

# Health Plan Entry and Exit in the Medicare Managed Care Market

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## Abstract

The Balanced Budget Act of 1997 radically changed the payment formulas and regulations of Medicare managed care plans, resulting in dramatic swings of entry and exit. We use semi-reduced form, sequential estimators to decompose health plan decisions into three parts: exit from the commercial market, entry and exit from Medicare, and entry and exit from selective counties while remaining in the Medicare program. Entry and exit decisions are highly elastic to changes in pricing, but industry trends and regulations play an even greater role in explaining recent trends. Simulations suggest that increasing county payment rates will only partially reverse recent exit.

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## **1. Introduction**

Recent years have witnessed dramatic swings of entry and exit of managed care plans in the Medicare program, motivated heavily by significant changes in the payments and regulations due to the Balanced Budget Act (BBA) of 1997. While previous work has studied Medicare Health Maintenance Organizations' (HMOs) entry decisions in the 1980s and 1990's up until 1998 when HMOs were entering this market, little formal modeling has studied market exit since that time. This paper combines recent Medicare data with commercial HMO data at the plan and county level to study HMO entry and exit behavior.

Our empirical specification decomposes Medicare health plan entry and exit decisions into three parts: entry and exit of HMOs from the commercial market, the decision of whether to participate in Medicare if an HMO is already serving the commercial market, and the selective entry and exit of plans into specific counties once it has decided to participate in the Medicare program. We call these the commercial market entry and exit decision, the Medicare participation decision, and the county selection decision, respectively. We show that all three decisions are elastic to changes in Medicare prices, but that regulations and non-price factors also play a critical role in explaining recent trends. Previous research modeling Medicare HMO entry and exit as a single decision has failed to capture the complexity of recent trends. Roughly 20% of plan-county exits from Medicare since 1998 are explained by the market exit of commercial plans. Of the remaining 80% of the plan-county exits, 30% reflect decisions by plans to cease participation in the Medicare program, while approximately 50% reflect selective plan exit from unprofitable counties. Our three-stage framework attempts to better understand each of these three trends, determine how they have been related to payment and regulatory changes in recent years, and simulate whether simply increasing payment rates can reverse recent trends.

Our analysis should be of interest to policy makers and researchers on at least three levels. From a policy perspective, understanding how payment and regulatory policy affects HMO<sup>1</sup> entry and exit decisions is of critical importance given the perceived importance of managed care to the Medicare program as a cost containment and quality assurance strategy. At this time, the Centers for Medicare and Medicaid Services (CMS) is being urged to dramatically reform its Medicare+Choice payment formula, including options such as abandoning risk adjustment, dramatically increasing county payment rates and changing the payment setting strategy from a regulatory formula to a competitive bidding framework (MEDPAC, 2002). Understanding health plan reactions to potential changes in payment and regulations will be central to formulating appropriate strategies. Health economists more broadly are interested in how health plan payment policies affect plan behavior, including selection incentives, costs, profitability and accessibility. Our panel of plan and county level data over a very recent time period, encompassing a period of dramatic price changes and a reversal in momentum from entry to exit may help clarify several of these issues. Finally, HMO entry and exit decisions can be viewed from an industrial organization perspective as an example of competing firms reacting to significant changes in the market. Unlike most markets in which prices are set endogenously, the Medicare managed care market, with its regulatory-determined prices provides a very useful setting for studying firm competitive behavior.

Our analysis of health plan entry and exit over the sample period 1997-2001 differs from the existing literature in several ways. Our unit of observation is a plan-county-year; in contrast, previous research has either modeled plan level entry (Pai and Clement, 1999) or the number of plans in a county as the dependent variable (Cawley et al., 2000). The rationale for using the county as the HMO market area is the observation that a market is normally defined as an area in which a uniform “price” is used. The “price” variables in Medicare Managed Market are the payment rates, which are constant in a county,

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<sup>1</sup> The BBA changed the name of the Medicare managed care program to “Medicare+Choice” in order to emphasize that one goal of the new program was to encourage choices among alternative health plan organizational forms. As we discuss briefly below, there has been very little entry of new organizational forms, such as Preferred Provider Organizations (PPOs) or Competitive Health Plans (CHPs). Since the focus of this paper is on entry and exit decisions of the managed care plans that are organized as HMOs, and since this terminology is widely understood,

but vary within MSAs or HMO's combined market. The reason for not aggregating HMOs within a county is to understand how a plan's own characteristics and those of competing plans in the same county affect HMO decisions.

## **2. Policy Background**

Before the Balanced Budget Act of 1997, Medicare HMO payment rates were based on adjusted average per capita costs (AAPCC). The AAPCC was calculated using a five-year average county per capita fee-for-service (FFS) cost for a typical enrollee, adjusted first with a county demographic score and then by individual score, which depended on age, gender, institutional status and eligibility for Medicaid. The payment setting methodology was heavily criticized due to the mostly unexplainable variation of rates across counties, the variation of rates over time within a county and the inability of the limited risk adjusters to capture the variation in individual level health care costs (GAO 95-174, GAO 97-133).

The Balanced Budget Act of 1997 fundamentally changed the payment methodology with the goal of eliminating overpayments and saving money for Medicare. County average payments are now defined as the maximum of county blended capitation rate, which is a weighted average of county capitation rate and the national average capitation rate<sup>2</sup>, minimum "floor" capitation amount and minimum 2% increase. The new methodology was intended to be budget neutral, so that the final payments on average must be equal to the desired national average payments trended forward from 1997.<sup>3</sup> As of January 2000, Medicare program has also started using both demographic information and inpatient diagnostic information (as a proxy for medical need) to calculate the individual risk factors. During the phase-in, the payments are a weighted average of the two payment formulas; a payment calculated using the old formula similar to AAPCC and the new formula based on the diagnostic risk adjustment model.

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we have chosen to consistently call our managed care plans "HMOs" rather than calling them Medicare+Choice plans, as CMS prefers.

<sup>2</sup> The blend parameter for local capitation rate was originally scheduled to be 10% in 1998, 18% in 1999, 26% in 2000 and 34% in 2001; however subsequent legislation has delayed this phase-in so that has remained at 10 percent throughout our sample period.

The current schedule would result in risk adjusted payments being 100% based on diagnostic in 2006, and using not only inpatient but also diagnoses from all clinician encounters in that year.

With regard to other regulations, one important requirement that affects HMO participation is the Adjusted Community Rating (ACR) mechanism. Each spring CMS determines whether each participating HMO's profit margin for its Medicare enrollees is higher or lower than for its commercial enrollees. If the profits are projected to be higher, then the HMO has to either increase benefits or reduce premiums or return the excess profits to the program. In practice, no HMO chooses the last option. Encinosa and Sappington (1999) claim that the mechanism implies an asymmetric treatment of profits and losses, which may discourage HMOs from entering the Medicare market, especially if commercial profits remain below equilibrium level for extended periods of time or the commercial market is marked with excess capacity, extensive merger and acquisition activity and unusually small rates of return. Even if the ACR constraint does not bind, competitiveness of the market may force HMOs to charge lower premiums or offer a smaller set of benefits than their admitted ACR proposal, which may eventually lead to HMO exits from Medicare (GAO 97-133).

Balanced Budget Act of 1997 changed the name of the managed care program to "Medicare+Choice" and eliminated the 50/50 rule, minimum size constraints, and the contiguous counties requirement<sup>4</sup>, therefore allowing HMOs to enter the Medicare market before building a commercial base first. In November 1999, Congress modified the BBA by passing the Balanced Budget Act Refinement Act (BBRA) to encourage plan participation. The act reduced some administrative requirements, decreased the length of time the plan had to wait before re-entering<sup>5</sup>, and increased plan flexibility to vary

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<sup>3</sup> In 1998 and 1999, the floor provisions, together with the minimum 2% increase resulted in all counties being either at the floor or minimum increase (HCFA, Report to Congress, 1999).

<sup>4</sup> These regulations were part of the Tax Equity and Fiscal Responsibility Act of 1982. The 50/50 rule required that HMOs have at least the same number of commercial enrollees as Medicare enrollees in a given county. The minimum size constraints for being allowed to offer a Medicare risk product was a commercial enrollment 5000 in urban areas, 1500 for rural areas. The contiguous counties requirement restricted the ability of plans to selectively enter high payment counties without also enrolling nearby people: the service areas had to be connected.

<sup>5</sup> Before BBRA, The plans could not re-enter into the Medicare market within 5 years after the withdrawal. A GAO (99-91) report mentions that some plans may have exited the market just before January 1999, since none of the plans before that date were technically Medicare+Choice plans and this particular restriction would not apply. This

benefits within a geographical area. Plans that began serving counties in which there was no previous HMO are now eligible to receive a five percent entry bonus (GAO 00-183). The schedule for full implementation of diagnosis-based risk adjustment was delayed from 2004 to 2007. The payment formulas were further revised by BIPA 2000, which increased the floor payment and raised the minimum guaranteed increase from two to three percent, while also imposing restrictions on how these increases in revenues could be used.

In summary, the Medicare payment formula has changed dramatically since 1997, and changes in the Medicare county level payment rates are appropriately considered exogenous to any actions that individual health plans have taken since then. Moreover, there have been important changes in the regulatory environment since 1997. The goal of this paper is to develop a structural model that can distinguish the impact of these payment and regulatory impacts, and then use the model to simulate the impact of hypothetical alternatives.

### **3. Previous Research**

The earliest work on identifying the determinants of HMO participation in Medicare market is by Adamache and Rossiter (1986), who focused on Medicare demonstration projects. Porell and Wallack (1990) analyze the entry decisions of Medicare risk HMOs, and include various organizational, market area and performance and competitive market structure attributes. AAPCC rates (and alternative supply price variables), experience in cost contracting, federal qualification, and poverty rate in the elderly population are consistently significant in all specifications. Herfindahl indices, plan shares of HMO market, and net revenues per enrollee contribute little, but controlling for utilization and favorable financial performance increases the probability of entry. Pai and Clement (1999) adopt a diversification argument to explain risk HMO entry into Medicare market, using a market definition that includes all

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preemptive exit could have provided an opportunity to withdraw and observe the short-term consequences of the BBA before re-entering

counties served by the HMO. They find HMO size, growth of HMO market enrollment and federal qualification status to be more important than payment rates in explaining market entry.

Brown and Gold (1999) explore previously unstudied market characteristics that may influence HMO participation. Their case studies indicate that historical presence of managed care plans in a service area was the main cause of the market expansion in some MSAs, even where the AAPCC rates were not among the highest. In markets with large physician groups, risk plans are also more likely to flourish, whereas markets that are dominated by academic medical centers and large hospitals may be less attractive. Areas with resource intensive practice patterns, high cost medical technologies and higher ratio of specialists to primary care physicians could signal higher expected costs, and therefore be undesirable.

The recent literature on HMO participation has concentrated on market competitiveness and used the number of plans in a county as the dependent variable. Empirical work by Cawley et al. (2001), Buchmueller and Town (2000), Dranove and Mazzeo (2001), Town and Liu (2001) are based on methodology developed by Breshanan and Reiss (1991). Cawley et al. use a latent profit function that depends on payments, estimated average variable costs, market size, variables that affect probability of enrollment and fixed costs to estimate the necessary HCFA payment rate thresholds that support a given number of risk plans in a county for the year 2000. Their framework does not permit them to include the characteristics of specific HMOs or to separate the county selection decision from the plan exit decision. They find that only 526 counties have payment rates that exceed what is needed to support one HMO. Buchmueller and Town (2000) construct parameters that characterize the intensity of competition in the commercial HMO market in California, and find that the competition was intense in the mid 1990s and decreased over time. Dranove and Mazzeo (2001) use a differentiated products framework to distinguish between national and local commercial HMOs, concluding that firms of the same “product type” (national vs. local product) compete with each other, but effect of differentiated firms is insignificant. These recent studies imply that the strategies and characteristics of other Medicare HMOs that are currently serving the county could influence the decision of an HMO to enter the market or to renew an existing contract.

Various GAO reports have also identified determinants of plan participation other than changes in payment rates. Plans are more likely to withdraw from the market if faced with larger competitors and the likelihood increases if the difference in market shares between the HMOs is high, the number of large competitors is small or the plan does not have enough experience in the county (GAO 99-91, GAO 00-183). Business strategies by HMOs also influence entry decisions; publicly traded HMOs are more likely to expand their service areas, due to the need to increase short-term profits<sup>6</sup>. (GAO 99-37).

Another issue relevant to this paper is favorable selection bias that may cause overpayments to HMOs. Baker (1997) showed that counties with high Medicare enrollments tend to have total Medicare payments that are biased upwards due to favorable selection. Batata (2001) highlighted that this problem of bias in the payment rates is higher for Part A (inpatient) services than for Part B (physician and other medical) services<sup>7</sup>. Calculations done at Mathematica Policy Research (Hill and Brown, 1990; Brown et al, 1993) indicate that payments were on average 5.7% higher than they would have been in fee-for-service, even after the 5% discount<sup>8</sup>. Overpayment allows plans to generate a surplus by negotiating below-market rates with providers and reducing utilization and to attract more enrollees through extra benefits and lower premiums (Brown and Gold, 1999). Flawed rate setting leading to overpayment may also explain the rapid increase in HMO participation before the Balanced Budget Act.

#### 4. Model

We construct a structural model of health plan entry and exit, and use it to specify a semi reduced form model that is used for empirical estimation and testing. Let  $t$  be an index over time,  $c$  an index over counties, and  $j$  an index over health plans. To simplify notation, we omit subscripts if not needed.

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<sup>6</sup> Mergers and acquisitions within the HMO market generally seek to obtain a larger share of commercial market, with the intention of offering a Medicare risk product after establishing a solid commercial presence. In a few cases, acquisitions are made specifically for ensuring dominance in the Medicare risk market. One example is the acquisition of FHP International by PacifiCare Health Systems in 1996

<sup>7</sup> Favorable selection in Medicare HMOs has been analyzed in other papers, although with less conclusive evidence. Dowd, Feldman and Moscovice (1996) and Rodgers and Smith (1996) find no evidence of biased selection in their studies, but the issue has been mentioned since the evaluations of the demonstration projects (Eggers, 1982; Lubitz, Beebe and Riley, 1985). Other studies with TEFRA risk HMOs also concluded that there is favorable selection (Cox and Hogan, 1997; Hellinger, 1995; Morgan et al, 1997).

Each year the Medicare program announces the risk adjustment formula and county level capitation payments for each county,  $CP_t = \{CP_{ct}\}$ . The first stage decision each plan must make is whether to continue to serve any commercial enrollees. This decision is influenced by plan and market characteristics, as well as potentially the profitability of the Medicare HMO participation. Conditional on continuing to exist as a commercial entity, the second stage decision made by each of the  $j = 1, 2, \dots, J$  commercial HMOs is whether to participate in the Medicare HMO program. The third stage decision that we model is conditional on deciding to participate as a Medicare HMO market, each commercial HMO must choose which counties they wish to serve in this market. As previously discussed, the BBA abolished the requirement that each plan serve the commercial population in each county as a condition for enrolling Medicare enrollees there. Despite this, economies of scale and scope seem to dictate that commercial market presence precedes Medicare market presence, and there are virtually no cases in our data where Medicare enrollment is not preceded by commercial enrollment. Although in principle HMOs were allowed to offer Medicare enrollment in counties where they were not offering commercial enrollment since 2000, in practice this was almost never done.<sup>9</sup> Therefore, we use the set of counties in which the commercial HMO is already serving as the definition of the potential market area that each plan could choose for serving Medicare. We assume that the HMO chooses the set  $D_{jt} = \{d_{jct}\}$  where  $d_{jct} = 1$  if the HMO  $j$  serves the county  $c$  in year  $t$ , and zero otherwise.

In addition to choosing the vector of counties to serve,  $D_{jt}$ , the HMO must choose the enrollee premium,  $P_{jt}^D$ , and benefit features,  $B_{jt}$ , subject to the Medicare program's Adjusted Community Rate (ACR) constraint.<sup>10</sup> We write this constraint as  $ACR(B_{jt}, P_{jt}^D, D_{jt}, CP_t, X_{jt}, Z) = 0$ , where  $X_{jt}$  is a set of plan level characteristics at time  $t$ , and  $Z = \{Z_{ct}\}$  is a set of exogenous county and market level variables

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<sup>8</sup> Most studies estimated overpayments, ranging from 5% to 20%. (HCFA Report to the Congress, 1999).

<sup>9</sup> The one notable exception was Stirling Health Plan a newly created Fee-for-service plan with no commercial enrollment that entered a remarkable 359 counties simultaneously in 2000. In 2001, this plan was offered in 1006 counties, but had only attracted 17,578 enrollees, an average of only 17.6 enrollees per county. This one firm is not an HMO and is a clear outlier that would greatly affect our results. We choose to drop it from our sample and model only conventional HMO entry and exit decisions.

<sup>10</sup> Up through 1999, Medicare regulations required that plan level variables reflected in  $B_T$  to be constant for the plans entire service area and not to vary by county. Starting in 2000, HMOs could also choose premiums and benefit

corresponding to the counties that the plan is already serving commercially. Using this notation (with subscripts omitted for clarity), the health plan's Medicare profit optimization problem can be written as

$$\begin{aligned} \text{Max}_{B, P^D, D} \quad & \Pi^{\text{Medicare}}(B, P^D, D; CP, X, Z) \text{ subject to } ACR(B, P^D, D, CP, X, Z) = 0 \end{aligned} \quad (1)$$

Corresponding to this full optimization problem there is a semi-reduced form problem that can be arrived at by implicitly substituting the ACR constraint, and the optimally chosen values  $B^*$  and  $P^{D*}$  into the objective function. Using plan and time subscripts for clarity, this profit maximization problem can be written and a linear approximation described as shown below.

$$\text{Max}_{D_{jt}} \quad \Pi_{jt}^{\text{Medicare}*}(D; CP, X, Z) = \left[ \sum_c d_{cjt} \pi_c^*(CP_{ct}, X_{jt}, Z_{ct}) \right] + F(X_{jt}) \quad (2)$$

As shown, we decompose each plan's total profits into two parts. The first part, shown in square brackets, is the sum of profitability of each of the counties in which the plan chooses to serve. The second part,  $F(X_{jt})$  is a fixed cost component, which depends on the characteristics of the HMO and the competitiveness of the markets that it serves, as well as whether the plan was in the Medicare program the previous year.

The first order condition for profit maximization for the discrete choice variable of  $d_c$  implies that profits are lower with exit than without. Conditional on being in the Medicare program at all, a plan should participate in county  $c$  if:

$$\pi_c^*(CP, X, Z) > 0 \quad (3)$$

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features that vary by county. The analysis of plan choices of county-level benefits and premiums is the subject of a future paper.

The plan should participate in the Medicare program if the sum of all profits in the counties that it serves, plus the fixed costs of participating in the program are positive. Hence the plan should participate in Medicare if

$$\Pi_{jt}^{Medicare*} \geq 0 \quad (4)$$

The plan should exit from the Medicare, Medicaid, and Commercial market altogether if

$$\Pi_{jt}^{Medicare*} + \Pi_{jt}^{Commercial} + \Pi_{jt}^{Medicaid} < 0 \quad (5)$$

For this paper, our focus is on the Medicare market, and hence we estimate a reduced form for the HMO exit decision without trying to model commercial plan entry and exit at the county level.<sup>11</sup> We are content here to use a simple binary specification of the commercial market exit decision in which we focus on how expected Medicare market profitability affects the overall commercial health plan entry decision.

In order to implement the model empirically we further specify that the county level profits can be approximated with a function that is linear in the set of variables  $W \equiv \{CP, X \text{ and } Z\}$ , and a plan level fixed cost function that depends only on plan level variables and expected county level profits. For the third stage county level decision, we include year and plan fixed effects, while at the plan level decisions we assume that there are only year fixed effects. This rich set of error terms captures unobserved plan level effects that influence county choice, and allow for spatially correlated errors in the county entry decision. Intertemporal correlation over time is captured by including lagged choice variables in some of the model specifications, which are predetermined, as well as characteristics of other HMOs in the same market area in the previous year (which is also predetermined). Our final linear approximation of the constrained profit function is

$$\Pi_j^*(D; CP, X, Z) = \left[ \sum_c d_{cjt} (CP_{ct} \delta_1 + X_{jct} \delta_2 + Z_{ct} \delta_3 + \alpha_j + \mu_t + \omega_{jct}) \right] + X_j \beta + \eta_t + \varepsilon_{jt} \quad (4)$$

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<sup>11</sup> Gurol (2002b) explores the spillover effects of the Medicare market on commercial market participation and examines county-level entry and exit decisions using additional plan and county specific variables.

Our model structure does not fall into a simple discrete choice framework, such as logit or nested logit. This is because a binary choice at the plan level each year is followed by multiple binary choices of whether or not to enter at the county level. The median HMO in our sample is choosing whether to participate in 22 counties that are already served in the Commercial market. Although in principle, we could set up the full likelihood function and use numeric techniques to integrate over these 22 counties simultaneously with plan choice, the large dimensionality, together with other statistical concerns make this FIML approach unattractive.

We use instead a sequential estimator, in which each stage is modeled separately. As is conventional, we estimate the third stage first, using bootstrap techniques to correct standard errors for correlated errors at the county level. Estimated coefficients from this third stage model are used to predict the profitability of all of the potential counties that an HMO might be eligible to enter, regardless of whether actual entry occurred. Total expected profits should a plan decide to enter are generated by summing up all profits in all counties with positive profits. Hence, a plan for which entry into five counties is profitable has as its total profit the sum of predicted profits in those five counties.<sup>12</sup> We use as our measure of expected total profits,  $\Pi_j^E$  the sum of the utility indices from the third stage decision, which depends on explanatory variables  $W = \{CP, X_{jt}, Z_j\}$ .

$$\Pi_j^E * (W) = \left[ \sum_{c \in W_c, \delta > 0} \exp(W_c \delta) \right]$$

For the first stage decision, we use the “inclusive value” from the second stage choice process, which can be interpreted as the expected profit from the second stage decision to participate in the Medicare program.

## 5. Data

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<sup>12</sup> We also experimented with calculating the expected profits by taking the sum over all counties of  $\ln(1+\exp(W\beta))$ . This expression is the sum of the expected county level profits for at the extreme value distribution implicit in a nested logit formulation, ignoring spatial correlation. This alternative approach yielded similar conclusions, but we chose not to use it here because it is less convenient for correcting standard errors.

The data for the analysis comes from various sources. Interstudy's County Surveyor and Interstudy Competitive Edge databases provide the list of HMOs available to the commercial market at the county level in each year 1997 to 2001. Both the number of HMOs serving the commercial market and the total plan-county observations were increasing up through 1998, similar to the trend in the Medicare managed care market. The inclusion of the commercial market in the analysis serves two purposes. First, it defines the potential market areas for Medicare HMO participation, given the CMS regulation in place up until 2000, that a plan must serve the commercial market before being allowed to serve Medicare enrollees. Second, it allows us to separate trends in the commercial market from trends in the Medicare managed care market. Trends in the number of plans in both markets are illustrated in Figure 1.<sup>13</sup> The Competitive Edge database also provide plan level information such as plan age, total enrollment, number of primary, specialty and hospital contracts, and whether the plan is for profit, is federally qualified, is a chain organization and whether the plan has Medicaid experience. The total enrollment and contract information measure the effects of size of the plan and capture possible economies of scale.

The CMS geographic areas files provide the list of counties each HMO serves in the Medicare market, while the market penetration files provide Medicare HMO enrollment by plan and by county in each year. Unfortunately, the two files are not altogether consistent, with many counties having enrollments despite not being officially permitted to enroll Medicare beneficiaries from that county, and in other cases counties being "served" even with no Medicare enrollment. In an enormous number of counties appearing in the enrollment file, plan-county enrollments are only one or two people, most likely because of beneficiary movement. Following Cawley et al (2001) and Town (2001), we considered an HMO to be serving Medicare in a county if the number of Medicare beneficiaries in that plan in that county exceeds 25 or if the HMO Medicare penetration rate is greater than 0.5% of total Medicare eligible population in a county. This criterion drops the very large number of plan-county observations with a

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<sup>13</sup> Some of the changes in the number of HMOs in the commercial market have been due to HMO mergers and acquisitions during the sample period. For our analysis, mergers have been treated as both plans continuing

small number of beneficiaries. Despite dropping a large number of plan-county observations, our criterion still captures on average 99.3% of all Medicare beneficiaries in the Medicare Managed Care program.<sup>14</sup>

When both commercial and Medicare participation samples were formed, the plan identifiers used by Interstudy and those used by CMS had to be merged using plan-county and plan name information provided for both datasets.<sup>15</sup> These selection rules resulted in a final sample that captures in 87% of the Medicare HMO plans, and 75% of all Medicare plan-county observations.

The Medicare payment rates are provided by CMS for each county in each year for a standardized Medicare enrollee. These nominal rates were converted into year 2000 dollars using the Medical Services Consumer Price Index for each year, available from Bureau of Labor Statistics. The rates are also adjusted for geographical price differences using county level wage indices for 2000.<sup>16</sup> Trends for the maximum, minimum and four quartiles for payment rates after Balanced Budget Act are shown in Figure 2. The gap between the average payment rate and the maximum rate even after geographical price adjustment is still very large, with a value of \$243 in 2001, although it has decreased from a level of \$296 in 1997. The minimum real rate has increased by 70% from 1997 to 2001. Although the rates for the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> quartiles have stayed more or less stable, the large real adjustments for the lower and upper percentiles remain to be the most important reason behind the recent entry and exit decisions of Medicare HMOs.

Other county level variables are the log of total Medicare eligible population for each year, and demographic measures such as the number of physicians and hospitals per 1000 people, poverty rate among elderly, per capita income and percentage of population with a college degree. For demographics, we used census data from 1990 to ensure that it would be independent of HMO participation decisions

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operations, whereas acquisitions have been treated as exits.

<sup>14</sup> We have omitted Puerto Rico, Guam and Virgin Islands from Medicare plan-county samples for each year and combined the city-counties of Virginia into their parent counties as one observation since our other data sources did not separate information to the level of cities in these counties.

<sup>15</sup> In some counties the same Interstudy plan is associated with multiple plans in the CMS data files. In such cases where one managed care organization was offering multiple plans in the same county we kept only one plan observation per county, assuming that a commercial HMO serves a Medicare product if there is at least one plan from CMS data matches the planname-county observation.

<sup>16</sup> The 2000 wage index we use is from the CMS payment rates for December 2001, and is CMS's county level deflator used for blending payment toward the county-inflated national average. The wage adjustor is not available

during our sample period. Our proxies for market competitiveness are the number of Medicare HMOs in the county for the previous year, constructed using the final sample; and the Herfindahl index for the commercial market in 1999, available from the Interstudy County Surveyor.

## 6. Results

### *Descriptive Statistics*

Descriptive statistics for the explanatory variables are provided in Tables 1a and 1b. Table 1a divides the counties into two groups according to whether or not at least one Medicare HMO is offered in the county. The descriptive statistics for these two groups are remarkably different. The counties in which there is at least one HMO have higher real payment rates, larger Medicare eligible population. The population is concentrated more in urban areas, they are more educated, and have higher incomes and lower poverty rates among the elderly. The third stage decision also seems to be influenced by the number of physicians per person positively and the number of hospitals per person negatively. Counties with greater commercial competition, as measured by the Herfindahl index, tend to have Medicare presence whereas counties with lower commercial competition do not. Differences between means for all variables in these two groups are highly significant.

Whereas Table 1a shows that the counties in which plans are choosing to enter Medicare differ from those where plans do not, Table 1b uses the plan rather the county as the unit of analysis in order to identify differences in plans that serve or do not serve Medicare enrollees. The plans that serve Medicare tend to have more experience in the commercial market and Medicaid market, larger number of total enrollees and are more likely to be federally qualified and/or affiliated with a national plan or Blue Cross Blue Shield. The contrast between means of contracts per enrollee in the two groups is quite surprising. Plans that are serving Medicare are much more selective in the number of physicians, specialty doctors

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for all years in our sample, but the cross sectional distribution is very highly correlated, so we do not believe that we have introduced a meaningful distortion by using a constant year regional deflator.

and hospitals that they choose to contract with. Differences between means in these two groups for all variables except for whether the plan is for profit are also highly significant.

### *Logit choice process*

Table 2 presents coefficients from our three stage, sequential logit model of the participation decision. Year dummies are included in all three models to capture unexplained time trends, and for the third stage of the model, plan fixed effects are included and hence we omitted all of the plan level variables.<sup>17</sup> To correct for clustering of the data and the use of fitted values in the first and second stages of the model, we estimate the standard errors by bootstrapping each of the three stages. For each model, we present the sample sizes, dependent variable means, pseudo R-squares and the Log likelihood function value. The sample means of the binary dependent variables for the three stages are of great interest themselves. They indicate that 92% of all plans decide to continue with their commercial operations in the following year, 31% of the all commercial plans serve Medicare market in at least one of their counties, and that overall, HMOs that choose to serve the Medicare market choose to do so in only 32 percent of the counties that they serve in the commercial sector. Clearly, commercial HMOs are very selective in their Medicare entry decisions, and it is of interest to identify the variables that explain these decisions.

Consider first the third stage model of the decision to serve a county once a decision to participate in Medicare is made. The large sample size ( $N = 23,958$ ) of plan-county-years served by the commercial market ensures considerable precision in selecting counties. As expected, the county's Medicare average payment rate is a very important predictor of whether a plan will choose to serve a county in a given year, with a coefficient of .0046 and a z-value of 5.80. HMOs are more likely to serve the Medicare population in counties with large population of Medicare enrollees, and strongly prefer to be in counties where there were more Medicare HMOs serving the county in the preceding year.<sup>18</sup> Among the county level variables,

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<sup>17</sup> None of the counties offered Medicare HMO coverage in all commercial counties in every year, and by construction all plans that were never in the Medicare market for the year are excluded. Hence we did not have to exclude any plans for which the fixed effect was a perfect predictor.

<sup>18</sup> We also examined specifications that excluded the (predetermined, but not fully exogenous) lagged number of HMOs in the county, and the pattern of significant coefficients remains very similar. The static pricing effects are larger, as would be expected. We present evidence below on the dynamic properties of our model.

the coefficient on the county level Herfindahl index for 1999 for all commercial plans is also highly significant and negative, which implies that HMOs prefer to serve counties in the Medicare market where there is less market power on the commercial side. Bootstrapping of the results to generate correct standard errors reduces the precision of almost all of the estimated coefficients. Predictors of county entry that remain significant even after bootstrapping the results are the poverty rate and the number of hospitals in the county, both of which are negatively related to serving a county).

Turning now to the characteristics of plans that make them more likely to participate in the Medicare+Choice program, we see that HMOs are more likely to participate if they are for profit, are affiliated with a national or Blue Cross/Blue Shield plan, or if they are also serving the Medicaid population. Being of a large size (in the commercial and Medicare markets combined) is the most significant predictor of whether a plan chooses to be in the Medicare market, suggesting that there are high fixed costs of participating in this program. It is striking that even though HMOs in the Medicare market differ dramatically in their average number of primary care, specialty, and hospital contracts from those not in the Medicare market, these three contracting variables are not statistically significant predictors of whether a plan chooses to participate. Remarkably, all of the large differences across plans in the characteristics of these variables are explained by other variables included in this second stage of the model.

Of considerable interest given the structure of our model is the effect of expected county-level profits on the Medicare participation decision. As one would expect, plans are more likely to participate in the Medicare program when the counties that they are expected to serve are profitable.<sup>19</sup> The number of counties that the plans serves in its Commercial market is also a strong predictor of Medicare enrollment, with plans that serve many counties being less likely to participate in the Medicare program. Interestingly, being large in enrollment makes a plan *more* likely to participate, while being large in the

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<sup>19</sup> We use total profits in this (our preferred) specification, however it was also true that similar but somewhat weaker significance was obtained when we looked at the average profitability of the counties that a plan serves (not included here).

sense of serving many counties makes a plan *less* likely to participate in Medicare. This finding suggests significant fixed costs per county of participating in Medicare, such as marketing and reporting costs.

Turning now to the first stage of the decision process, the decision of whether to remain in the commercial market, shown in the first column of Table 2. Very few of the variables that we have included in our model are statistically significant predictors of this commercial exit decision. Large enrollment plans are more likely not to exit, as are plans that serve a large number of counties (although here the z-value is only 1.73 after bootstrapping). For this first stage choice, we again included the expected profitability of participating in the Medicare as an explanatory value, which is a conventional inclusive value from the first stage model. It is both small and statistically insignificant; however, the large standard error means that we cannot reject that Medicare profitability does spill over onto the commercial entry and exit decision.<sup>20</sup>

In all three stages of the model, we also included yearly dummies, to capture the effect of regulatory, cost, and technology changes over time. These variables almost invariably come in statistically significant and show a trend toward exit over time that is not captured by either the payment rates or the commercial market exit that was going on. We interpret the magnitudes of these yearly dummies below by considering their significance in a simulation model that tracks actual and hypothetical payment rate changes over time.

### ***Simulations***

In order to better understand the interaction of the three decision stages in our model, we use our model to simulate Medicare HMO participation at the county level both to see how well our model performs, as well as to simulate hypothetical policy changes. The policy change of greatest interest uses simulated payment rates that assume there were no pricing reforms due to the Balanced Budget Act of 1997. In order to simulate the effect of a world in which there had been no BBA reforms, we forecast

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<sup>20</sup> In further logit specifications (not shown here) we explored including the average county level payments as an explanatory variable in the first stage model. It came in significantly positive in this model. We have not explored fully whether this significance remains once other measures of geographic price and utilization measures are included that are also picked up by this payment variable.

“expected” payment rates. “Expected payment rates” are real payment rates for 1997 extrapolated forward using the average growth rate in the Medicare FFS sector. In all of our simulations, we use the AAPCC rate for each county, and do not attempt to adjust for the actual average demographic scores of HMO enrollees. Plan level variation in the demographic scores would make each plan's actual revenue from CMS and costs vary. The greatest differences between the ‘real’ and ‘expected’ rates are in 1998, for the lowest quartiles, because of the jump of the rates due to the new floor payments.

Predictions were generated for each county in each plan-year for the third stage of our model, and then the probabilities of serving each county was multiplied by the probabilities of serving the Medicare market by that plan, and the probability of the plan not choosing to exit from the commercial market altogether. Because we use plan fixed effects in the third stage of our model, it was important to choose an average fixed effect for our simulations (we did not use the actual plan level fixed effect for each plan, but instead assumed that it was simply part of the error term.) Given that our model is highly nonlinear, it was not surprising that our model underpredicted the sample mean number of plans per county. We chose the plan fixed effect for the third stage of our model that generated a mean prediction in 1997 that exactly matched the actual proportion of counties served by Medicare plans, and used that same fixed effect assumption for all of our simulations.<sup>21</sup>

Results are illustrated in Figure 3, where we also show that actual pattern of mean HMOs per county. Our three-stage simulation model tracks the actual pattern quite closely, with a 12 percent underprediction by the end of our five-year sample period. The path of predicted and actual means in our sample is very similar to that shown in Figure 1 as well.

In order to understand the predicted consequences the BBA reforms, we performed two types of BBA simulations: one using “No BBA with constant time” and one using “No BBA with variable time”. For the “No BBA with variable time” simulation, the only change in explanatory variable made was to use the expected payment rates. For the “No BBA with constant time”, the time dummies that are

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<sup>21</sup> Results from choosing a different fixed effect show the same pattern in relative terms, but are systematically biased upward or downward.

believed to be picking up cost, regulatory and technology trends are all set to their 1997 values. The “No BBA with variable time” simulation suggests that the average number of HMOs in each county would have been 45 percent higher (an average of number of HMOs of .39 versus .30 in 2001) if all of the regulatory changes of the BBA, the cost trends and other trends beyond pricing, were to occur but that the rates had continued to increase from their historic pattern at the same rate as the FFS sector. A much greater deviation is predicted if rates had not only increased but that the regulatory changes had not occurred. Undoing the time trend would have resulted in a continued growth in HMO offerings, with a 30% increase from 1997 instead of the observed 50 percent decline.

The sharp difference between including and excluding the time trend is highlighted in Figure 4, which summarizes the mean number of HMOs in each county in 2001. Five means are shown. The first is the average actual number of HMOs, while the second is the average predicted number of HMOs. It is easily seen that the regulatory changes, cost trends and other terms picked up by the time trend have a very large effect compared to the pricing changes of the BBA. The final bar simulates the predicted impact of raising the actual Medicare payments by 5% in each year since 1997. The mean number of HMOs in each county is predicted to be .38, almost identical to the prediction for the absence of the BBA without the time trend. In short, our model suggests that the net pricing effect of the BBA was equivalent to having lowered prices by approximately five percent in each year since 1997.

In addition to predicting the mean of the distribution quite well, our three-stage model also does a good job at capturing the full distribution of the number of HMOs offering Medicare coverage in each county. The distribution of counties served by zero, one, two or three and more Medicare HMOs is illustrated in Figure 5. Here we see that the BBA payment changes or raising payment rates by five percent has a relatively small proportional impact on the number of counties with zero, one, or two plans with a much larger impact on the number of counties with three or more HMOs. This is consistent with CMS reports and Brown and Gold (1999) finding that a major impact of the Medicare reforms was to reduce competition in counties served by more than three Medicare HMOs. Once again, the time trend,

which captures regulatory, cost trend, and other non-pricing changes, has a much larger impact than the pricing changes on the distribution of counties.

## 7. Conclusions

In this paper, we have developed a rich three-stage model of health plan decisions about whether to serve the Medicare population in the era since the Balanced Budget Act of 1997, which dramatically changed payment formulas and regulations facing health plans. Our structure separately models the fact that about half of all plan exits since 1997 have been selective exit from counties already served by commercial plans while 20 percent are due to commercial plan deaths and 30 percent to commercial plans' decisions not to serve the Medicare population at all. This structure is an improvement over previous studies that have modeled plan entry or exit by looking only at the county participation decision (Town and Liu, 2001) or plan level (Pai and Clement, 1999). Using a five-year panel dataset enables us to distinguish pricing effects from the regulatory and other trend effects of the BBA reforms.

We have used this rich model to demonstrate several things. Most important, we have shown that health plans continue to be very selective about which counties they choose to participate in for the Medicare program, with plans only serving about a third of their market areas with Medicare. As would be expected, plans are less willing to remain in counties that are more highly competitive; so much of the plan exit has been from counties with many Medicare HMOs. Although selective entry and exit from counties is an important part of the story, exit from the Medicare program altogether has also been substantial, and is shown (by our second stage model) to respond to county-level profitability. Our dynamic result that plans prefer to serve Medicare enrollees in counties where other plans serving the Medicare population existed in the previous year is important, since it encourages competitiveness in counties served by at least one HMO. Although commercial plans have been choosing to die over our sample period, we find no evidence that this can be attributed to changes in Medicare profitability.

Although plan county selection and Medicare participation decisions are highly responsive to pricing changes, the large time-trend effect in our model strongly suggests that regulatory changes

imposed by the BBA have had an even more dramatic effect. Pricing changes since the BBA appear to be equivalent to a five percent decrease in county-level payment rates. The dramatic decline in recent years may be due to administrative burdens and uncertainties due to risk adjustment and future reforms. It is beyond the scope of this study, or perhaps any study with these data, to be able to separate out the effects of these different reforms.

An important topic for further research is our model's implications for the recently proposed competitive bidding strategies. Our results suggest that plan participation in selected counties is highly responsive to the payment rates by Medicare, and by extension, that bidding strategies for Medicare may work well in counties with several commercial HMOs, but not in counties with few commercial HMOs. Our model is limited in being able to make predictions about the competitive bidding framework however, since we use a reduced form model of health plan choices that does not attempt to separate out the choice of Medicare participation from the choice of the premium to charge and benefits to offer. In future research we hope to examine HMO choice of consumer premiums and how this interacts with benefit design features and the Medicare payment formula in influencing plan enrollments.

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**Table 1a**  
**Descriptive statistics of county level variables**

County-year characteristics	Counties with at least one Medicare HMO		Counties with no Medicare HMOs		T test of difference between means
	Mean	Standard Deviation	Mean	Standard Deviation	
	Payment rates, in 2000 prices	469.598	80.648	451.968	
Log of total Medicare eligible population in the county	9.686	1.307	7.842	2.007	62.10
Number of Medicare HMOs serving the county in the previous year	2.303	1.973	0.048	0.270	66.33
Herfindahl index for commercial plans in county, 1999	0.364	0.212	0.653	0.274	-64.18
Percentage of urban population in county, 1990	56.076	30.060	31.080	26.265	43.42
Percentage of white population in county, 1990	86.703	12.301	87.976	15.924	-4.87
Percentage of population with a college degree in county, 1990	17.271	8.446	12.321	5.388	32.10
Per capita income in county, 1990	17.083	4.290	14.575	2.938	31.75
Poverty rate among elderly in county, 1990	2.066	1.477	3.569	3.157	-37.85
Number of physicians per 1000 people in county	0.178	0.165	0.095	0.099	27.58
Number of hospitals per 100 people in county	0.315	0.315	0.671	0.791	-37.97
Number of observations	3,388		10,673		

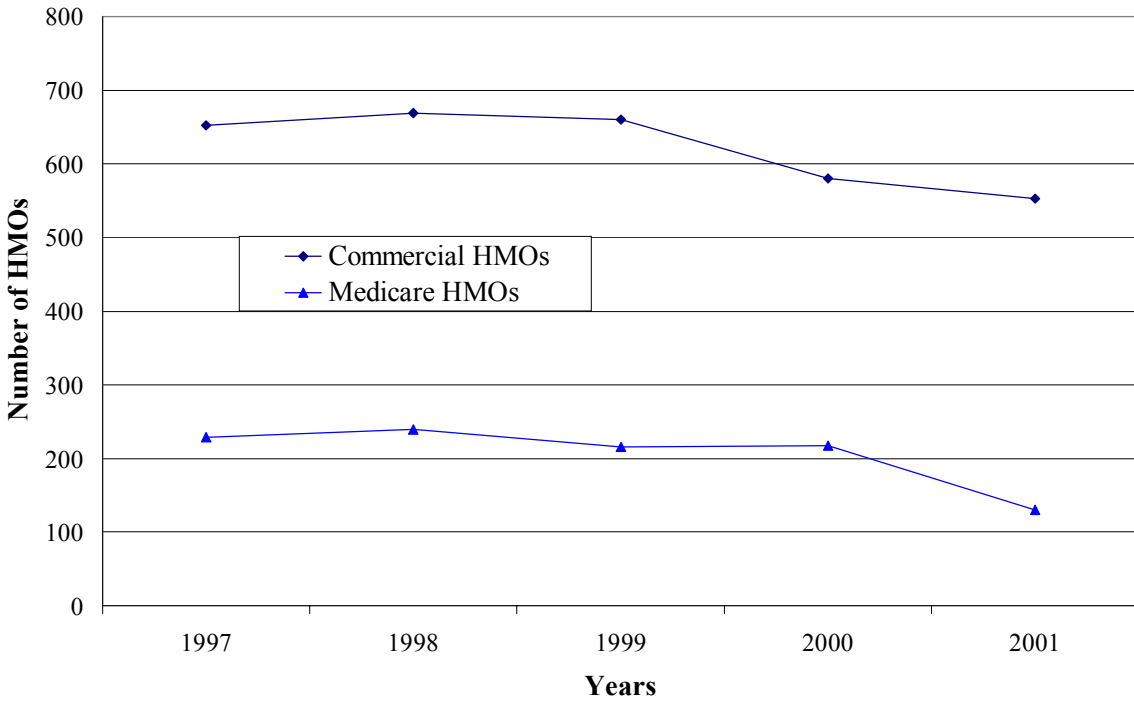
**Table 1b**  
**Descriptive statistics of plan level variables**

Plan-year characteristics	Plans that are serving Medicare		Plans that are not serving Medicare		T test of difference between means
	Mean	Standard Deviation	Mean	Standard Deviation	
	Age of plan	14.051	7.231	10.409	
Equals one if plan is for profit	0.724	0.455	0.744	0.437	-1.11
Equals one if plan is federally qualified	0.535	0.499	0.300	0.458	12.04
Equals one if plan is affiliated with a national plan or BCBS	0.677	0.468	0.601	0.490	4.01
Equals one if plan serves Medicaid	0.450	0.498	0.381	0.486	3.46
Log of total enrollment (commercial + Medicare) of the plan	11.728	1.313	10.272	1.599	25.83
Number of primary care contracts, per 1000 enrollees	1.893	3.550	8.912	30.096	-10.29
Number of specialty contracts, per 1000 enrollees	3.918	6.998	18.099	54.876	-11.37
Number of hospital contracts, per 1000 enrollees	0.642	1.357	3.113	9.821	-11.04
Number of counties the plan serves	26.015	25.402	21.502	24.535	4.48
Number of Observations	905		2,006		

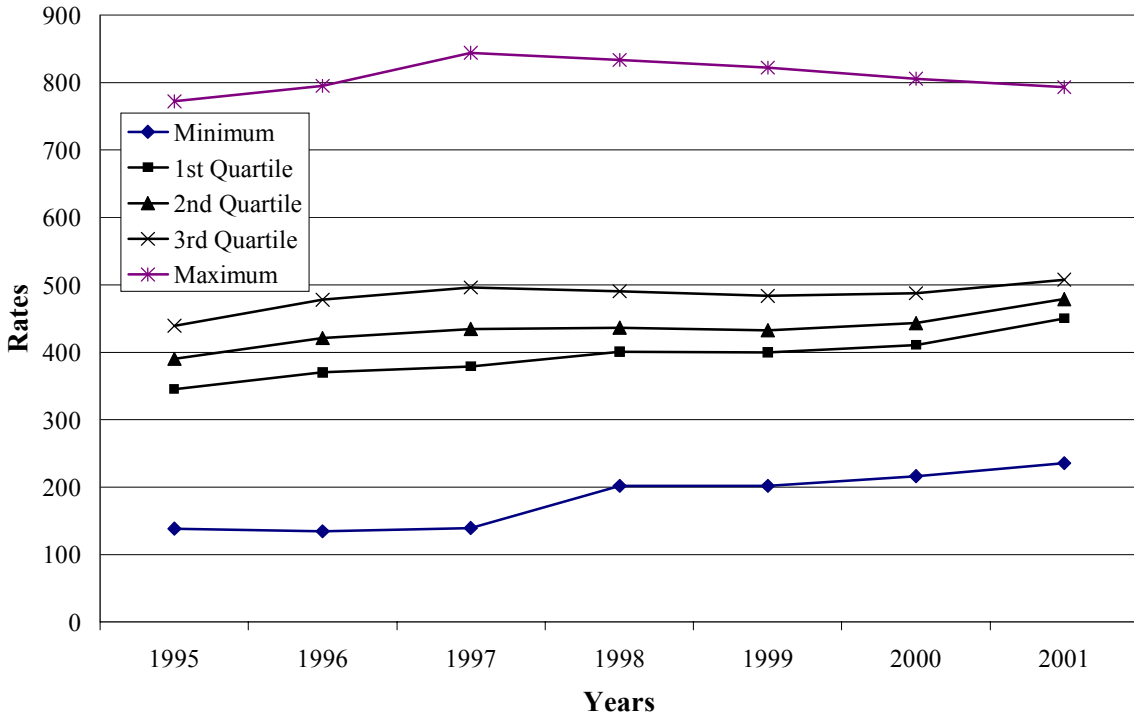
**Table 2**  
**Bootstrapped Logit Decision Results**

	<b>First Stage Commercial Market Decision</b>		<b>Second Stage Medicare Market Decision</b>		<b>Third Stage County Selection Decision</b>	
<b>Observations</b>	2398		2911		23958	
<b>Pseudo R-squared</b>	0.0703		0.205		0.4385	
<b>log likelihood</b>	-628.62		-1434.48		-8385.385	
<b>Dependent Variable Mean</b>	0.92		0.31		0.32	
<b>Variable Description</b>	<b>coef</b>	<b>z-value</b>	<b>coef</b>	<b>z-value</b>	<b>coef</b>	<b>z-value</b>
<b>Year-County Level Variables</b>						
Payment rates, in 2000 prices					0.0046	5.80
Log of total Medicare eligible population in the county					0.2423	4.36
Number of Medicare HMOs serving the county in the previous year					0.6126	12.97
<b>County Level Variables</b>						
Herfindahl index for commercial plans in county, 1999					-0.9376	-4.97
Percentage of urban population in county, 1990					-0.0024	-1.03
Percentage of white population in county, 1990					-0.0048	-0.99
Percentage of population with a college degree in county, 1990					-0.0024	-0.29
Poverty rate among elderly in county, 1990					-0.1472	-3.54
Per capita income in county, 1990					0.0211	1.16
Number of physicians per 1000 people in county					0.4190	1.19
Number of hospitals per 100 people in county					-0.3976	-2.85
<b>Plan Level Variables</b>						
Age of plan	-0.0062	-0.46	-0.0045	-0.59		
Equals one if plan is for profit	-0.1458	-0.68	0.2714	2.26		
Equals one if plan is federally qualified	0.3336	1.72	0.3866	3.76		
Equals one if plan is affiliated with a national plan or BCBS	-0.2043	-1.07	-0.3037	-2.86		
Equals one if plan serves Medicaid	0.2893	1.38	-0.3917	-3.40		
Log of total enrollment (commercial + Medicare) of the plan	0.2545	3.74	0.8917	11.45		
Number of primary care contracts, per 1000 enrollees	0.0030	0.26	0.0052	0.37		
Number of specialty contracts, per 1000 enrollees	-0.0006	-0.10	-0.0098	-1.18		
Number of hospital contracts, per 1000 enrollees	-0.0020	-0.11	-0.0068	-0.15		
Expected profits, from next stage model	0.0751	0.13	0.0129	3.00		
Number of counties the plan serves	0.0065	1.73	-0.0069	-3.18		
<b>Year Dummies</b>						
Dummy for year 1997	(omitted)		(omitted)		(omitted)	
Dummy for year 1998	-0.5401	-1.98	-0.2050	-1.43	-0.2563	-2.17
Dummy for year 1999	-1.0350	-3.35	-0.3282	-2.20	-0.5894	-5.61
Dummy for year 2000	-0.6723	-1.98	-0.2700	-1.63	-0.1573	-1.37
Dummy for year 2001			-0.7457	-4.78	-0.8168	-6.15
Plan fixed effects?	no		no		yes	

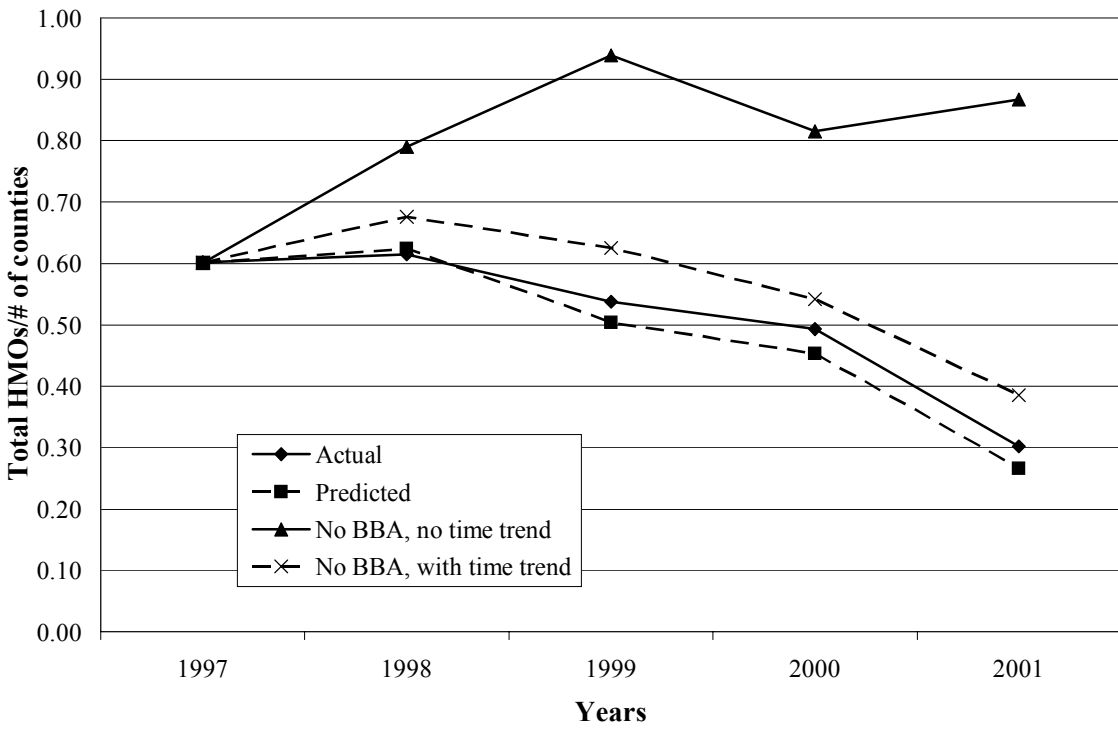
**Figure 1**  
**Number of Commercial and Medicare HMOs**



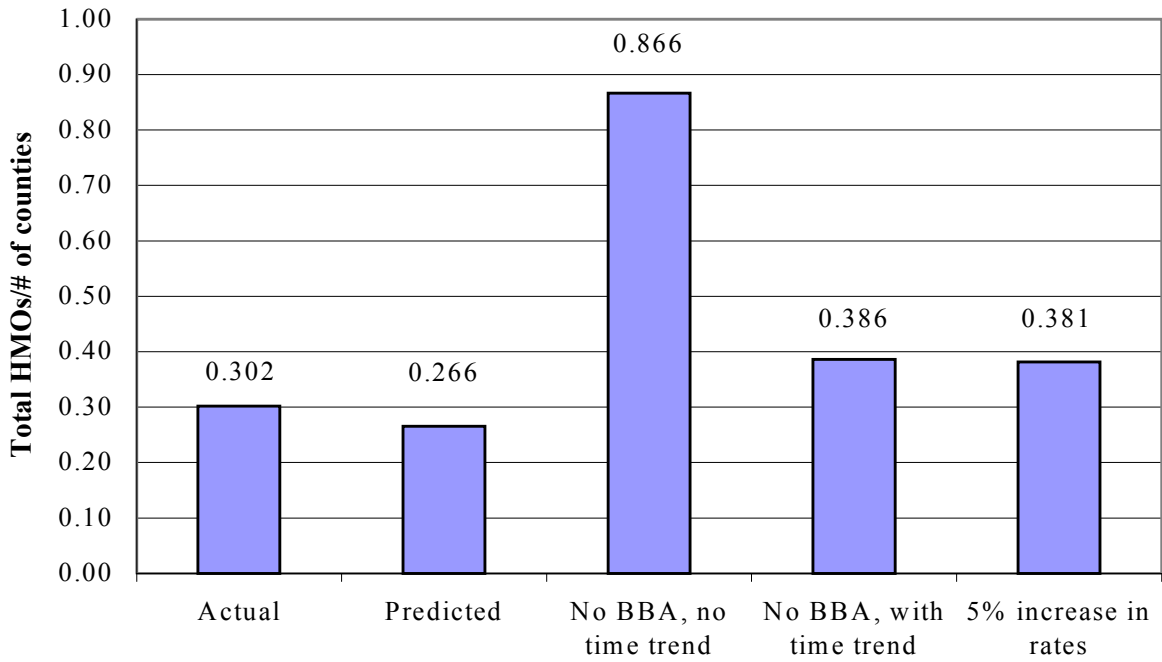
**Figure 2**  
**Payment Rates, in 2000 prices, 1995-2001**



**Figure 3**  
**Number of Medicare HMOs per county**



**Figure 4**  
**Number of Medicare HMOs per county, Year 2001**



**Figure 5**  
**Distribution of Counties by Number of Medicare HMOs in County**

