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Does Competition Among Medicare Advantage Plans Matter?: An Empirical Analysis of the Effects of Local Competition in a Regulated Environment

by

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EXHIBIT EE

Abstract

The regulatory oversight of the private Medicare Advantage (MA) program makes the role of competition in this market unclear. This paper empirically examines the impact of competition by measuring the effects of changes in market structure on enrollment. The study examines competition in local geographic markets using county-level enrollment data from 2001-07. I find that an increase in the number of competitors results in an increase in the number of enrollees served – consistent with competition motivating firms to provide more generous benefits. Competition also results in an increase in product proliferation, which highlights a dimension of competition not previously examined. Overall, the results are similar to what one might expect in an unregulated environment, suggesting that there are benefits from competition that are not realized by regulation alone.

1. Introduction

The arrival of the baby-boom generation into the Medicare eligible population in the next few years creates a greater urgency for understanding the various components of the Medicare program. The Medicare Advantage (MA) program is an important part of Medicare, accounting for almost 20% of all Medicare eligible individuals in 2007. The MA program provides Medicare eligible individuals the option to forgo the traditional fee-for-service (FFS) plan and enroll in a privately administered Medicare HMO or PPO alternative.[1] The private plans cover all traditional fee-for-service Medicare services (Parts A and B) and, in exchange, private insurers receive a payment made from Centers for Medicare & Medicaid Services (CMS). The insurers enter and offer plans at the county level and Medicare also approves plans and sets reimbursement rates by county. The rationale for having a private component to Medicare is that private insurers may be more efficient at providing care, which would reduce federal Medicare expenditures and provide consumers with more health insurance choices. In addition, competition among private insurers in a county may lead to more affordable and generous benefits beyond what is covered under traditional FFS Medicare.

The regulatory oversight of CMS makes the role of competition in the MA program unclear. The regulatory powers of CMS include approving plan offerings, negotiating the benefit offerings with insurers, and auditing plans. While CMS has stated that competition among insurers will generally improve the plans offered to consumers, they have also made statements implying that CMS has strong regulatory control: "The Congress ... did not leave the determination of rates entirely to market forces. We are required to determine that the reasonable and equitable test is met and we are given negotiating authority to assure this result."[2]

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[1] The traditional fee-for-service insurance plan ("Original Medicare") consists of part A and part B insurance. Part A provides hospital coverage with a 20% coinsurance rate and is free to all individuals over age 65 or disabled individuals that have worked 10 years. Part B provides out-patient (physician) expenses with 20% coinsurance coverage and is available to all over age 65 and disabled individuals for a monthly premium.

[2] Federal Register January 28, 2005

If CMS regulation fully dictates insurer behavior or if other Medicare options provide tough competition, then there would be no benefits from competition among MA plans and one should not expect any change in market outcomes from changes in market structure. This paper attempts to shed some light on the role of competition among MA plans by estimating the effects of competition in local geographic markets using enrollment data from 2001-07 from across counties nationwide.

This paper contributes to the literature by showing competitive effects in the MA regulated environment. Showing competitive effects is important for at least three reasons. First, it implies that competition leads to improved benefits to consumers, confirming a fundamental rationale for the MA program. Second, it shows that antitrust enforcement is important, even in the MA regulated environment. Third, for antitrust investigators, evidence of competition among MA insurers demonstrates that the relevant product market may be as narrow as MA insurance.

The large change in number of competitors and enrollment over the 2001-07 period implies that the data is well-suited for measuring competitive effects using panel data methods. Over this time period I observe a total of 480 entries, 233 exits, and large fluctuations in enrollment. Nationally, enrollment in urban areas drops from about 6 million in 2001 to 5 million in 2003, and climbs back to over 6 million in 2007. As new firms enter and exit the market it is possible to observe increases and decreases in market enrollment as insurers enter and exit markets. I employ panel data methods along with instrumental variable techniques to identify the effects of competition.

I focus on the effects of competition on enrollment. While premiums or margins provide alternative measures of market performance, enrollment is appealing because insurers may respond to changes in competition in a variety of ways that a researcher may not predict or observe, including changing premiums, benefit structures, marketing efforts, changing provider networks, or introducing an entirely new set of products. It is difficult to examine the impact

of competition on each of these strategic variables. However, the revealed-preferences of consumers imply that all strategic actions should be reflected in the number of enrollees in the market. In this way, the enrollment reflects aspects of competition that are often difficult for both health researchers and antitrust authorities to identify. Moreover, premiums charged by MA insurers are often $0, implying that competition is likely to have an effect along other dimensions that would be reflected in enrollment, but not premiums charged.[3]

The results of the paper show that an additional competitor in the local market expands overall enrollment. The econometric estimates reveal that the effects of an additional competitor are greatest when there are few competitors, which is consistent with the findings in the literature across a variety of industries.[4] For example, in rough terms, the second competitor in the market increases total MA enrollment by 25-30% relative to a market with only one MA insurer.[5] The third competitor increases enrollment relative to a market with only two competitors, but the increase is closer to 15-20%.

In addition to market expansion effects, this paper explores a number of other aspects of competition that are important for both CMS regulators and antitrust authorities. This paper examines the competitive impact of different sized firms. This is important for antitrust authorities because merging insurance companies may argue that fringe firms provide sufficient competitive discipline. Although there are plausible reasons to think that fringe firms have a limited impact on larger incumbents,[6] the actual effect is an empirical question. My

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[3] Focusing on just one strategic variable or making an incorrect assumption about the strategic variable used by insurers, may incorrectly forecast the effects from changes in competition.

[4] Many papers have suggested this pattern of competition using only entry information. For example, Bresnahan and Reiss (1991) find this pattern for a variety of professions including doctors, dentists, druggists, plumbers and tire dealers; Berry (1992) finds this pattern in the airline industry; Dranove et al (2003) observe this pattern for local and national HMOs in the commercial insurance market. Abraham et al (2006) look at competition in local hospital markets and use both quantity and entry information and observe that variable profits fall as the number of competitors in the market increase, but the effect declines as the number of competitors increases.

[5] Throughout this paper, references to the number of MA insurers exclude MA PFFS insurers, as explained in Section 3.

[6] First, larger insurers are able to negotiate for provider services at lower costs. Second, larger carriers with a greater number of providers are able to offer more attractive products with

results suggest that fringe carriers provide much less competitive benefit relative to larger insurers. Specifically, I find that the market expansion effect of the first few fringe insurers is roughly 7%-8% while the first few large competitors have an expansion effect of roughly 20% to 30%.

The paper is structured in the following way: Section 2 reviews the literature; Section 3 discusses the conceptual framework that relates enrollment to competition; Section 4 discusses the data; Section 5 describes the econometric analysis and results; and Section 6 concludes.

2. Literature Review

This paper is most closely related to the work of Pizer and Frakt (2002) who use a natural experiment to examine the impact of competition on particular plan benefits in the MA markets, which was called Medicare+Choice at the time of their study. They examine how premiums and benefits change when the government unexpectedly increases reimbursements paid to insurers. They find that plans in less concentrated markets had a larger increase in benefits and lower premiums, relative to more concentrated markets. My paper differs from theirs because it examines the competitive impact on enrollment, which reflects changes in all benefits and other strategic variables that may be affected by competition. In addition, I allow for the competitive effect to vary by size and number of firms, which allows me to examine the effect of competition for a variety of industry structures as additional competitors enter or exit a market.

Competition in insurance markets has also been examined in the commercial sector. Wholey et al (1995) examine the effects of market structure on HMO premiums in the commercial HMO market. They find that additional HMO competitors reduce HMO premiums. Feldman and Wholey (1996) focus on the effect of mergers on commercial HMO premiums and find that mergers have no

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extensive networks. Third, larger carriers tend to offer a greater number of products, implying they will be a closer competitor to a greater number of firms.

effect on premiums, suggesting that economies of scale from mergers are either small or cannot be distinguished from other observations in the data.

Aside from Pizer and Fract, there are relatively few papers that have examined the supply side of the MA market. Those that have looked at the supply side first estimate demand and make behavioral assumptions to recover the cost parameters of the firms.[7] For example, Town and Liu (2003) estimate the demand for MA products to calculate total welfare from the availability of these products. In calculating welfare effects, they assume a Bertrand-Nash pricing game in premiums to determine marginal costs and assume free entry to calculate fixed costs. With these assumptions, they find significant welfare benefits from MA plans. Both Maruyama (2006) and Lustig (2007) also assume a Bertrand-Nash pricing game in analyzing the supply side of the market.

My paper is complementary to these very structural papers, which presume that insurers may act competitively in a particular structural framework (i.e. static Bertrand-Nash pricing) and are unconstrained by CMS regulators. My paper confirms a correlation between competition and enrollment that is consistent with insurers competing. I find both enrollment expansion effects similar to what one should expect in an unregulated environment. These results suggest that the Bertrand-Nash pricing might be a reasonable assumption of firm behavior, although it does not appear that price is the only dimension in which firms compete. This paper shows that product proliferation appears to be a dimension of competition that has not been accounted for in previous work. [8]

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[7] Much of the previous empirical literature examining the MA market estimates the demand for MA products. For instance, Town and Liu (2003) use information on plan characteristics combined with aggregate enrollment data to estimate a nested-logit differentiated product demand model. Other papers have estimated similar nested-logit demand model including Lustig (2007), Hall (2007), Maruyama (2006), and Dafny and Dranove (2005) using aggregate data, and Atherly, Dowd and Feldman (2004) using consumer level data. In general, estimates from these papers imply that consumers are sensitive to changes in the premiums of MA products, as well as other characteristics of the product, and that MA products are more similar to each other than to original Medicare.

[8] This last finding has implications for instrumental variable approaches used in estimating structural demand models. In particular, the common assumption that rival product characteristics are uncorrelated with the unobserved quality of the plan may be violated in this market

3. Conceptual Framework

The analysis presented in this paper is a reduced form analysis of the effect of competition on enrollment in MA markets. This analysis is distinct from most reduced form studies of competition that focus on the effect on price or some other strategic variable of the firm, while this paper focuses on the effect on quantity. Therefore, it is useful to discuss the mechanism of how I expect competition to effect quantity and how the effect might be interpreted.

I view insurers as competing for a quality-adjusted price, p, for MA products. The quality adjusted price reflects benefits, the premium, the network and other choice variables of the insurer that affect the insurers perceived quality. Consumer utility is affected by the number of insurers in the market, N, as insurers compete by lowering the quality-adjusted price, p(N). A reduction in, p, has an impact on the probability that an individual consumer selects a MA product, q(p(N)). Therefore, all else equal, an increase in the number of firms, N, should reduce the quality-adusted price and the probability that a consumer chooses a MA product should increase. That is, $Dq/DN=(Dq/Dp)*(Dp/DN)$ and since $Dp/DN<0$ and $Dq/Dp<0$ we should expect that $Dq/DN>0$.

With one additional assumption, the model may also be informative regarding how the quality-adjusted price changes as the number of competitors in the market increases. In particular, if we take the derivative of the log of individual demand we find $d(\log(q(p(N))))/dN=(1/q*dq/dp)*(dp/dN)$. In the case that the semi-elasticity, $(1/q*dq/dp)$, is a constant, c, then $d(\log(q(p(N))))/dN=c*(dp/dN)$, the percentage impact on quantity is proportional to the impact on price. Even if the semi-elasticity is not constant, one might view this as an approximation, as long as the market semi-elasticity does not change significantly as the market price changes. The effect of competition on total enrollment follows similarly.[9] The literature on entry and competition in other

[9] Let the market size be, S, then the number of enrollees in MA products is equal to $Q(N)=Sq(p(N))$ so that $\log(Q(N))=\log(S)+\log(q(p(N)))$. Therefore, similar to the effect when looking at individual demand, the effect on market enrollment is $d(\log(Q(N)))/dN=d(\log(q(p(N))))/dN=(1/q*dq/dp)*(dp/dN)$.

industries suggests that each additional competitor might have a diminishing effect on market price. Therefore, if MA markets are similar to other competitive industries, one should expect the competitive impact on the probability of selecting an MA product to decline with the number of insurers in the market.

While this section provides an overview of the expected effect of competition on enrollment, it does not discuss how this effect will be identified. Both the number of insurers and enrollment are endogenous, which complicates the identification of a competitive effect. A more complete review of how the empirical approach for identifying the effects of competition is discussed in greater detail after reviewing the data used in this study.

4. Data

The primary data used in the analysis is publicly available enrollment data from Medicare. The data contains monthly information by county and plan from 2001-07.[10] The data includes the number of individual enrollees in a product within a county, the number of eligible members in a county, the type of products sold, and the name of the carrier selling the product.[11] The data is supplemented with Medicare Ratebook information that lists the Medicare benchmark rate for the county; the benchmark rate is the primary determinant of insurers reimbursement. The data is also supplemented with Census data. The Census data provides estimates of the population over age 65 and information that allows us to match counties with MSAs.[12]

Sample

The analysis focuses on markets that may be large enough to support a local HMO or PPO product. I select markets that have an initial Medicare eligible population of 6,500 or more, which is roughly equivalent to counties with total

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[10] The primary data is at http://www.cms.hhs.gov/home/rsds.asp.
[11] I also consider changes in ownership over time. For instance, I mark products owned by Pacificare as owned by United after their merger.
[12] The data is available at http://www.census.gov/popest/datasets.html.

populations of about 40,000. I also select markets that begin with some positive level of enrollment in an MA plan of any type in 2001.[13]

The MA program has gone through a number of important changes over the 2001 to 2007 period of the sample, primarily caused by the passage of the Medicare Modernization Act of 2003. It added regional PPOs, created a new system for proposing insurance plans, instituted a bidding system that partially determines payments to MA insurers, and created the prescription drug component (part D). Although these changes have had an impact on the types of services offered and the administrative procedures followed by insurers, both the competition among plans and the regulatory oversight of CMS has been a constant presence. Throughout the 2001 to 2007 period private insurers have been free to propose benefit plans of their choosing, and CMS has maintained the power to reject proposed plans.

The geographic market in this paper is defined as the county. Plans are regulated and administered at the county level. Both the oversight of the plans and Medicare rates paid to insurers are determined at the county level. In addition, when insurers enter a county they must offer the same plan to all individuals in that county.[14]

Although the data is available monthly, I look at only a single month in each year. This timing corresponds to consumers making enrollment decisions on an annual basis. I choose the month of October in each year. The analysis focuses on competition among local HMO and PPO products. The Private Fee For Service plans have recently become more popular, but they are more predominate in rural areas compared to the more populated counties studied in this paper.

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[13] The primary results presented below are robust to alternative samples chosen. For instance, I obtain similar results if I estimate the models below using a sample of all areas with more than 30,000 eligible individuals.

[14] Additional robustness checks were performed where only the largest county in each MSA was selected, and I found similar results.

Variables

The analysis that follows uses a variety of variables produced from these data. The following is a simple listing of variables and definitions that are used throughout the analysis:

Enrollees - This is the number of enrollees in a local HMO/PPO plan for a carrier in a month.[15]

Eligible – The predicted number of Medicare eligible individuals in a county in a month.[16]

MA Rate – The statutory benchmark set by Medicare for the part A and B component of the MA bid. This is an important determinant of the amount private insurers are paid to provide coverage for Medicare enrollees.[17] The rate is adjusted to 2007 dollars using the Consumer Price Index.

Competitor – I define a competitor as a carrier with 5% or more of the MA enrollees that purchase a local HMO or PPO product and have at least 100 enrollees.[18]

Fringe competitor – I define a fringe competitor as a carrier with at least 100 enrollees, but less than 5% of the market share.

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[15] This also includes local demonstration plans and cost based plans that appear to be offered locally as HMOs. These other plans make up a very small percentage of the MA market. This definition excludes Private FFS plans and Regional PPOs.

[16] The number of eligible individuals is only available until 2005 from the Medicare website. Census estimates provide population figures for individuals aged 65+ from 2001-06. I predict 2006 and 2007 eligibility figures based on county levels in 2006 and county level trends for 2007.

[17] Prior to 2006, the benchmark was the payment that Medicare offered to insurers for providing coverage to enrollees. In 2006 and later, the role of the benchmark changed so that insurers that bid below the benchmark are able to provide this cost savings to consumers as extra benefit. More precisely, if the bid is below the benchmark, the insurers return 75% of the difference as extra benefits to consumers. The local benchmarks are calculated as the maximum of the following amounts: (1) National county floors (there is one for rural and one for urban) (2) 50/50 blend of national and local healthcare rates (3) Original Medicare costs for the county.

[18] A variety of reasonable definitions of "competitor" were explored and the results presented here have proven to be robust across definitions.

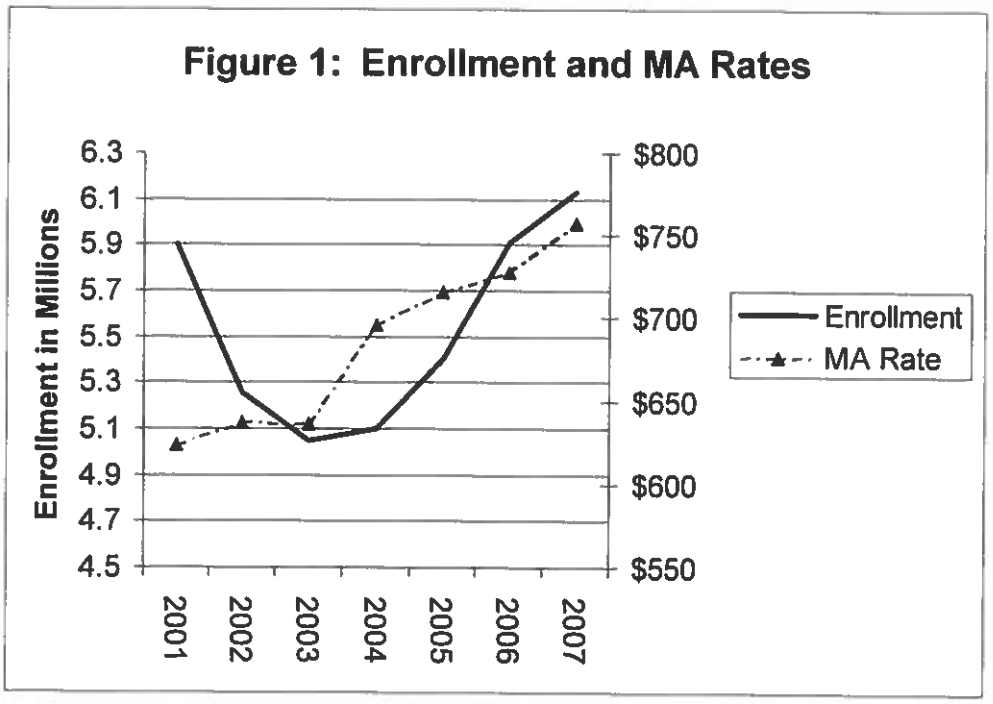
Penetration – The fraction of the eligible population enrolled in a MA HMO or PPO-type plans.

Proliferation – Number of contracts offered in the market minus the number of competitors in the market. By subtracting the number of competitors from the number of products offered, I focus on additional contracts offered in the market. I only look at additional product offerings, because it is obviously the case that an entrant must offer at least one product in the market. If each firm offers a single contract then the product proliferation variable is 0.[19]

Descriptive Statistics

Before analyzing competition, I begin with some graphs and tables that show some recent trends in the MA market. *Figure 1* presents the national enrollment in coordinated care plans along with the statutory benchmark rates paid to insurers over the 2001-07 time period. The enrollment is shown in the sold line with enrollment in millions shown along the left vertical axis. The benchmark rate is shown in a dotted line with the dollar figure shown on the right vertical axis.

[19] The number of contracts in the market is a proxy for the actual number of products. There may, if fact, be a number of products per contract so the number of products tend to be greater than the number of contracts. However, it seems that plans offered under the same contract are typically similar, suggesting that the number of contracts may be a better proxy for variety offered in the marketplace.



The graph displays a large change in enrollment over time.[20] Enrollment initially declines and then begins to increase in 2003 at the time of the passage of the Medicare Modernization Act of 2003. One can see that the passage of the act corresponds to a large increase in benchmark rates paid to MA carriers. The rates increased by 10% above the overall CPI from 2003 to 2004, while in the prior two years the growth was less than 2%. The large increase in rates reflected the goals of policymakers to encourage plan participation and expand access to plans, and did not necessarily reflect changes in medical costs at the time. As evidence of this policy shift, note that the CPI for medical care services ranged between 2-3% above the overall CPI for this same period. This supports that idea that changing reimbursement rates to insurers reflect changes in national policy rather than changes in the underlying costs of medical services.

Table 1 below shows the net entry and exits in markets for both competitors and fringe carriers. The entry and exit table show several expected patterns that

[20] Note that the enrollment figures include only HMO and PPO plan types, which make up a vast majority of enrollment in urban areas.

match changes in enrollment shown in figure 1 above. First, in the beginning of the sample there are a large number of exits that corresponds to the period in which enrollment levels are falling and MA benchmark rates are relatively low. In 2003 there is a sharp reduction in the number of exits from the market, accompanied by a large increase in the number of entrants. The table shows a large number of competitors entering the market and few exits from 2004 on corresponding to an increase in MA rates and an overall growth in enrollment. Looking at fringe competitors, there is a very similar pattern, although with fewer exits in 2002 relative to the larger competitors.

Table 1: Net Changes in Number of Competitors

	2002	2003	2004	2005	2006	2007	Total
Competitor Entry	24	34	41	94	161	126	480
Competitor Exit	124	31	25	12	31	10	233
Finge Entry	30	17	36	71	151	105	410
Fringe Exit	39	19	14	16	35	36	159

The large number of cases of entry and exit shown in *Table 1* is important because I identify the effects of competition by observing changes in enrollment as the number of competitors and fringe firms in a market change.

While *Table 1* and *Figure 1* provide some information on the overall trends and changes in the market, *Table 2* provides a recent snapshot of the MA market in 2007. The first column shows the number of competitors in the market and the corresponding row shows the average characteristic in markets with that number of competitors. For instance, the second column shows the eligible population is greater in markets with more entrants. The third column shows higher average rates in markets with more competitors. The table shows that markets with more competitors typically have more enrollment and penetration. In addition, markets with more competitors seem to offer a greater number of products.

Table 2: Market Characteristics By Number of Competitors in the Market in 2007

Competitors	Avg. Eligible	Avg. MA Rate	Avg. Enrollment	Avg. Penetration	Avg. Proliferation	Number of Obs.
1	21,395	$736.78	2,027	7.9%	0.4	162
2	36,210	$756.67	7,057	18.4%	1.3	240
3	74,013	$786.06	15,951	21.1%	2.1	106
4	61,583	$781.23	13,927	22.1%	2.3	55
5	140,715	$837.20	43,347	29.2%	4.4	25
6	156,443	$804.18	63,504	29.0%	5.1	7
7	81,400	$732.04	6,236	7.7%	5.0	1

The descriptive statistics in *Table 2* suggest that competitive forces are at work in MA markets. First, markets with a greater number of competitors are typically larger and have higher MA rates, which is consistent with insurers entering markets that have greater demand. Second, penetration and enrollment is higher in markets with more competitors. It is important to note that the table does not show a direction of causality. That is, one cannot tell from *Table 2* whether competition leads to greater enrollment, or whether firms are attracted to markets that are more receptive to MA products.

There is a large assortment of market structures in these data. *Table 3* below shows the observed market structures over the 2001-07 time period. The left hand side of the table shows the number of competitors, while the top of the table shows the number of fringe firms. The counts of competitors and fringe firms is greatest for those markets with between 1 and 4 competitors and between 0 to 3 fringe firms, which account for over 95% of the observations.

Table 3: Observed Market Configurations in the 2001-2007 Time Period

Number of Competitors	Number of Fringe Firms: 0	1	2	3	4 or more	Total
1	1,441	59	14	1	0	1,515
2	1,118	156	60	23	11	1,368
3	353	126	45	9	4	537
4	159	49	10	6	19	243
5 or More	26	20	15	27	31	119
Total	3,097	410	144	66	65	3,782

4. Econometric Model and Results

This section discusses the econometric model used to explain the effect of competition on market outcomes. The basic empirical model is simply a regression of the number of competitors on log enrollment. The goal of the model is to isolate the impact of a change in competition on enrollment. The regression used in the analysis is:

$$Log(enrollment_{it}) = \beta_0 f(Num.\ Competitors_{it}, Num.Fringe_{it}) + \beta_1 g(Eligible_{it}, MA\,Rate_{it}) + County_i + Time_t + Time_t - State_i + \varepsilon_{it}$$

The first set of variables $f(Num.\ Competitors_{it}, Num.Fringe_{it})$, captures the competition between carriers. The second group of variables, $g(Eligible_{it}, MA\,Rate_{it})$, captures the change in enrollment as the size of the market changes, where the size of the market is affected by the size of the eligible population and the statutory benchmark rate set by Medicare. The variables $County_i$, $Time_t$, and $Time_t - State$ are county, time, and time-state fixed effects. The error term is ε_{it} and β_1, β_2, and β_3 are parameters to be estimated.

Typically using simple regression analysis produces biased estimates. Specifically, a selection bias can arise if there are unaccounted for demand or marginal cost factors that jointly affect both enrollment and the number of firms in the market. I control for the selection bias applying both fixed effects and instrumental variable techniques.[21]

As argued above, much of the entry and exit observed in the data is caused by a known exogenous policy change affecting MA rates, limiting the role of unobserved marginal cost or demand shocks that could potentially affect entry and enrollment and bias the estimates. By including time dummies that capture changes in national policy along with local MA rates and county fixed

[21] I follow the work of Evans, Froeb and Werden (1993) and Davis (2005, 2006) that control for endogeneity in two ways. First, the panel structure of the data accounts for factors that affect equilibrium selection that are invariant over time. Second, instrumenting accounts for any remaining effects of endogeneity or measurement error that may cause imprecision in the estimates.

effects, the analysis has controlled for many of the important factors that affect entry and exit in MA markets over the studied time period. Therefore, one might argue that the fixed-effect estimates without instrumenting provide precise unbiased estimates of the competitive effects.

However, it is possible that endogeneity bias could arise from demand or marginal cost factors that may be correlated with both the number of competitors and enrollees. If county fixed-effects are included along with state-time dummies, then for a potential bias to exist it is necessary for changes in marginal cost or demand factors specific to a county to be correlated with entry and enrollment in that county.[22] To correct for this potential problem I need instruments that are uncorrelated with changes in unobserved marginal cost or demand in the county, but correlated with the number of competitors in the market. A variable that captures the fixed cost from entering a market would be ideal because fixed costs affect the number of firms in the market, but do not affect marginal cost or demand.

The instrument used in this paper is the average number of MA carriers in other counties of the state. The reason this is an appropriate instrument is that there are shared fixed costs from entering geographic regions including establishing a contract with a large provider in an area or shared administrative facilities in an area.[23] The number of competitors in a state may also be correlated if changes in state regulation commonly affecting fixed costs of entry. For instance, fixed costs associated with obtaining a state HMO license. Note that including state-time fixed effects may be important for this instrumenting

[22]In other words, after accounting for all factors that commonly affect enrollment across the state that also affect quantity, I should expect for the only remaining correlation in the number of firms to be related to common fixed costs from entry. If all factors affecting entry are common across the state or if all fixed costs are local, then I should expect a change in the number of firms in the rest of the state to be poorly correlated with the number of firms within a county and the instrument will produce insignificant results.

[23] The underlying assumption is that demand for healthcare services and marginal costs for healthcare are local, while many components of fixed costs are shared across larger geographic regions.

strategy to work because it ensures that common changes in marginal cost that might affect entry and enrollment across the state are netted out.[24]

a. Market Expansion Effects – Enrollment

I estimate a series of models showing the effect of market structure on enrollment. The results of the regression analysis are shown in *Table 4* below. The first column of the table lists the variables and the remaining columns show parameter estimates and t-stats of various regression models. I begin with a baseline OLS specification of the above model that leaves out market fixed effect dummies. I find that the effect of market structure on enrollment is positive and highly significant. The first model predicts that the second large competitor increases enrollment in the market by over 84%; however, without controlling demand and cost effects specific to the market, I cannot be certain of the direction of causality in the model. That is, I cannot tell whether firms enter the market because enrollment in the county is high, or whether enrollment is high because of competition. If bias exists I should expect that demand and marginal cost changes would bias coefficients upward because positive demand shocks and negative marginal cost shocks will induce entry and increase total enrollment.

In the model Fixed Effect (1), I control for county level fixed effects that account for equilibrium selection problems specific to a county. The coefficient on the competitors drops considerably relative to the OLS regression analysis. The effect of the second competitor on enrollment is about 36.3%. Fixed Effect (1) also shows that the fringe competitors have an impact on competition. Specifically, the first small competitor in the market increases enrollment by about 15.5%, but the marginal effect of an additional fringe firm is much smaller, with the second fringe firm having an impact of just 2.2%. Each additional competitor, both small and large, has a diminishing marginal effect on enrollment.

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[24] The traditional instrument used in this type of analysis is a lag of the market structure (E.g. number of firms or Herfindahl), but this approach does not work well in the presence of serial correlation.

The second model, Fixed Effect (2), adds an interaction of the number of large competitors and number of small competitors to account for the fact that as the number of competitors increases the marginal output from additional fringe firms should be less. I find the expected negative coefficient on this interaction. Fixed Effect (2) also includes state specific time trends. These state specific trends account for changes specific to a state that might affect enrollment such as changes in medical cost or regional variation in demand. After accounting for these additional state specific trends, one can see that the results are qualitatively similar to those found without these state specific trends. Specifically, the first large competitor has a large effect on demand and additional rivals have much smaller effects.[25]

Table 4: Expansion Effects - Regressions on Log(Market Enrollment)

	OLS		Fixed Effect (1)		Fixed Effect (2)	
	Coef.	t	Coef.	t	Coef.	t
2nd Competitor	0.842	(14.59)	0.363	(10.06)	0.275	(8.55)
3rd Competitor	0.237	(4.44)	0.244	(7.51)	0.170	(5.99)
4th or More Comp.*(#Comp. - 3)	0.098	(2.48)	0.159	(3.54)	0.204	(4.18)
1st Fringe	0.622	(11.61)	0.155	(5.06)	0.145	(5.21)
2nd Fringe	0.291	(4.01)	0.022	(0.55)	0.016	(0.38)
3rd Fringe	0.119	(1.34)	0.029	(0.83)	0.062	(1.29)
4th or More Fringe.*(#Fringe - 3)	0.140	(5.66)	0.056	(3.21)	0.071	(2.55)
# Competitors*# Fringe					-0.017	(-1.67)
Log(MA Rate)	7.943	(5.17)	2.741	(1.73)	0.940	(0.66)
Log(Eligible)	5.973	(6.04)	2.598	(3.12)	1.101	(1.41)
Log(Eligible)*Log(MA Rate)	-0.784	(-5.19)	-0.351	(-2.57)	-0.136	(-1.07)
Constant	-53.112	(-5.29)	-13.338	(-1.37)		
Year Dummies	Yes		Yes		Yes	
State & Time Dummies	No		No		Yes	
County Fixed-Effects	No		Yes		Yes	
Rho			0.935		0.965	
R-Squared (Within)			0.282		0.580	
R-Squared (Between)			0.695		0.337	
R-Squared (Overall)	0.743		0.667		0.367	
Number of Observations	3668		3668		3668	
Number of Groups	643		643		643	

[25] To check if these results appear to hold in the current MA environment, I also estimate an entry model that includes only the last three years of data. I find very similar results to those presented in the model Fixed Effect (3).

Next I examine instrumental variable estimates. For the instrumental variable estimates I change the specification of the model slightly. Specifically, I make the competitive effects variable continuous rather than discrete, but allow for flexibility in how output changes with the number of competitors by including competitors and competitors squared. This transformation allows us to match the continuous nature of the instruments and also to reduce the number of variables that must be explained by the chosen instruments. *Table 6* below shows the results from this instrumenting strategy. The model Fixed Effect (4) in table 6 estimates the model without instrumenting, but including the nonlinear competitive effects. The IV Fixed Effect (1) is the same as Fixed Effect (4), but instruments are applied.[26] There is little qualitative difference in the two specifications. However, a Hausman test for endogeneity suggests that there is an endogeneity problem. Another noticeable difference in the two estimates is that the significance of the t-statistics fall in the IV Fixed Effect model, which may be caused by an expected loss of efficiency from the IV procedure. The IV regression suggests that a second competitor in the market increases enrollment by 24%.[27]

[26] The specific instruments include the average number of competitors in other counties, the average number of competitors in other counties squared, the average number of fringe competitors in other counties, the average number of fringe competitors squared and the interaction of these instruments. I also include a dummy variable for whether the average number of competitors is greater than one and whether the average number of fringe firms is greater than one.

[27] 23% =25.4*(1)-2.4*(1^2)

Table 5: Expansion Effects - Regressions on Log(Market Enrollment)

	Fixed Effect (4)		IV Fixed Effect (1)	
	Coef.	t	Coef.	t
# Competitors	0.254	(13.84)	0.279	(7.52)
# Competitors^2	-0.013	(-2.83)	-0.036	(-3.31)
# Fringe Competitors	0.078	(4.91)	0.100	(3.67)
# Fringe Competitors^2	-0.006	(-2.52)	-0.018	(-4.05)
Log(MA Rate)	1.234	(1.65)	0.221	(0.27)
Log(Eligible)	1.292	(2.91)	0.642	(1.32)
Log(Eligible)*Log(MA Rate)	-0.164	(-2.43)	-0.064	(-0.87)
State & Time Dummies	Yes		Yes	
Rho	0.965		0.965	
R-Squared (Within)	0.576		0.562	
R-Squared (Between)	0.350		0.311	
R-Squared (Overall)	0.384		0.354	
# Observations	3668		3668	
# Groups	643		643	

Although the estimates above are indicative of consumer benefits from competition, it is unclear how these expansion effects might translate into savings. For instance, if demand for MA products is highly elastic then expansion effects may be large, but benefits to consumers may be small. Estimates from Atherly, Dowd and Feldman (2004) suggest that the own-price elasticity of demand between MA products and traditional Medicare is about -.64 suggesting an expansion effect of 20% would correspond to a decrease in price of 31% (=.20/.64). More recently, Dunn (2009) estimates the elasticity between MA products and traditional Medicare to be –3.8, implying a price effect of 6.2%=(.20/3.19). Clearly both these predictions of competition on quality-adjusted price are quite crude and more work is needed to directly measure the effect of competition on consumer welfare.

b. Market Expansion Effects - Product Proliferation

As noted in the introduction of the paper, firms may compete on a number of dimensions. In this section, I examine how the number of competitors in the market affects the number of insurance contracts offered. Before proceeding

with the analysis, I first examine some descriptive statistics. *Table 6* below shows a tabulation of the proliferation variable. The left hand column shows the possible values of the proliferation variable observed in the data, the second column shows the frequency of markets in which I observe that value, and the third column shows the percent of markets where I observe that frequency. It is important to note that 58% of markets have no product proliferation, implying that each carrier in the market has a single contract. The high fraction of markets with zero proliferation suggests that the error term will not be normally distributed and that a standard regression approach will be inappropriate. Therefore, in analyzing the effect of competition on product proliferation I apply commonly used count regression techniques.

Table 6: Frequency of Market Proliferation Variable

Proliferation	Frequency	% of Sample
0	2,117	57.7%
1	934	25.5%
2	338	9.2%
3	159	4.3%
4	55	1.5%
5	24	0.7%
6	13	0.4%
7	7	0.2%
8	8	0.2%
9	2	0.1%
10	6	0.2%
11	1	0.0%
13	1	0.0%
15	2	0.1%
16	1	0.0%
Total	3,668	100%

In the regression analysis shown in *Table 7* below I assume that the error term has a Poisson distribution. In the first regression I show a simple Poisson regression without state or county fixed effects, but including a time trend. The analysis looks quite similar to the market expansion effects shown in the previous subsection. In particular, I find that additional competitors increase product proliferation, but that this effect declines as the number of competitors

in the market increases. The second competitor in the marketplace increases product proliferation in the marketplace by around 65%[28]. In addition, I find that larger competitors have a greater effect than smaller ones. However, the expansion effect declines as the number of competitors in the market increases. The dummy variables included in the model show a clear time trend for product proliferation, showing that, all else equal, the number of products available in the market has steadily increased since 2001.

It is important to note that the same potential biases that occur in the enrollment regressions may also have an impact on product proliferation. To correct for these potential problems I include state and county fixed effects in Poisson regression (2) and FE Poisson, respectively. Including these fixed effects results in smaller market expansion effects for both the number of competitors and number of fringe firms. However, the results still show that the larger competitors have the greatest impact on product proliferation and that this effect declines as the number of competitors in the market grows.[29]

[28] (=71.9%*1-8%*(1^2))

[29] The nonlinearity of the poisson model makes it more difficult to include additional fixed effects or to apply instrumental variable techniques, so these additional robustness checks are not applied. However, if the enrollment expansion effects above are an indicator, then I may not expect the above results to change when an IV approach is applied.

Table 7: Expansion Effects - Regressions on Proliferation

	Poisson (1)		Poisson (2)		FE Poisson	
	Coef.	t	Coef.	t	Coef.	t
# Competitors	0.743	(11.17)	0.497	(9.86)	0.445	(5.12)
# Competitors^2	-0.093	(-6.88)	-0.058	(-5.82)	-0.030	(-1.83)
# Fringe Competitors	0.215	(6.31)	0.207	(6.47)	0.090	(1.85)
# Fringe Competitors^2	-0.013	(-4.52)	-0.012	(-3.55)	-0.005	(-0.94)
Log(MA Rate)	-2.943	(-1.38)	0.523	(0.32)	-9.402	(-3.01)
Log(Eligible)	-1.665	(-1.27)	0.112	(0.11)	-3.549	(-1.99)
Log(Eligible)*Log(MA Rate)	0.282	(1.42)	0.022	(0.15)	0.601	(2.21)
Constant	15.028	(1.07)				
Year Dummies	Yes		Yes		Yes	
State Fixed-Effects	No		Yes		No	
County Fixed-Effects	No		No		Yes	
Log likelihood	-3345.6		-2869.2		-1758.9	
Number of Observations	3726		3540		2815	
Number of Groups	671		39		435	

6. Conclusion

This paper directly analyzes the effect of competition on enrollment in MA markets. Estimates presented here provide evidence of market expansion effects by showing that additional competitors in the market grow overall enrollment. The results also suggest that benefits to competition decline with the number of competitors, as is found in a number of other industries. The paper also provides evidence that an increase in the number of insurers in a market increases the proliferation of products offered. This result is interesting because product proliferation may be an important dimension of competition that has not been accounted for in previous work. The descriptive analysis presented here suggests that a theory of competition that considers the strategic decision to introduce a new product may be an important direction for future research.

Overall the analysis presented here suggests that competition among MA insurers does matter despite the regulated environment, especially the first few MA competitors. However, there are many aspects of competition that require further study. First, although this study highlights that there are benefits to

competition, the estimates do not quantify how much competition matters to consumers or how consumers benefit with more competitors. Second, the study analyzes the effects of additional entry, but does not look at what factors affect entry such as government payments to MA insurers. It may be of interest to policy-makers to compare the benefits of competition to the additional cost to the government to induce entry by increasing MA rates. Third, the estimates presented here are unbiased if both the fixed effects and IV techniques effectively control for endogeneity. To explore the accuracy of the results presented here, one may want to explore alternative approaches for identifying competitive effects when entry and pricing are endogenous.[30]

[30] For example, Abraham, Gaynor and Vogt (2007) control for entry selection in examining the effects of competition using a structural entry model for hospitals.

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