Geographic Variation in Determinants of Medicare Managed Care Enrollment

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Objective. To examine the effect of adjusted average per capita cost (AAPCC) rate and volatility on Medicare risk plan enrollment at the county level.
Data Sources. Secondary data from the Health Care Financing Administration's office of managed care and other sources were merged to create comprehensive data on all Medicare risk plans in 3,069 of the 3,112 U. S. counties in December 1996.
Study Design. A two-step least squares regression was estimated to examine the effects of AAPCC rate and volatility, commercial HMO enrollment, market factors, and characteristics of the county population on Medicare HMO enrollment. The model was also used to simulate the effects of the Balanced Budget Act of 1997. Data from the Health Care Financing Administration were merged with other sources at the county level. The Federal Information Processing Standards code and a crosswalk file matching that code with the county name linked the data across sources.
Principle Findings. The AAPCC rate has a small positive effect on the probability of Medicare HMO availability and enrollment. However, commercial HMO enrollment has a much stronger positive effect on Medicare HMO enrollment. Volatility has a negative effect on the probability of any Medicare HMO enrollment.
Conclusions. The results suggest that payment changes enacted as part of the Balanced Budget Act will have a limited effect on Medicare HMO enrollment, especially in rural areas. Other policy changes are needed to stimulate Medicare HMO enrollment.
Key Words. AAPCC, Medicare managed care, rural area

Medicare managed care enrollment has been steadily rising over the past several years. In January 2000 about 16 percent of Medicare beneficiaries were enrolled in Medicare risk plans [Health Care Financing Administration (HCFA) 1999b]. However, enrollment has been mostly concentrated in urban areas. In January of 2000, 2.1 percent of rural Medicare beneficiaries were enrolled in Medicare managed care compared to 19.9 percent of urban beneficiaries. The Balanced Budget Act (BBA) of 1997 created a new environment for growth in enrollment in managed care plans by rural Medicare beneficiaries. Most importantly, the BBA substantially increased the payment made to

Medicare managed care plans in some rural counties. This payment reform is expected to stimulate growth in the Medicare managed care market in rural areas by making it more attractive for insurance companies and provider-sponsored organizations (PSO) to offer Medicare managed care plans to rural beneficiaries.

At the same time, the BBA limited growth in the payment rate in most urban areas and in some rural counties adjacent to metropolitan areas. Several large HMOs responded by withdrawing from the Medicare managed care market in selected counties in 1999, affecting about 407,000 Medicare HMO enrollees, about 7 percent of enrollment. The HCFA has also projected that withdrawals will affect another 327,000 enrollees in 2000 (HCFA 1999a). Most withdrawals in 1999 affected urban beneficiaries; 57,520 of the enrollees affected lived in rural counties. Because it probably takes longer for a firm to generate a Medicare risk product than to withdraw an existing one it may be too soon to see the effect of higher payment rates in rural areas. However, the rapid response of some firms to lack of growth in payment rates in urban areas indicates its importance in influencing firm behavior and subsequent beneficiary enrollment.

Although several studies have examined factors associated with both Medicare risk plan market entrance and enrollment by beneficiaries, none have used a data source that contains comprehensive information on beneficiary enrollment at the county level for all US counties. This study examines the independent effects of the adjusted average per capita cost (AAPCC) rate and volatility in that rate (the average of the absolute value of the percent change in AAPCC rate at the county level less changes in the U.S. per capita cost from 1990–97), commercial HMO enrollment, market factors, and characteristics of county population on Medicare risk plan enrollment for all counties in the United States in December 1996. Based on a model incorporating the significant variables identified by the multivariate analysis the

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effects of current policies are simulated to show likely changes in enrollment into Medicare risk plans.

BACKGROUND

The observed variability in Medicare managed care enrollment across the country is the end product of two processes. First, firms must decide whether it is in their financial interest to offer a Medicare risk product to beneficiaries in a particular geographic area. Firms are positively influenced by the payment assigned to counties (Adamache and Rossiter 1986; Porell and Tompkins 1993; Porell and Wallack 1990; Serrato, Brown, and Bergeron 1995); characteristics of the Medicare population in the area such as income status, proportion disabled, and size of the elderly population (Adamache and Rossiter 1986; Porell and Tompkins 1993; Porell and Wallack 1990; Serrato, Brown, and Bergeron 1995); the size of commercial risk plan enrollment (Welch 1996); the firm's financial performance (Serrato, Brown, and Bergeron 1995); and whether the Medicare risk contract is a regional component of the firm's products (Porell and Tompkins 1993).

The second part of the process leading to observed levels of Medicare risk plan enrollment is the decision by Medicare beneficiaries to enroll in (or disenroll from) a plan. Most multivariate studies have focused on aggregate enrollment at the county, state, or market level. Welch (1996), in a study of large metropolitan counties, found Medicare managed care market share to be positively influenced by AAPCC rate and the commercial HMO market share, with the latter dominating the former in regression models. However, Welch's study was completed using only data from a small subset of counties in the United States—the largest metropolitan counties—and ignored the statistical problem created by the fact that most counties in the United States have no Medicare managed care enrollment. Thus, Welch's findings may not be generalizable to smaller metropolitan and rural counties.

The Barents Group (1997) analyzed both factors associated with firms' entry into the Medicare managed care market and beneficiary enrollment. As in previous studies the AAPCC payment positively affected the probability that a firm will offer a Medicare risk product and influenced market penetration. Medicare beneficiaries are more likely to join an HMO with attractive, rich supplemental benefits and lower copayments and premiums, which are more common in urban counties (McBride 1998). Finally, Pai and Clement (1999) found that growth in and size of the commercial HMO market and the AAPCC rate influence HMOs to offer a new Medicare risk product.

Previous studies have not addressed the specific question of interest in this article—the effect of AAPCC rate changes for rural counties. There are a number of reasons for this oversight in the literature: use of data for selected counties only, the statistical problems encountered when so many rural counties have no enrollment, and interest only in those counties with enrollment in Medicare risk contracts, which would exclude most rural counties.

The current study addresses the limitations of previous studies in several important ways. First, we use a data set containing comprehensive information on Medicare beneficiaries enrolled in the 3,112 counties in the United States. Second, we include a measure of past volatility in the AAPCC rate as a predictor of enrollment because rural counties experience substantial volatility that may affect firms' perceptions of riskiness in the Medicare managed care market (McBride, Penrod, and Mueller 1997). Third, we use statistical methods most appropriate for the estimation of enrollment considering that Medicare managed care plans do not exist in 77 percent of U.S. counties.

DATA AND METHODOLOGY

Theoretical Model and Specification

A model of the market for Medicare managed care can help to describe the relationship between enrollment in these plans and the AAPCC rate paid to these plans and other county characteristics. The market for Medicare managed care products has a supply side in which firms decide whether to include a particular geographic area in their Medicare risk product service area and a demand side in which Medicare beneficiaries decide whether to enroll in a managed care plan available to them.

We use a reservation price model (see Barnow, Cain, and Goldberger 1981; or Maddala 1983 for useful summaries of the literature) of the determinants of Medicare risk plan enrollment to explain the effect of AAPCC rate on enrollment. In the reservation price model a market participant (here a managed care organization) decides to enter the market if and only if the price of their product at least covers the costs of supplying the product. In this case insurance firms (HMOs and others) will enter the Medicare managed care market if the revenues they receive (direct Medicare AAPCC payment plus what can be collected as an additional monthly premium directly from the beneficiaries) are greater than or equal to the costs of services to Medicare beneficiaries. Thus, firms will offer a Medicare risk plan if and only if the

AAPCC payment subsidy is greater than or equal to the reservation price (minimum cost) of providing Medicare-related services (net of any premium that can be charged to the beneficiary).

On the demand side Medicare beneficiaries choose between traditional Medicare, a fee-for-service plan with open choice of providers (possibly supplemented by Medigap coverage), or a Medicare risk plan if available. The choice is determined by characteristics of the plan (e.g., benefits, out-of-pocket costs) and personal preferences.

This discussion describes the effect of AAPCC on Medicare risk plan enrollment. Both the supply of and demand for plans should increase as the AAPCC rate increases. If the AAPCC rate is above a threshold value that enables plans to meet reservation prices net premiums charged to beneficiaries, a market for Medicare HMOs will exist in the county.

We use Heckman's (1979) two-step method to examine the effect of payment rate, volatility, and other county factors on (1) the probability of any Medicare enrollment in the county (the supply side), and (2) the level of enrollment in counties with some positive enrollment (the demand side). There are two justifications for this approach. First, it describes the sequence of events in counties. Health plans first decide to offer a Medicare plan in a geographic area and then Medicare beneficiaries make enrollment choices.

A second reason to use a two-step method is that the sample is divided into counties with zero Medicare HMO enrollment (77 percent of counties) and those with positive enrollment (23 percent). Ordinary least squares regression does not account for unmeasured factors influencing both the probability of a Medicare HMO plan being available and the amount of enrollment in counties with plans. The omitted relevant variable (or variables) leads to biased and inconsistent ordinary least squares estimates in the regression of enrollment on payment rate and other county characteristics. Heckman's (1979) two-step method corrects the bias in the ordinary least squares estimates. We estimate the regression model using the LIMDEP program (Econometric Software), which is designed to handle estimation of limited dependent models (Greene 1998).[1]

Data

The source file for the analysis presented here is drawn from a series of county-based files specially compiled by the Rural Policy Research Institute (RUPRI) rural health panel for the purposes of analyzing the effect of Medicare policy changes (see Table 1). The RUPRI Medicare capitation county data file was constructed by merging data from several sources, mostly provided by the

HCFA in a series of periodic reports prepared by its office of managed care. The most important data reports used in this study are (1) the monthly report "Medicare Managed Care Plans"; (2) the "State/County/Plan Medicare Managed Care Penetration Report" (available quarterly); and (3) the "Medicare Managed Care Geographic Service Area Report" (also available quarterly) (HCFA 1999b). County-level characteristics were largely drawn from the area resource file, but one notable exception is the estimates of commercial enrollment of the nonelderly in managed care plans, which were drawn from data published by the American Association of Health Plans (AAHP).[2]

To match data across sources we used the Federal Information Processing Standards (FIPS) code (a county-specific code in the area resource file) and a crosswalk file matching the FIPS code with the county name (available in HCFA files). Mismatches in the merging process were corrected in all

Table 1: Variables and Data Sources

Variable	*Source*
Medicare managed care enrollment, December 1996 by county	Quarterly State/County/Plan Medicare Managed Care Penetration Report, HCFA
Geographic service area of Medicare managed care plans, 1996	Medicare Managed Care Geographic Service Area Report, HCFA
AAPCC rates, 1996	HCFA, office of the actuary
Average volatility in AAPCC rates, 1990–96	Computed from HCFA, office of the actuary
Medicare enrollment in the county, 1996	Quarterly State/County/Plan Medicare Managed Care Penetration Report, HCFA office of managed care
Commercial HMO, PPO, POS enrollment in the county	AAHP
County typology (Beale) codes	Economic research service, U.S. Department of Agriculture
Hospital beds per capita in county	Area resource file
Physicians per capita in county	
% labor force employed in health services in county	
Population aged 65–74 years as % of population aged 65 and older	
Median income, 1994	
Whites as % of population	
% of population college educated	
Poverty rate, 1994	

cases except for Alaska counties. Because of incompatibilities between the HCFA and FIPS classifications all Alaska counties were dropped from the analysis as is often done in analyses using geographic classifications. Data from U.S. territories (Guam, Puerto Rico, Virgin Islands) were also dropped from the analysis because of the differences between these territories and the U.S. states.

The data were also adjusted by dropping Medicare managed care enrollees who reported residence in a county outside the service area of the plan in which they were enrolled (see McBride 1998 for a detailed discussion). Although only 126,000 beneficiaries of the approximately 4.2 million (1996 data) enrolled in Medicare managed care plans were dropped, the adjustment yields a dramatic change in the number of counties with positive enrollment figures. Before the adjustment 83 percent of counties had some Medicare managed care enrollment compared to 23 percent after adjusting for the residence problem. Thus, the analytic file included characteristics (including Medicare managed care risk enrollment) for 3,069 of the 3,112 counties (excluding the U.S. territories and Alaska) in the United States.

Variables

Variables predicted to affect the probability of a Medicare managed care plan being offered in a county were: AAPCC rate (proxy for potential revenues to the firms and for the benefit package); AAPCC volatility (proxy for firms' risks); commercial enrollment in HMOs, preferred provider organizations (PPO), and PSOs by the under-65 population (proxies for potential economies of scale for firms); population aged 65 to 74 years as percent of the population aged 65 and older (proxy for HMO potential to enroll younger elderly and for there to be "aging in" from retirees previously covered by managed care while employed); number of Medicare beneficiaries (proxy for economies of scale—larger communities can support a plan, whereas smaller ones cannot); supply of physicians, hospital beds, and health services providers (proxies for infrastructure to attract firms); median income and poverty rate (proxy for measures of health status, high use, adverse selection potential); and county type (central urban, other urban, rural-adjacent, rural-nonadjacent).

Variables predicted to affect enrollment in Medicare managed care plans include: AAPCC rate (proxy for firms' prices and for the richness of benefit package); commercial enrollment in HMOs, PPOs, and PSOs by the under-65 population (proxies for "tastes" for managed care); percent of population aged 65 to 74 years as a percent of the population aged 65 and older (proxy for younger elderly people's tastes for Medicare fee-for-service or HMO); percentage of whites and college-educated people in population (proxy for county-level tastes for managed care); median income and poverty rate (proxy for measures of health status, high use, adverse selection potential); and county type (central urban, other urban, rural-adjacent, rural-nonadjacent).

RESULTS

Table 2 presents descriptive statistics for the variables in the analysis by county type. Urban counties have higher AAPCC rates and lower volatility, higher levels of commercial HMO enrollment, and about the same number of hospital beds per capita as rural counties. Urban counties have about twice as many doctors per capita as rural counties. The median income is higher and poverty rate is lower in rural counties.

The results from the estimation of the first step of the analysis, a probit model to estimate the effect of each independent variable on the probability of any Medicare HMO enrollment in the county, are presented in Table 3. Consistent with other studies we found that counties with a higher probability of Medicare HMO enrollment were those with higher AAPCC rates; more

Table 2: Characteristics of Counties: Mean and Proportions (Standard Deviation)

Variable	*Rural* (n = *2,258*)	*Urban* (n = *811*)	*Total* (n = *3,069*)
Proportion enrolled in risk plans	.0063 (.03)	.063 (.10)	.021 (.063)
AAPCC, 1996	$356.88 (62.28)	$414.00 (74.7)	$371.97 (70.44)
AAPCC volatility, 1990–96	.037 (.02)	.026 (.01)	.034 (.019)
% in commercial HMOs	23.3% (8.3)	36.2% (14.2)	26.7% (11.7)
% in commercial PPOs and POSs	40.8% (7.97)	39.8% (10.5)	40.6% (8.7)
Medicare-eligible people (thousands)	4.06 (3.84)	35.2 (61.8)	12.29 (34.76)
Population aged 65–74 years as % of population aged 65 and older	.556 (.044)	.587 (.034)	.564 (.045)
Physicians per capita	.0007 (.0008)	.0018 (.0017)	.0010 (.0012)
Hospital beds per capita	.0045 (.0054)	.0038 (.0033)	.0043 (.005)
% of labor force in health services	7.45 (2.7)	8.21 (2.1)	7.65 (2.56)
Whites as % of population	88.0 (16.1)	86.3 (12.6)	87.6 (15.3)
% of population college educated	.118 (4.8)	.181 (8.0)	.135 (.065)
Median income (thousands of dollars)	$16.744 (3.143)	$20.117 (4.404)	$17.635 (3.82)
Poverty rate, 1994	14.5% (7.1)	9.2% (4.67)	13.09% (6.98)

commercial HMO, PPO, and PSO enrollment; and a larger Medicare population and population of "young-old" people in the county. Higher volatility in the payment rate, more hospital beds per capita, and higher poverty decreased the probability of a Medicare HMO plan being available. Finally, central urban counties are more likely to have Medicare HMO plans, all else equal, compared to rural-nonadjacent counties and urban counties outside of a central city.

The results of the selectivity corrected least squares regression of enrollment level on the payment rate and other county characteristics, including whether the county is rural or urban, are summarized in Table 4. Higher AAPCC rates and more commercial managed care enrollment are associated with higher Medicare risk plan enrollment. In particular the results show that a \$100 increase in the monthly AAPCC rate would lead, all else equal, to an increase in enrollment of 2.2 percentage points. However, an increase in commercial HMO enrollment of 10 percentage points would increase enrollment by 4.8 percentage points, all else equal. The effects of education and income in the county were not statistically significant. However, counties with more poverty and more whites in the population have higher Medicare HMO enrollment, all else equal. The older the Medicare population, the

Table 3: Predictors of Any Medicare HMO Enrollment in All Counties: Probit Coefficients and Standard Errors ($N = 3{,}069$)

Predictor	*Coefficient (Standard Error)*	p-*Value*
AAPCC	.0044 (.0006)	<.001
Volatility	−13.954 (2.69)	<.001
% in HMOs	.066 (.004)	<.001
% in POS, PPO	.0291 (.005)	<.001
Medicare-eligible people	.020 (.003)	<.001
Aged 65–74 as % of over-65 population	3.829 (1.02)	<.001
Doctors per capita	−.722 (36.00)	.98
Hospital beds per capita	−39.145 (11.92)	.001
Workers in health care	.035 (.021)	.08
Income	.026 (.015)	.084
Poverty rate	−.022 (.008)	.008
Other urban county*	−.496 (.228)	.03
Rural-adjacent county*	−.106 (.247)	.97
Rural-nonadjacent county*	−.916 (.256)	<.001
Constant	−7.472 (.829)	<.001

*Central urban county is the reference category.

Note: Log likelihood function = −839.37; chi-square = 1587.557; degrees of freedom = 14; significance $p < .001$.

lower the enrollment level in the county. The less urban the county, the lower the Medicare HMO enrollment, with enrollment about 5 percentage points lower in rural counties compared to central urban counties, all else equal.

To aid in the interpretation of the results Table 5 presents the marginal effect of changes in explanatory variables on (1) expected probability of enrollment and (2) expected level of enrollment in counties. In this analysis all variables except the one of interest are set equal to the mean. Then the variables of key interest are altered one at a time and the probability of any enrollment and expected level of enrollment values is recomputed.

The results suggest that the AAPCC rate does affect both the probability a Medicare HMO plan is available in the county and level of enrollment. If the AAPCC rate is higher by one standard deviation above the mean, the probability of Medicare HMO enrollment in the county would increase from roughly .12 to .20. Moreover, if the AAPCC rate were to increase one standard deviation above the mean, expected enrollment would be about 10.3 percent compared to the mean level of 8.6 percent, probably the result of richer benefits offered. An increase in volatility in the AAPCC rate of one standard deviation decreases the probability of Medicare HMOs in the county by about 4.4 percentage points.

The data show that the amount of non-Medicare HMO enrollment has a larger effect on Medicare HMO enrollment than AAPCC rates. In counties

Table 4: Predictors of Medicare HMO Enrollment: Selectivity Corrected Least Squares Estimates and Standard Errors ($N = 688$)

Predictor	*Coefficient (Standard Error)*	p-*Value*
AAPCC	.00022 (.00006)	<.001
% in HMOs	.0048 (.0005)	<.001
% in POS, PPO	.0011 (.0005)	.023
Aged 65–74 as % of over-65 population	.333 (.101)	<.001
% white in population	.001 (.0003)	.002
% college educated	.067 (.062)	.28
Income	−.0013 (.012)	.29
Poverty rate	.004 (.001)	<.001
Other urban county*	−.048 (.010)	<.001
Rural-adjacent county*	−.045 (.013)	<.001
Rural-nonadjacent county*	−.053 (.021)	.011
Constant	−.518 (.105)	<.001
Lambda	.016 (.012)	.21
Adjusted R^2	.36	

*Central urban county is the reference category.

Table 5: Marginal Effects of Changes in Independent Variables on Medicare HMO Enrollment*

	Probability of Any HMO Enrollment		*Expected Enrollment*	
Variable	*Assumed Value*	*Probability of Enrollment > 0*†	*Assumed Value*	*Expected Enrollment*†
Mean		.117		8.64%
AAPCC Rate				
Minimum	$207	.028	$207	3.87%
Mean − standard deviation	$302	.067	$347	6.97%
Mean + standard deviation	$442	.188	$498	10.31%
AAPCC Volatility				
Minimum	.6%	.212	NA	NA
Mean − standard deviation	1.5%	.178	NA	NA
Mean + standard deviation	5.3%	.073	NA	NA
Maximum	31.8%	0	NA	NA
% Nonelderly in HMO				
Minimum	8.3%	.008	8.3%	0%
Mean − standard deviation	15.1%	.025	25.3%	2.26%
Mean + standard deviation	38.4%	.335	51.8%	15.04%
Maximum	80.2%	.990	80.2%	28.74%
% Nonelderly in PPO				
Minimum	12.2%	.022	12.2%	5.78%
Mean − standard deviation	31.8%	.074	28.7%	7.56%
Mean + standard deviation	49.3%	.174	48.8%	9.73%
Maximum	62.9%	.294	62.9%	11.24%
Geographic Locale‡				
Central urban		.826		10.66%
Other urban		.671		5.87%
Rural adjacent		.096		.29%
Rural nonadjacent		.014		0%
Medicare-Eligible People				
Minimum	.02	.074	NA	NA
Mean/2	6.1	.094	NA	NA
Mean + standard deviation	47.0	.315	NA	NA
% of Population Aged 65–74				
Mean − standard deviation	51.9%	.086	52.7%	7.41%
Mean + standard deviation	60.9%	.154	62.6%	9.87%
Hospital Beds per Capita				
Mean/2	.002	.135	NA	NA
Mean + standard deviation	.009	.085	NA	NA
Maximum	.062	0	NA	NA

continued

Table 5: *Continued*

	Probability of Any HMO Enrollment		*Expected Enrollment*	
Variable	*Assumed Value*	*Probability of Enrollment > 0*†	*Assumed Value*	*Expected Enrollment*†
Poverty Rate				
Mean – standard deviation	6.1%	.150	4.3%	6.35%
Mean + standard deviation	20.1%	.089	14.8%	10.94%
Maximum	56.9%	.015	56.9%	29.32%

Note: Marginal effects computed with all variables set at mean, except for the variable shown. For expected enrollment estimates, means for subsample of counties with enrollment shown.

*Probability a county will have any Medicare HMO enrollment.

†Expected enrollment as % of Medicare-eligible population given that county has some enrollment.

‡Marginal effects computed with all variables set at mean for subsample in the geographic locale.

with the percent of nonelderly in commercial HMOs one standard deviation above the mean the probability of enrollment increases from roughly .12 to .34, an increase of almost threefold. Moreover, expected Medicare HMO enrollment would be 15 percent in counties with roughly 50 percent nonelderly HMO enrollment, but we would expect only 2.3 percent Medicare HMO enrollment in counties with only 25 percent nonelderly HMO enrollment, all else equal. This finding suggests that HMOs may consider economies of scale more important than the rate they receive from the HCFA for Medicare HMO enrollees. That is, adding a Medicare HMO product to a current commercial HMO product is cost effective.

The effect of geographic location after controlling for other factors is highest in urban counties with a large central city (.83) and lowest in rural-nonadjacent counties (.01). In rural-nonadjacent counties the expected Medicare HMO enrollment with all of the variables for that geographic subsample at their means is close to 0 percent compared to about 5.9 percent and .3 percent in urban counties outside the central city and rural-adjacent counties, respectively. The highest expected enrollment controlling for payment rate and other county characteristics is in urban counties with a central city at about 10.7 percent.

The population of Medicare-eligible people in a county has a large effect on the probability of Medicare HMO enrollment. In counties with a population one standard deviation above the mean the probability of Medicare HMO would be roughly .32, more than 20 percentage points higher than in a county with the mean population. The age of the population marginally matters with respect to both probability of and expected enrollment in Medicare HMOs. The probability of any Medicare HMO enrollment increases to .15 when the proportion of the population aged 65 to 74 years is above the mean by one standard deviation. This likely occurs because the age of the population has both demand- and supply-side effects. A younger Medicare population may be more likely to have had experience with an HMO in the workplace and thus age in to Medicare risk contracts, requiring little or no marketing. On the demand side younger Medicare beneficiaries may be less concerned about changing doctors as compared to people over age 75 years.

As the number of hospital beds increases, the probability of Medicare HMO enrollment decreases. This variable was expected to be positive and intended to capture the capacity of the health care infrastructure in a county. A plausible explanation for the negative effect of hospital beds is that number of beds may reflect HMOs' willingness to offer a Medicare HMO product in counties that already evidence practice patterns that are consistent with HMO reliance on less acute and more outpatient care.

Finally, the model can be used to simulate the effects of the BBA on Medicare risk plan enrollment. Actual values were used for all of the observed explanatory variables in the model except for the two crucial variables that will be altered by the BBA legislation: the Medicare capitation payment rate and the volatility in that rate. For these two variables we used RUPRI rural health panel projections of actual payment rates in the period 1997–99, the county's associated volatility measure, and projections of the future payment rates and volatility in 2000–04 (McBride 1998).

Future Medicare+Choice (M+C) rates are deflated by the rate of growth in the Medicare national average per capita cost (a value used to set M+C rates). This means that counties that experience growth exceeding the national average in their M+C rates (mostly counties with low AAPCC rates in 1997) will observe positive increases in their M+C rates as used in the simulations, whereas the opposite will be true of counties that are projected to experience growth below the national average in their M+C rates (mostly counties with the highest AAPCC rates in 1997). This method of deflating M+C rates will most accurately reflect the real situation facing M+C plans because they will care most about the growth in M+C rates relative to the growth in M+C costs. Thus, this measure will more accurately reflect costs compared to other possible measures for deflation such as the overall consumer price index or its medical inflation component.

The predicted probability that a resident of a rural adjacent county would have a Medicare managed care plan available is projected to increase from .31 to .42 from 1997 to 2004. The proportions would also increase from .06 to .10 in rural-nonadjacent counties and from .65 to .71 in other urban counties while holding constant at about .99 for central urban counties. It is worth noting that almost all of this change in rural areas is projected to occur in the first two years of the BBA because of the effect of raising some counties to the payment floor. In contrast to these positive findings the expected enrollment in Medicare risk plans is projected to drop slightly in all counties as a result of the change in capitation rates resulting from the BBA, all else equal, with projected enrollment rates dropping about 1 percentage point in all counties compared to enrollment rates when the BBA was phased in. This result follows because, while the BBA will lead to increases in capitation rates in some counties (those with low enrollment), it has led to slower growth in rates in other counties (often the counties with the higher enrollment).

Implications

The BBA contains provisions that will lead to significant effects on the payments made to plans that choose to participate in the M+C program, offering alternatives to traditional Medicare. The payment changes have already led to significant increases in these rates in some locations (at the payment floor) and have affected rates paid in all other counties by limiting the growth in these rates to 2 percent in 1998 and 1999. Eventually, when all of the provisions of the legislation are implemented, capitation payment rates will be further affected by the "blending" provisions, leading to an acceleration of growth in lower-rate counties and continued slow growth in higher-rate counties.

The implementation of the blended rate begins in January 2000. By 2004 the rates are projected to increase 34 percent in rural-adjacent and 38 percent in rural-nonadjacent areas compared to 26 percent and 32 percent in central and other urban counties, respectively. Will the policy lead to increased enrollment in M+ plans, especially in traditionally underserved areas?

This research shows that while it is a significant variable, the rate of payment is only one contributor to the decision to offer an HMO and the enrollment into that HMO. However, it is the variable most directly affected by public policy; hence it is the lever of choice. The legislative objective is to affect the decision to offer the plan, realizing that the rate is a necessary but not sufficient condition for enrollment.

The BBA included other provisions thought to influence development of managed care plans: allowing plans to focus exclusively on Medicare enrollees (previously plans were required to include at least 50 percent commercial enrollment); allowing PSOs to contract directly with the HCFA and be federally certified even if they are not licensed in the state; and lowering minimum enrollment requirements. However, these BBA changes relate only to decisions regarding how to launch a managed care plan after the decision to enter the market has been made.

Other factors, including volatility in payment rates, enrollment in non-Medicare HMOs and managed care plans, and population in the county, are more significant contributors to total enrollment. Consequently, the modest changes in payment experienced during the first two years after the BBA was enacted should not be expected to lead to significant increases in enrollment. Dramatic changes in payment occurred in only those counties in which previous payments were well below the new minimum payment set in the BBA. These are the same counties in which the other considerations mitigate the enrollment (low, if any, enrollment in non-Medicare HMOs, low population, history of volatility in the rate).

Given the ability to affect only two of the significant variables (payment rate and volatility) associated with enrollment into Medicare HMOs, Congress may have created unduly optimistic expectations by promoting changes in payment as inducements to increase rural beneficiary enrollment. Their decision was based on incomplete information including the simple bivariate relationship between payment and enrollment as presented during the debates by the Medicare Fairness Coalition and others (Foote 1997). Further refinement of the BBA policies can now be made with more complete information, which should mean two strategies.

First, a minimum payment rate that reflects the "necessary" condition for market entry should be set, perhaps at a level higher than the current floor. Experiences of HMOs at the floor, such as the Yellowstone Plan in Billings, Montana (closed at the end of 1999), can be used to help set that level. In this regard it is worth pondering what the results of the present model suggest. Using the second stage of the model the equation can be solved for the "reservation" AAPCC rate—the rate that would need to be exceeded in an area for enrollment to increase above zero. If we do this here we find that the reservation AAPCC rate would be roughly $435 in rural-adjacent areas and $504 in rural-nonadjacent areas, both rates well above the legislated floor for capitation rates ($380 in 1999). Given this, it is not surprising that few new entrants are found in the M+C markets in many areas. It is important to keep in mind that these reservation rates were computed using means for the other variables in the model; thus, the reservation price is a function of other market characteristics such as the level of commercial HMO enrollment in the county. Counties with higher commercial HMO enrollment, for example, would have lower reservation rates, a finding that makes sense when one considers what it takes to compete effectively in managed care markets.

Second, policies that affect the number of beneficiaries aggregated into plans can be altered. One step in this direction is included in amendments to the BBA passed in October 1999 allowing plans to vary the benefits and premiums within their service area to reflect variation in costs and Medicare payment. For rural counties in particular policies that encourage regional service delivery networks could help create regional health plans with larger base populations from which to draw enrollees.

The results of this research help us understand the turbulence in Medicare managed care offerings and enrollment since the provisions of the BBA began to be implemented. Health plans that did not receive the payment they expected based on increases experienced in previous years pulled out of markets where enrollment was proportionately (compared to other counties) low. On the other hand, overall enrollment in Medicare HMOs continues to increase as would be expected in counties where the more significant variables (non-Medicare HMO enrollment, population) are operative. For rural counties the effect has been related more to rates not meeting expectations (in rural-adjacent counties that were part of urban-based service areas and in counties not receiving blended payment) than to the amount of the rate or a desire to cease providing managed care plans.

CONCLUSION

This article establishes a relationship between Medicare payment and propensity to offer risk contracts in a given county to Medicare beneficiaries and a relationship of payment rates to enrollment into risk plans. However, once a threshold is crossed whereby the combination of Medicare payment and beneficiary premium meet the reservation price of the health plan, the independent explanatory power of the payment rate diminishes considerably. Thus, when the model used to explain health plan and beneficiary decisions is used to simulate actual enrollment through 2004 (when provisions of the BBA that change the payment are fully implemented), increases in payment controlling for other variables influencing enrollment predict very little change in enrollment. Variables other than the payment rate have a larger effect on change in enrollment.

A limitation of this article is that the data used in the model measure enrollment into HMO-style managed care and not any of the other options in the M+C provisions of the BBA. Further model development and testing should be completed after there is some experience with PPOs, point-of-service plans, PSOs, and medical savings accounts.

NOTES

1. Because Medicare managed care enrollment is observed (will be greater than zero) in a county if the AAPCC rate is above the reservation premium with enrollment equal to zero otherwise, values for the dependent variable are censored at zero. A model with these characteristics can also be estimated with a Tobit model (Maddala 1983). Results were qualitatively similar to the two-step analysis presented.
2. Actual enrollment data by county for 1996 are not available. Using published tables from AAHP, an imputation procedure was used to estimate the percent of persons enrolled in insurance plans by type of plan. This procedure is consistent with Wholey et al. (1996). To compute this, statewide enrollment and metropolitan statistical area (MSA) enrollment breakdowns are used. For an MSA county the percentage reported by AAHP is used. The residual enrollment in managed care plans in that state—left after removing the MSA enrollment from the statewide total enrollments by type of plan (e.g., HMO, PPO, POS)—is then allocated to the non-MSA counties and used to estimate managed care enrollment as a proportion of the population in non-MSA counties. This assumption implies that all non-MSA counties have the same managed care penetration. To test this strong assumption we tested an equally strong assumption at the other extreme, imputing the enrollment the same way in the MSA counties but allocating all of the residual managed care enrollment to rural counties adjacent to the urban counties. We ran our multivariate model both ways but the coefficients on the key variables of interest did not change a great deal. Thus, the results presented here use the first imputation procedure, assigning all of the residual enrollment equally as a percentage of population in non-MSA counties.

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