaid coverage. For example, a one percentage point greater state percentage of Medicare beneficiaries with retiree coverage was associated with 75 percent lower odds of an MA plan being offered in 2008 and 78 percent lower odds of a plan being offered in 2012. However, retiree coverage was not statistically significantly associated with plan presence in 2011.

Moreover, the coefficients on Medicaid coverage seemed to contradict the hypothesis completely: A one percentage point greater state percentage of Medicare beneficiaries dually eligible for Medicaid was associated with 11.2 *greater* odds of a plan being offered in a county in 2008, 10.3 greater odds of a plan being offered in a county in 2011, and 17.5 times greater odds of an MA plan being offered in a county in 2012.

The first difference analyses also seemed to contradict the original hypothesis. A net one percentage point increase in the percentage of the Medicare population with retiree coverage in the state between 2008 and 2011 was associated with a 62 percent increased risk of an MA plan entering, relative to never entering a county, and a 44 percent lower risk of a plan exiting, relative to remaining in a county. A net one percentage point increase in the percentage of the Medicare population in the state dually eligible for Medicaid was associated with a 3.1 times increased risk of entering, relative to never

entering a county but was not statistically significantly associated with risk of a plan exiting relative to staying in a county between 2008 and 2011.

Plan penetration analyses also yielded mixed results. Results from the cross sectional analyses indicated some support for the original hypothesis: a one percentage point greater state percentage of Medicare beneficiaries with retiree coverage was associated with a 17 percent lower rate of MA penetration in 2008, and a 7 percent lower rate of MA penetration in 2011. However, retiree coverage was not statistically significantly associated with MA penetration in 2012. Similarly, a one percentage point greater state percentage of Medicare beneficiaries dually eligible for Medicaid was found to be associated with a 37 percent lower rate of MA penetration in 2008, a 53 percent lower rate of MA penetration in 2011 and a 12 percent lower rate of MA penetration in 2012.

First difference analyses, however, found that a one percentage point increase in the state percentage of Medicare beneficiaries with retiree coverage was associated with a 4 percentage point *increase* in MA penetration, contradicting the original hypothesis. However, a one percentage point increase in the state percentage of Medicare beneficiaries dually eligible for Medicaid was found to be associated with a 22 percentage point decrease in MA penetration, which fits with the original hypothesis.

It is possible that the mixed plan presence results relating to Medicare beneficiaries dually eligible for Medicaid are reflecting the fact that some dually eligible Medicare beneficiaries may choose to enroll in a privately run MA special needs plans (as opposed to having Medicaid serve as the wraparound for their coverage). If a parent company

offers a MA special needs plan in an area, one might expect that they would be more likely to offer another type of MA product in that area as well.

Another issue may have been the data itself: the sample size of the Current Population Survey was insufficient to produce county-level estimates of coverage, so the analyses presented here had to rely on state level estimates. It is possible that the findings would have been different had county-level data been available.

HOSPITAL MARKET CONCENTRATION. Highly concentrated hospital markets may discourage plan participation, as hospitals with significant market power are better able to act as price setters. In contrast, plans may be more likely to participate in areas with highly competitive hospital markets, because they will have greater bargaining power and would be more likely to successfully negotiate lower prices for hospital services. The evidence presented here supports this hypothesis, as, on the whole, the results indicate that there was a negative and statistically significant association between health plan participation and hospital market concentration.

Cross sectional models found that a higher level of hospital market concentration, specifically, a 100 point greater hospital HHI, was associated with 0.2 percent lower odds of an MA plan being offered in a county in 2008, 2011, and 2012. First difference multinomial logit models showed that a 100 point increase in hospital market concentration (HHI) was associated with a 0.4 percent decreased risk of a plan entering relative to never entering a county between 2008-2011. However, a 100 point increase in hospital market concentration (HHI) was not statistically significantly associated with the risk of a plan exiting relative to staying in a county between 2008-2011. This suggests

that hospital market concentration may have a stronger association with market entry decisions than market exit decisions by insurers.

Plan penetration analyses yields slightly more mixed results. While hospital market concentration was negatively and statistically significantly associated with plan penetration in the cross sectional analyses, the first difference analyses found no association between hospital market concentration and plan penetration. A 100 point increase in hospital market concentration (HHI) was associated with a 0.02 percentage point lower rate of MA plan penetration in 2008, and a 0.04 percentage point lower rate of MA plan penetration in 2011 and 2012. However, among the first difference analyses, a 100 point increase in the hospital HHI in the county was not statistically significantly associated with a change in MA plan penetration between 2008 and 2011.

NON-MEDICARE MANAGED CARE PARTICIPATION. As discussed in Chapter III, a parent company's activity in the non-MA health insurance market could be associated with a greater likelihood of participation in the MA market for a number of reasons, including reduced barriers to entry due to extensive experience with insurance regulations in that state, established provider networks in a market, experience with the population in a given area, and local name recognition. For these reasons (among others) it was hypothesized that health insurers that offered non-MA plans in a market would be more likely to participate in MA in that market, as compared to those organizations that did not offer non-MA plans.

For the most part, the results of the analyses presented here did, in fact, suggest that there was a positive association between having a parent company that offered a non-MA plan

in the county, and participation in the MA market in that county. The exception was the cross-sectional analysis from 2008, which contradicted the hypothesis, finding that having a parent company that offered a non-MA plan in the county was associated with 10 percent lower odds of a plan being offered in the county in 2008. However, this result may have been due to the fact that PFFS plans dominated the MA market in 2008 and at the time, PFFS plans were not required to have provider networks, and thus may have been easier to implement without prior experience in a county. Findings from 2011 and 2012 fit with the original hypothesis. Having a parent company that offered a non-MA plan in the county was associated with 89 percent greater odds of a plan being offered in a county in 2011 and 2.63 times greater odds of an MA plan being offered in a county in 2012.

Longitudinal first difference analyses for 2008-2011 also showed a positive association: Having a parent company that offered a non-MA plan in the county in either 2008 or 2011 was associated with a 50 percent increased risk of a plan entering relative to never entering a county, and a 67 percent lower risk of a plan exiting, relative to staying in a county.

Plan penetration analyses also seemed to show a positive association between the percentage of MA plans with a parent company that offers a non-MA plan in the county and MA penetration in a county. A one percentage point greater percentage of MA plans with a parent company that offers a non-MA plan in the county was associated with a 5 percentage point greater rate of MA penetration in 2008, a 2 percent greater rate of MA penetration in 2011 and a 1 percent greater rate of MA penetration in 2012. First difference analysis found that a one percentage point increase in the percentage of MA

plans with a parent company that offers a non-MA plan in the county was associated with a 1 percentage point increase in the rate of MA penetration in a county between 2008 and 2011.

LIMITATIONS AND STRENGTHS

LIMITATIONS. In addition to those already mentioned, there are some additional limitations to the analyses presented here that warrant discussion.

This study is affected by the limitations commonly associated with the use of secondary data, particularly that the researcher has less control over the quality of the data, that the data do not always include all theoretically relevant variables, and that sometimes the variables that are available are not defined in an ideal way.[75] As discussed above, one major limitation relating to the use of secondary data was that the analyses presented here had to rely on state level estimates of the rates of retiree and Medicaid coverage among Medicare beneficiaries, as opposed to county-level estimates. However, CMS data are generally acknowledged to be of high quality and a concerted effort was made to make up for the absence of key variables from the CMS files by incorporating an extensive amount of additional data from a wide variety of sources such as the Area Health Resources File, HealthLeaders-InterStudy, the Current Population Survey and the Census.

Another major limitation was the inability to perform ideal longitudinal data analyses that would allow for causal inference. Originally, the intent of this research was to look at annual changes in plan participation using fixed effects longitudinal data analysis for each of the years 2008-2012. However, there was insufficient variation across each of the

years for one of the key variables, MA benchmark rates, necessitating the use of cross-sectional and first difference regression methods instead.[76]

It is also important to carefully consider how to define a plan's "potential to participate in a market". In the analyses presented here, a plan was considered to have the potential to participate in a county if the MA plan was offered in at least one county in the region. However, it is possible that a more accurate definition of a plan's potential to participate in a given market could be either looser or tighter than the definition employed here.

STRENGTHS. There are a number of strengths associated with this analysis. Most of the work in this area has not been updated since the 2006 implementation of the benchmark-based bidding system established by the MMA, let alone the 2010 passage of the ACA, so there is a need for new research in this area that takes advantage of more recent data. This is particularly important as policymakers continue to be interested in the potential impact of payment rate variations on plan participation and enrollment.

Another key strength is that no research, to date, has been conducted on this topic using such an extensive variety of datasets. Because this research uses a combination of CMS, HealthLeaders-InterStudy, Area Health Resources File, Census and CPS data, the final data sets contain a large amount of robust data for analysis. These data are of high quality and most of the data files are complete (almost no missing data). Furthermore, the final data sets that were compiled will be extremely valuable for future research on related topics.

Finally, the lessons that can be drawn from this research reach beyond just the Medicare program. For example, a better understanding of the factors affecting plan participation

could be very relevant to state and federal policymakers as they continue to work on both the health insurance exchanges and Medicaid managed care. In addition, the fact that benchmark rates are determined by the Centers for Medicare and Medicaid Services, as opposed to payment rates being determined externally through the market, provides a unique opportunity to examine the factors affecting plan behavior in a different way. Therefore, these results may be of interest to a broader audience, beyond just those interested in Medicare Advantage policy.

CHAPTER VII: POLICY IMPLICATIONS

The often-quoted objectives of Medicare managed care – to reduce Medicare spending, to increase choice for Medicare beneficiaries, and to offer better health care benefits for seniors – are objectives frequently in conflict. As the party with primary political power has shifted over time, so has the relative importance of each of these objectives. Democrats and Republicans have fought over the role of private plans in Medicare for years, with Republicans arguing that higher payments and looser regulation would encourage private plan participation and promote choice in the Medicare program, and Democrats arguing that managed care plans should be required to be more efficient than traditional fee-for-service Medicare, and thus should be able to operate at a lower cost.

Looking back over the past three decades, it becomes apparent that in the cacophony of contrasting views expressed about Medicare managed care, almost entirely absent is any sort of rational, evidence-based discussion of the policies needed to balance these conflicting ideological objectives while ensuring the sustainability of the Medicare program.

HISTORY

When the prospective payment program for private plans in Medicare was first introduced in 1982, the motivation was unmistakably to reduce Medicare spending; the decision to set the reimbursement rate for plans at 95 percent of expected costs in traditional Medicare was a transparent effort to reduce per-beneficiary costs by 5 percent. However, with inadequate risk adjustment mechanisms in place, and a pattern of

favorable selection into Medicare private plans, the first prospective payment program actually ended up costing Medicare 5.7 percent *more* per private plan enrollee.[77]

These extra payments, in combination with the ability of private plans to control costs through restricted provider networks and stringent managed care mechanisms such as pre-authorization requirements, meant that, in the years following the implementation of the prepaid payment program, private plans were increasingly able to offer enhanced benefits – including prescription drug coverage, which was not a standard benefit at the time – and lower premiums to enrollees. As these enhanced benefits attracted greater numbers of beneficiaries to private plans, the overall costs to Medicare began to rise, counteracting the original purpose of the prospective payment program.

In the late 1990s, with President Clinton in office, it was becoming increasingly clear that managed care plans were a key source of rising costs in the Medicare program, and policymakers began to look for ways to stem the growth in spending. The Balanced Budget Act of 1997 (BBA) specifically targeted private plans, reducing the annual updates to plan payments in an effort to 'level the playing field' with traditional fee-for-service Medicare.[78] In his statement upon signing the bill into law, President Clinton focused exclusively on the cost containment objective of Medicare managed care, noting the importance of the cuts to overall Medicare solvency, stating that the BBA "honors our commitment to our parents by extending the life of the Medicare Trust Fund for a decade." [79]

Private insurers, however, were outraged by the cuts included in the BBA, and began lobbying Congress, arguing that the severity of the payment reductions would no longer

allow them to offer the level of enhanced benefits that kept beneficiaries enrolled in their plans. Eventually, Congress gave in to the pressure and eased up on some provisions by introducing new legislation that increased payments in certain geographical areas through the Balanced Budget Recovery Act of 1999 and the Benefits Improvement and Protection Act of 2000.[80,81] Despite this, pressure from insurers continued to mount. When President Bush – a well-established supporter of private sector approaches – assumed office, the stage was set for another shift, both in plan payments and in the purported purpose of Medicare managed care, this time from cost containment to enhanced choice.

In late 2003, just over two years into his first term, President Bush signed the Medicare Prescription Drug, Improvement and Modernization Act (MMA) into law. Although the introduction of the Part D prescription drug benefit was the most widely publicized feature of the law, the MMA also included provisions that dramatically increased payments to Medicare managed care plans, in an effort to expand the role of the private sector in Medicare. In his remarks upon signing the MMA into law, President Bush addressed Medicare managed care at length, stating:

> In addition to providing coverage for prescription drugs, this legislation achieves a second great goal. We're giving our seniors more health care choices so they can get the coverage and care that meets their needs. Every senior needs to know if you don't want to change your current coverage, you don't have to change. You're the one in charge. If you want to keep your Medicare the way it is, along with the new prescription benefit, that is your right. If you want to improve benefits—maybe dental coverage, or eyeglass coverage, or managed care plans that reduce out-of-pocket costs—you'll be free to make those choices, as well.
>
> And when seniors have the ability to make choices, health care plans within Medicare will have to compete for their business by offering higher quality service. For the seniors of America, more choices and more control will mean better health care … Our seniors are fully capable of making health care choices, and this bill allows them to do just that.[82]

There was a clear emphasis on choice, control, and expanded benefits in this address. Noticeably absent, however, was any mention of the increased payments to plans that made such enhanced benefits possible.

In the years following the passage of the MMA, increasing numbers of plans entered the Medicare market, and an unprecedented number of Medicare beneficiaries enrolled in private plans: enrollment sky-rocketed from 5.3 million beneficiaries in 2003 to 10.1 million by 2008.[83] The extra benefits available to enrollees also expanded. Plans no longer needed to operate efficiently to be able to offer enhanced benefits; the massive increases in payments to plans ensured that nearly all plans offered benefits above what was offered in the traditional Medicare program. The new rhetoric around Medicare Advantage was not about efficiency or cost containment, it was about expanded benefits and health plan choices.

Political tides began to shift once again, however, and the Democratic Party gained a majority in the House and Senate in 2007. By 2008, the increased payments to MA plans resulting from the MMA were costing Medicare an estimated $8.5 billion annually.[84] Again pushing for cost containment, Democrats proposed new legislation – the 2008 MIPPA – that would phase out a duplicative payment for Indirect Medical Education (effectively lowering payments to MA plans) and placing new regulations on PFFS plans, including provider network requirements.[85] The MIPPA was passed by both the House and Senate by July 9, 2008. President Bush, reaffirming his stance in support of higher payments and looser regulation for private Medicare managed care plans, vetoed the MIPPA, though Congress promptly overrode the veto and the MIPPA became law on July 15, 2008.[86]

POST-ACA PAYMENT POLICY AND THE ROLE OF THE INSURANCE INDUSTRY

Clearly, Medicare managed care policy has swung from one end of the ideological spectrum to the other numerous times over the past three decades. However, this has not been the sole result of pressure exerted by politicians; insurers have also had a lot to say about – and a lot of say in – changing payment rates and regulatory policies as well. The insurance industry depends heavily upon MA as a major source of profits; one quarter of all UnitedHealth Group profits and as high as two-thirds of Humana's profits reportedly came from MA products in 2014.[87] As the MA program continues to grow, the stakes for insurance companies grow ever greater as well, and therefore, lobbying efforts by insurance industry representatives have become increasingly intense over time.

In the years following the passage of the ACA, scheduled cuts to MA payments have become quite contentious. Because CMS has broad administrative power over MA plan payments, they can make modifications to payment rates beyond those outlined in the ACA. The insurance industry has capitalized on this in recent years by putting intense pressure on President Obama and members of Congress to sustain the level of payment generosity that plans became accustomed to under the MMA.

As a result of this pressure, President Obama has been forced to withdraw some of the same proposed cuts that he once trumpeted. In December 2008, then President-elect Obama gave a briefing on his proposal to reform health care, which was one of his key campaign platforms. When asked how he might fund such a proposal, he mentioned MA specifically, responding:

> We're also going to examine programs that I'm not sure are giving us a good bang for the buck. The Medicare Advantage program is one that I've

> already cited where we're spending billions of dollars subsidizing insurance companies for a program that doesn't appreciably improve the health of seniors under Medicare.[88]

However, pressure from insurance companies, particularly the industry lobbying group America's Health Insurance Plans (AHIP), has led the Obama Administration (and by extension, CMS) to back off on ACA-scheduled cuts to MA payments numerous times. AHIP's "grassroots" organization – The Coalition for Medicare Choices – has been particularly active, mobilizing Medicare beneficiaries in recent years with dramatic print and television advertisements targeting seniors with messaging that MA rate cuts would make their benefits go away and cause them to pay substantially more for their MA coverage.[89]

Their efforts have been incredibly effective: In early 2013, CMS announced that payments to MA plans were slated to be cut by 2.2 percent in 2014, but after intense lobbying from AHIP and the Coalition for Medicare Choices, payment rates actually ended up being *raised* by 3.3 percent.[90] Then, in early 2014, CMS announced proposed payment cuts of 1.9 percent for 2015. With the 2014 midterm elections approaching, many Democrats, fearful of alienating seniors who, typically, are more likely to vote in midterm elections than other groups, joined their Republican counterparts in protesting the cuts. A February 14th, 2014 letter to then-CMS Administrator Marilyn Tavenner signed by a bipartisan coalition of 40 senators – including Ed Markey (D-MA) and Chuck Schumer (D-NY) – stated,

> MA has been a great success and should remain a competitive choice for our constituents. Unfortunately, continued regulatory changes that affect the program's funding year after year create disruption and confusion among beneficiaries who are looking for consistency and predictability.

> Furthermore, such disruptions inhibit plans from driving the innovation that has resulted in better care and improved outcomes for Medicare beneficiaries … Funding stability is key to building upon MA's successful coordinated care health outcomes. We urge you to maintain payment levels that will allow MA beneficiaries to be protected from disruptive changes in 2015.[91]

Here, the issues of cost containment and efficiency are being sidelined in favor of an emphasis on beneficiary choice and quality of care, and particularly, how beneficiary choice would be restricted and quality of care would be greatly diminished without a continuation of the enhanced payments plans receive. Ultimately, payments to plans were not cut, but instead were raised 0.4 percent for 2015. [92]

On February 20, 2015, CMS released their proposed MA payment rates for 2016. Currently, MA payment rates are scheduled to stay flat for 2016, but it remains to be seen whether this will hold.[93]

CONCLUSION

The history of private plans in Medicare paints a picture of policies continually swayed by political ideology and insurance industry influence. However, given persistent concerns about the financial future of the Medicare program, and for the sake of the 54 million beneficiaries who depend on the coverage it provides them, isn't it time that MA policies be guided by scientific evidence, rather than rhetoric?

The Medicare Payment Advisory Commission (MedPAC), the nonpartisan, quasi-governmental agency that provides both Medicare policy analysis and recommendations to Congress, has consistently recommended that payments to private plans be lowered so that they are on equal footing with the traditional Medicare program. AHIP has argued

that the MA program would not survive that level of payment cuts. What the data presented here suggests is that plan payment rates do matter, but perhaps not as much as AHIP might have everyone believe. In 2012, a relative MA benchmark rate two standard deviations below the mean – 95.5 percent of average costs in traditional Medicare – was associated with a probability of MA plan participation just 2.3 percentage points lower than the probability of plan participation at the mean relative benchmark rate of 114.7 percent. Similarly, between 2008 and 2011, a change in the relative benchmark rate of as much as two standard deviations below the mean change – a 10.1 percentage point decrease in the relative benchmark rate – was associated with a 2 percentage point decrease in the predicted probability of plan entry and just a 5 percentage point increase in the predicted probability of plan exit.

Moreover, it is unclear to what extent these higher payment rates are even being passed on to enrollees in the form of better benefits. A 2014 National Bureau of Economic Research study by Duggan et al. suggests that, of the extra payments that MA plans receive, only about 20 percent is used to enhance enrollee benefits or reduce out-of-pocket costs; a much larger proportion goes to insurer profits and advertising expenditures.[94]

Ultimately, sustainability will become a key issue. High payments are bringing seniors into the MA program, but financial pressures will only increase as more seniors enroll in private plans. Does it really make sense to draw more and more seniors into MA when eventually benefits will have to be cut, or cost-sharing will have to increase (or, perhaps, both will have to happen) in order for Medicare to remain solvent? Perhaps a first step is

acknowledging that modest payment cuts may not be as damaging as they are claimed to be.

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CURRICULUM VITAE

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