

Medicare risk contracting: Determinants of market entry

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The Tax Equity and Fiscal Responsibility Act (TEFRA) of 1982 made it more attractive for health maintenance organizations (HMOs) and other competitive medical plans to enter into risk contracts with Medicare. Since the start of the TEFRA program in April 1985, more than 160 HMOs have had risk contracts with Medicare under

the program. An investigation of factors associated with TEFRA risk-market entry at the end of 1986 revealed that high adjusted average per capita cost payment levels, prior Medicare cost-contract experience, and prior Federal qualification were the most important factors distinguishing market entrants from nonentrants.

Introduction

Given the passage of the Tax Equity and Fiscal Responsibility Act (TEFRA) of 1982, risk contracts with health maintenance organizations (HMOs) have been viewed as a promising approach for the efficient delivery of high-quality care to the Medicare population through competitive market forces. The future success of Medicare risk contracting will depend greatly on the eagerness of HMOs to enter into and maintain their risk contracts with Medicare. Whereas Medicare's significant buying power in hospital markets virtually ensures widespread hospital participation in the prospective payment system (PPS), Medicare does not possess the same market power in the HMO marketplace. The rapid expansion of the HMO industry over the past decade has occurred without significant Medicare risk enrollment. Significant expansion of Medicare HMO capitation will occur only if HMOs find it in their best interest to participate in the TEFRA program and to enroll large numbers of Medicare beneficiaries.

As of June 1, 1988, 138 plans had signed TEFRA risk contracts with the Health Care Financing Administration (HCFA) as federally qualified HMOs or competitive medical plans (CMPs). Forty-eight other plans also had pending TEFRA risk applications as of that date. Enrollment in Medicare at-risk HMOs has grown substantially since the inception of the program in April 1985. More than 1 million Medicare beneficiaries were enrolled in TEFRA risk plans in June 1988. Although this growth has been encouraging, the future of Medicare HMO capitation is uncertain. More than three-quarters of all HMOs currently do not serve the Medicare population under TEFRA risk contracts, and 68 TEFRA risk contractor HMOs have chosen not to renew their risk contracts with HCFA within the last 3 calendar years.

A significant fraction of the Medicare population will never be enrolled in Medicare HMOs unless large numbers of HMOs enter into Medicare risk contracts. Understanding what factors are associated with Medicare HMO market entry can help to shape policy that could potentially encourage broader HMO participation in the

TEFRA program. The study of market entry should also help in assessing the need for and/or the likely supply response to potential changes in capitation payment formulas in the future.

Previous research

Most of the earliest research on HMO growth was focused on identifying the impacts of market and regulatory conditions on the formation and growth of HMOs. Based on surveys of HMO administrators (McNeil and Schenkler, 1975) and econometric analyses (Goldberg and Greenberg, 1981; Morrissey and Ashby, 1982), it is suggested that HMO development was most prevalent in areas where high fee-for-service (FFS) utilization or expenditures reflect opportunity for competitive pricing by HMOs. Differential HMO market share was found to be more strongly associated with demand characteristics of the population, such as age composition and income levels.

The later work of Welch (1984) was also focused on factors affecting the establishment of HMOs and their subsequent enrollment growth. Welch found that HMO establishment and enrollment per capita were greater in markets with lower per capita incomes and those with more educated populations. In addition, HMO establishment was more likely to be found in the more populated geographic markets, and greater HMO enrollment per capita was found in markets with higher hospital per diem costs.

The recent work of Adamache and Rossiter (1986) is of particular relevance to this study because in it they addressed the determinants of HMO participation in the Medicare HMO Competition Demonstrations sponsored by HCFA. In their findings, they suggest that the most important factors associated with participation in the demonstrations were high Medicare capitation rates under HCFA's adjusted average per capita cost (AAPCC) formula in the HMO's main county of operation, prior HMO experience in serving the Medicare population on a cost basis, and previous Federal qualification of an HMO. These findings are an important contribution toward understanding the supply response of HMOs to Medicare capitation. However, it is not clear whether the response of HMOs to a Medicare demonstration program will accurately reflect their response to the actual TEFRA program. Because early demonstration participants might be viewed as pioneer entrants into the Medicare risk marketplace, factors leading a small set of 40 plans to become demonstration sites may differ from those

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affecting entry of a much larger and more diverse group of recent TEFRA market entrants.

In particular, in their findings, Adamache and Rossiter may have overstated the impact of AAPCC on later TEFRA market entry, for at least two reasons. First, given that the spatial distribution of demonstration participants was as strongly biased toward the highest AAPCC markets, later TEFRA entrants are more likely to come from lower AAPCC markets than from demonstration sites simply because there will be fewer potential TEFRA entrants left in those higher AAPCC markets. Hence, the much larger group of all TEFRA HMOs to date is expected to be more representative of all HMOs than the small group of early demonstration sites. Second, in contrast to demonstration HMOs, the Medicare profit rates of TEFRA risk HMOs have been regulated through adjusted community rate (ACR) regulations. ACR is a projection of monthly revenue requirements for serving Medicare enrollees that is based on the average premium an HMO charges for commercial enrollees. The commercial premium, containing a net-profit rate, is adjusted to reflect only Medicare covered services and is adjusted further through experience multipliers, reflecting the higher utilization and resource intensity of the Medicare population relative to commercial enrollees, to yield the ACR.

Under ACR regulations, TEFRA HMOs are required to return any net revenues from Medicare in excess of the profit rate earned in their commercial markets to HCFA or pass them on to beneficiaries in the form of reduced premiums or expanded benefit packages. ACR regulations could weaken the financial incentives associated with high AAPCC payment rates under the TEFRA program.

Data and model development

Potential market entrants

The universe of HMOs in this study consisted of 410 HMOs that were in operation as of June 1985 whose enrollment, model type, age, and profit status were available from at least one of the following sources:

- *HMO Summary June, 1985* (InterStudy, 1985a).
- *The Tenth Annual Report to Congress, Fiscal Year 1984* (Office of Health Maintenance Organizations, 1985).
- *The 1984 National HMO Census* (InterStudy, 1985b).
- Unpublished data from quarterly reports submitted by some federally qualified HMOs to the Office of Prepaid Health Care (OPHC) of HCFA.

Because HMOs serving multiple geographic markets may enter the TEFRA risk market in selected geographic markets, separate HMO study units of observation were usually defined for each geographic market to maintain the integrity of local market conditions as a potential determinant of entry. Separate HMOs were defined for sites of national or regional chain organizations when data were reported separately in the InterStudy data or when the sites were regional components of federally qualified HMOs. Regional components are distinguished in the case of federally qualified HMOs because of different community rates. Most of these regional components are not distinguished as separate HMOs in the HMO census data published by InterStudy.

Given the focus on TEFRA period risk-market entry in this study, 38 HMOs that served Medicare beneficiaries prior to the start of the TEFRA risk program as demonstration sites or through old risk contracts were excluded from most of the analyses. These HMOs had in effect already entered the Medicare risk market several years before the start of the TEFRA program. Given the rapid changes occurring in the health care markets, including those in the HMO marketplace, the same conditions that affected their earlier entry might not be present in 1985. It could be argued that the continued TEFRA participation by most demonstration plans is analogous to a TEFRA entry decision. However, factors affecting a plan's decision to exit the Medicare market probably differ from those governing initial entry. Although some models were estimated for all 410 HMOs for comparison purposes, the empirical analyses in this study will be focused mainly on factors affecting TEFRA market entry decisions of the 372 remaining nondemonstration HMOs.

Health maintenance organization markets

HMO geographic market areas were defined as county-based metropolitan statistical areas of the U.S. Bureau of the Census for HMOs whose central site was located in a metropolitan area. Nonmetropolitan geographic markets were defined by the major county of HMO operation. These geographic definitions were generally consistent with the service area definitions of federally qualified HMOs, where the great majority of HMOs in multiple county MSAs served the population in more than one county. Market area data were obtained from the *Area Resource File* (U.S. Department of Commerce, 1987), the U.S. Bureau of the Census, and through the geographic aggregation of HMO data from the sources summarized previously.

Market entry

TEFRA market entrants were defined in this study as all HMOs in operation as of June 1985 who had signed TEFRA risk contracts before the end of the calendar year 1986. Unpublished risk contract data were obtained from OPHC. A few of the study HMOs still had pending risk applications as of December 1986. Most of these applications were later classified as inactive by OPHC. Because 24 of 52 TEFRA risk applications submitted by study HMOs through January 1986 were subsequently withdrawn or declared inactive, an assumption that application is equivalent to entry is not strongly supported by past experience. Thus, the few plans having pending applications at the end of 1986 were not treated as market entrants in this study.

Model development and specification

Our economic model of Medicare market entry is based on the assumption that Medicare market entry is the result of rational utility maximization by HMOs. HMOs are assumed to have utility functions with arguments for expected enrollment, expected profit, and the risks associated with the variance in the distributions of

expected enrollments and profits. Larger expected enrollments and/or profits should increase utility. Marginal increases in risk are assumed to lower utility because of assumed HMO aversity to financial risk. Although more complex behavioral models could be postulated, HMOs are simply assumed to compare the utilities arising from their expected enrollment, profit, and risk for the discrete alternatives of entering into a Medicare risk contract versus the status quo.

Because the utility functions of HMOs cannot be observed, the probability of market entry was specified to be a function of HMO and market area attributes through a binary logit model specification. Organizational, market area, and performance attributes expected to influence the relative profitability and/or risks of Medicare risk contracting, as well as plan attitudes toward these risks, were specified as potential explanatory variables. The hypotheses associated with selected variables are discussed later. The operational definitions of the variables are summarized in Table 1.

Organizational attributes

Organizational attributes of HMOs can be expected to influence their entry decisions through their impact on expected revenues, expected costs, risk, and plan attitudes toward risk. Because of their scale and experience, older and larger HMOs should possess a number of cost advantages that should be favorable toward Medicare risk-market entry. Alternatively, young HMOs may view market entry as a means to more rapid expansion of market share. In addition to years of commercial experience and enrollment size, a dummy variable was specified to distinguish the newest HMOs (i.e., those with less than 3 years experience), to test for these possible opposing effects of commercial market experience.

The model type of an HMO could influence market entry in a variety of ways. Group and staff models are likely to have more effective organizational structures for controlling Medicare enrollee utilization and costs than open panel models. Other aspects of closed panel models, such as common bureaucratic requirements for physician approval of market expansion, could impede their likelihood of entry, however. There are also reasons to expect that open-panel individual practice association (IPA) and network models could be, more likely, market entrants. Not only do these models have some incentives for preserving the existing Medicare patient panels of member physicians, but the fact that patients may enroll without switching personal physicians may be an important marketing economy for open-panel models. Because of these counteracting incentives, the expected net effects of model type on entry are uncertain.

The effect of profit status of HMOs on market entry is also uncertain. Given the great financial risks of serving the Medicare population under capitation, for-profit HMOs may require a higher expected profit margin than nonprofit HMOs, which are more likely to have broader community service missions. On the other hand, to the extent that significant capital investment is involved in the short run, nonprofit HMO entry may be hindered because of greater difficulty in generating capital.

HMO members of national or regional chain organizations may experience economies associated with the centralization of certain administrative functions and/or possible risk spreading or cross-subsidization among regional sites that could facilitate Medicare market entry in certain geographic markets where it might not be profitable otherwise. Administrative centralization may make the likelihood of entry for a specific regional site dependent on the entry decisions of sites in other market areas, particularly the entry decision in the headquarter market. To test for such interdependencies, a dummy variable was specified as equal to unity for any regional sites when the central chain organization site was a market entrant.

Prior Medicare cost-contract experience could facilitate market entry for at least three reasons. Because of experience, these HMOs should be more capable of managing and delivering the mix of services demanded by the Medicare population than other HMOs. Although TEFRA regulations limit the rate of rollover enrollment, HMO cost enrollees may rollover into the risk program. The marketing barrier of loyalty to existing providers may serve as a marketing economy for encouraging rollover enrollment. Finally, such HMOs may be less inclined to view TEFRA regulatory requirements as an entry barrier given their prior experience with HCFA cost contracts.

Federal qualification status is not a regulatory requirement for market entry because non-federally qualified HMOs may opt to enter the TEFRA risk market as CMPs. However, to the extent that required submission of financial statements to HCFA is viewed as a regulatory barrier, holding prior Federal qualification status could reflect the surpassing of a regulatory entry barrier to the TEFRA program. It is more likely, however, that holding Federal qualification status simply distinguishes among plans with different missions in commercial markets that bear on their desire to serve the general Medicare population.

Market area attributes

Medicare risk-contract payment rates are based on projected Medicare FFS reimbursements through the AAPCC formula. Markets with higher AAPCC rates should be more attractive to the extent that these higher rates reflect savings opportunities for HMOs (e.g., high discretionary medical care use in local Medicare FFS delivery systems) rather than high prices. Because AAPCC rate variations should reflect both service volume and input price differences, nominal AAPCC rates were deflated by a geographic wage index for hospital workers (Standard Industrial Classification 806) used in setting Medicare PPS rates for hospitals.

It would have been desirable to also specify some measure of the typical medigap supplemental insurance rate in the local market area because Medicare HMOs must generally set beneficiary monthly premiums for enrollees below those of medigap supplemental insurers. Unfortunately, such data were not available.

The general population market demand for Medicare HMOs was specified through a number of proxy variables about market population size and population composition. Geographic markets with larger Medicare populations and

Table 1
Variable definitions and expected effects of entry

Variable	Description	Expected sign
Organizational attribute		
Plan enrollment	Total HMO enrollment as of June 1985	+
Age of plan	Year of HMO operation as of June 1985	+
Less than 3 years	A dummy variable indicating an HMO with less than 3 years of operation	?
Group model	Dummy variables indicating HMO model type (traditional IPA model omitted)	?
Staff model		?
Network model		?
HMO chain member	A dummy variable indicating HMO as a component of a multimarket HMO chain	+
Chain headquarter entry	A dummy variable indicating entry of the central HMO of chain	+
For-profit HMO	A dummy variable indicating for-profit HMO	?
Prior Federal qualification status	A dummy variable indicating Federal qualification status as of January 1985	+
Any Medicaid cost enrollees	Dummy variable indicating prior Medicare cost HMO enrollment as of June 1985	+
Market area attribute		
Wage-adjusted average per capita cost	Medicare wage-adjusted average per capita cost in the HMO market area, 1985	+
Medicare market population	Medicare beneficiary population in HMO market area, 1983	+
Population growth, 65 years of age or over	Percent growth of population 65 years of age or over in HMO market area, 1970-1980	+
Nonelderly HMO market penetration	HMO market penetration for nonelderly population, 1985	+
HMO market growth rate	Percent growth in total HMO enrollment in market area, 1984-85	?
Average HMO age in market	The average age of HMOs in the market area weighted by enrollment in 1985	+
Percent of population 65 years of age or over below overtly level	Percent of population 65 years of age or over with incomes below poverty level in the market area, 1980	?
Immigrants as a percent of population 65 years of age or over	Immigrant population 65 years of age or over (1975-80) as a percent of total population 65 years of age or over, 1980	+
Females as a percent of population 65 years of age or over	Female population 65 years of age or over as a percent of total population 65 years of age or over, 1980	+
White people as a percent of population 65 years of age or over	White population 65 years of age or over as a percent of the total population 65 years of age or over, 1980	+
Physicians per capita	The number of office-based physicians per capita, 1980	-
Competitive market structure and/or market position		
Plan share of HMO market	The plan's market share of total HMO enrollment in the local market, June 1985	?
Herfindal index of HMO concentration	The Herfindal index of market concentration, June 1985	?
Medicare demonstration market	The number of Medicare demonstration HMOs serving the HMO's local market	?
Performance attribute		
Hospital days per 1,000 enrollees	Annual hospital days per 1,000 members of HMO	-
Physician visits per enrollee	Annual physician encounters per enrollee	+
Plan net revenue per enrollee month	Net revenue per member month	?
Plan growth rate	The plan's average net enrollment increase per month of plan, 1984-85	?

NOTES: HMO is health maintenance organization. IPA is individual practice association.

SOURCE: Bigel Institute for Health Policy, Brandeis University: Data from the Health Maintenance Organizations Responses to the Tax Equity and Fiscal Responsibility Act Study.

those with greater growth rates in the Medicare population should have greater market potential. Higher income markets should generate less demand for Medicare HMOs if freedom to choose one's physician in the FFS sector is a normal economic good. The only available measure of market income level was the percent of elderly population with incomes below the poverty level. Because this measure could also reflect aspects of health status population composition, its expected sign is uncertain. The demand for Medicare HMOs should be greater (and marketing costs should be lower) in markets where beneficiaries are more informed about the HMO concept. HMO awareness was specified through a surrogate variable measuring the enrollment-weighted average age of HMOs in a market area.

Ties to personal physicians and strong FFS integration are generally believed to be a major impediment to Medicare beneficiary enrollment in HMOs (Garfinkel et al., 1986). In markets with greater elderly population immigration, smaller fractions of the population may face high costs of switching physicians. According to past research, there are sex and race differences in the likelihood of having regular sources of physicians care (Wilensky and Cafferata, 1983; Kasper and Barrish, 1982). Hence, sex and racial population composition variables were specified as additional indicators of FFS integration. Finally, a number of office-based physicians per capita were specified as a supply-based measure under the premise that FFS integration may be higher in markets with greater physician supply.

Competitive market structure

Characteristics of the HMO marketplace and local competitive forces may also affect market entry. Two characteristic variables were derived from HMO local market shares. A market-area Herfindal index of HMO concentration was constructed as the sum of squared market shares of HMO total enrollment for all HMOs serving a market area. Larger index values will result when a local market is concentrated among fewer HMOs. An individual plan's share of local non-Medicare HMO enrollment was specified to distinguish dominant and small share HMOs. Because competition and rivalry among firms are generally thought to be greater in less concentrated markets, a greater likelihood of market entry could be expected in such markets as long as entry is viewed as an instrument of competition. Alternatively, high concentration can be an inducement to entry if market concentration is viewed as a proxy for a profitable market where a small HMO can gain a larger niche in the local market with less chance of retaliatory action by the dominant HMO. Hence, the expected effects of HMO market concentration and plan-specific market share are uncertain.

Greater market saturation in the non-Medicare market may be expected to increase the relative attractiveness of the Medicare risk market as an alternative avenue for market expansion. HMOs should be more prone to enter the Medicare market when opportunities for commercial HMO market growth are more limited. Two variables were specified as indicators of the opportunities for commercial market expansion: the marketwide nonelderly HMO market penetration and the market area percent

growth rate in overall HMO enrollment. Finally, prior Medicare market entry by competitor HMOs may stimulate or impede the subsequent market entry of an HMO depending on the nature of competitive response in HMO markets. The number of prior Medicare demonstration sites in any market area was specified to test for possible competitive response effects toward the earlier market entry decisions of competitors upon post-demonstration TEFRA entry.

Performance attributes

Given the high proportion of Medicare expenditures attributable to inpatient hospitalization, effective management control of hospital utilization (e.g., through effective substitution for more expensive inpatient care) should be essential for serving the Medicare population. HMOs that are effective in their management of care, as reflected in lower hospitalization and higher physician visit rates in their non-Medicare enrollment, are expected to be more likely TEFRA market entrants.

Financially strong plans should be more prone to enter the Medicare market for a number of reasons. They should be better able to generate necessary capital for expansion and to absorb the risks of serving the Medicare population. Furthermore, because adjusted community rate (ACR) regulations for TEFRA risk plans should theoretically limit Medicare profit rates to those earned in commercial employer markets, ACR regulations should discourage the entry of plans with lower commercial profit rates.

Financially, plans experiencing more rapid commercial enrollment growth could be more prone to enter the Medicare market simply because they may be in a better financial position to do so during a period of growth. Rapid commercial enrollment growth could strain the short-run capacity of the HMO, however, making the expected effect of commercial enrollment growth on entry uncertain.

Empirical results

Table 2 contains some selected descriptive statistics on the independent variables for post-demonstration TEFRA risk-market entrants, demonstration Medicare HMOs, and nonentrant HMOs. Several differences between demonstration and TEFRA market entrants should be mentioned. Relative to demonstration participants, TEFRA risk HMOs, on average, are smaller, younger, and are more likely to serve smaller and less mature HMO markets, having lower AAPCC rates and Medicare FFS hospital utilization rates. Comparing the mean values of nonentrants with means for each of the demonstration and TEFRA entrant groups, it would appear that, as a group, later TEFRA entrants are indeed more representative of the HMO universe than were earlier Medicare HMO demonstration sites.

Logit model specifications

Because of data limitations, four alternative specifications were empirically estimated. Models I, II, and III exclude 38 demonstration and old-risk HMOs as

Table 2
Comparison of the mean attributes of TEFRA entrants with nonentrants

Variable	All health maintenance organizations (HMOs)	TEFRA period entrant	Early demonstrations or old risk	Nonentrant
Number of HMOs	410	105	38	267
Plan attribute				
Plan enrollment as of June 1985	46,103	54,100	80,731	38,394
Age of plan in years***	6.3	5.4	13.6	5.7
			Percent	
Age less than 3 years***	33	35	8	36
Group model	18	15	19	18
Staff model	13	9	27	13
Network model*	24	31	27	20
IPA model*	45	45	27	49
Prior Federal qualification as of December 1984	52	68	79	44
HMO chain member***	22	31	24	18
For-profit HMO	37	35	30	39
Any Medicare cost enrollees***	16	25	30	10
Market area attribute				
Wage-adjusted average per capita cost***	\$192.49	\$197.64	\$216.50	\$187.10
Adjusted average per capita cost***	\$205.56	\$216.04	\$239.67	\$196.74
Medicare FFS hospital days per 1,000 enrollees (1983)	3,834	3,391	4,078	3,813
Medicare FFS hospital admission rate per 1,000 enrollees (1983)	382	386	394	379
Medicare market population (1983)*	145,386	177,609	148,895	212,500
Percent of nonelderly HMO market penetration (1985)**	14.8	15.0	20.1	13.9
HMO market growth rate (1984-85)	63.6	54.9	45.1	69.8
Percent of population 65 years of age or over below poverty level (1980)***	11.6	10.8	10.7	12.1
HMO market age in years	9.1	9.2	11.6	8.8
Competitive market structure				
Percent of plan's share of HMO market	41.5	42.2	35.8	42.0
Percent of Herfindal index of HMO concentration***	57.5	57.9	42.0	59.5
Performance attribute				
Hospital days per 1,000 enrollees****	379 (313)	338 (88)	500 (34)	376 (190)
Plan physician visits per enrollees***	3.3 (292)	3.4 (86)	3.6 (35)	3.2 (170)
Plan net revenue per enrollee***	-\$14.12 (232)	-\$4.02 (78)	\$1.40 (32)	-\$24.74 (121)
Plan growth rate (per month, 1984-85)***	705	999	995	557

* Significant at 0.10 level.

** Significant at 0.05 level.

*** Significant at 0.01 level.

† These data contain Medicare enrollees for plans with Medicare enrollment as of June 1985.

NOTES: The number of HMOs with available data is reported in parentheses. IPA is individual practice association. FFS is fee for service. TEFRA is Tax Equity and Fiscal Responsibility Act.

SOURCE: Bigel Institute for Health Policy, Brandeis University: Data from the Health Maintenance Organizations Responses to the Tax Equity and Fiscal Responsibility Act Study.

observations. Model I specifications were estimated on 372 potential post-demonstration market entrants by limiting variables to those where data were available for all study HMOs. Models II and III were estimated on smaller samples of HMOs because each specification contained additional variables that were only available for a subset of the 372 study HMOs. The 222 HMOs in Model II specifications had HMO hospital day and physician visit data. The sample was slightly biased by the exclusion of young HMOs and some regional components of HMO chains where utilization data were not available. Model IV, equivalent to Model I in terms of variable specification, was estimated on all 410 HMOs for comparison purposes only.

For each of the model specifications I through IV, two sets of logit model parameters were estimated. Full-model specifications, containing all variables listed in Table 1, were estimated first. In addition, reduced-variable specifications were also estimated, in which only those variables whose estimated parameters were at least as large as their standard errors were retained. Because some redundancy in the information imparted by the large number of variables in the full model specifications is expected, the reduced specifications should contain more stable parameter estimates. Given the large number of model specifications fitted, only the empirical results for the reduced-variable model specifications are reported here.

Logit model empirical results

Table 3 contains the empirical results for the reduced-variable logit models I through IV. Although the chi-square values reported in Table 3 indicate statistically significant overall model fits, they convey little intuitive information about relative model goodness-of-fit. There is no widely accepted measure of the statistical goodness-of-fit for logit models that is comparable to the multiple R^2 of linear regression analysis. To give some indication of model fit, we have reported the relative proportions of actual entrants and nonentrants that were predicted to be entrants or nonentrants on the basis of the estimated model parameters. HMOs with predicted probabilities exceeding 0.50 were designated as predicted entrants.

The model predictions were fairly consistent with actual entry decisions. The overall percent of correct predictions ranged from 67 percent in Model III to 77 percent in Model II. The mean predicted entry probability for actual TEFRA entrants was more than double that of nonentrants in all of the specifications. For example, in Model I, the mean predicted entry probability for actual entrants was 0.52 versus 0.24 for nonentrants. Although the fraction of correct predictions was always less for actual entrants versus nonentrants, this pattern is typical for models where the actual outcomes are skewed toward one of the two dichotomous outcomes.

Organizational attributes

All model specifications yielded findings indicating that HMOs with prior experience in serving Medicare beneficiaries through cost contracts and/or those holding

prior Federal qualification status were far more likely to enter the Medicare risk market than HMOs without attributes. For both variables, the average predicted entry probability for HMOs with the experience was found to be roughly double that of HMOs without the attribute. Whereas the importance of prior experience in serving the Medicare population is intuitively understandable, the underlying reasons behind the importance of Federal qualification status are less clear. Given that CMPs and federally qualified HMOs have identical regulatory requirements for TEFRA participation, it would be difficult to ascribe the impact of Federal qualification status to the surpassing of a regulatory entry burden. It is more likely that the act of obtaining Federal qualification status manifests a self-selection of HMOs with missions relevant to potential service of the Medicare population.

No other organizational attributes were found to be significantly associated with market entry among all specifications. Significant coefficients were obtained for age, enrollment size, and the chain headquarter entry variables in Model I and IV specifications. These coefficients suggest that larger HMOs and younger HMOs were more likely to be market entrants and that the regional components of chain organizations were more likely to enter if the headquarter site was a TEFRA market entrant. Weaker or insignificant impacts of these variables were found in Models II and III, where HMO utilization rates and net revenues per enrollee were specified as plan performance indicators. It is unclear, however, whether these inconsistent findings are because of the bias in HMO samples with more complete performance data or to biased parameter estimates in the specifications with missing HMO performance measures.

Market area attributes

The empirical results are consistent with the earlier findings of Adamache and Rossiter (1986) concerning the importance of the AAPCC payment level as an entry determinant. The estimated coefficients for the wage-adjusted average per capita cost were all positive and statistically significant at the 10-percent level or higher. To gain some deeper insight on this supply response, we re-estimated our wage-adjusted average per capita cost entry model with a series of alternative supply price variables. Three of these alternative measures were the nominal AAPCC payment level, the Medicare FFS inpatient hospital day utilization, and the Medicare FFS inpatient hospital admission rate along with the average length of stay. The fourth alternative used the Medicare FFS hospital admission rate and the FFS Medicare average length of stay per admission specified as two separate variables describing Medicare FFS experience. If higher AAPCC payment rates are the result of discretionary hospitalizations that can be avoided by HMOs or lengths of stay that can be reduced by HMOs, specification of these alternative measures of HMO opportunities for savings should yield similar implications toward entry likelihood as did the AAPCC payment rates themselves. The estimated coefficients from these model specifications were used to assess the implied sensitivity of market entry to changes in supply price measured in each of these alternative ways.

Table 3
Reduced variable logit model empirical results

Variable	Model I		Model II		Model III		Model IV	
	Coefficient	(t)	Coefficient	(t)	Coefficient	(t)	Coefficient	(t)
Organizational plan attribute								
Plan enrollment	0.215	** (2.7)	0.214	* (1.8)	—	—	0.270	** (3.5)
Age of plan	-0.022	** (2.5)	—	—	-0.018	(1.1)	—	—
Age less than 3 years	0.364	* (1.8)	—	—	0.704	(1.6)	0.447	** (2.5)
Staff model	-0.274	(1.2)	-0.449	* (1.8)	—	—	—	—
HMO chain member	-0.208	(1.1)	-0.259	(1.1)	—	—	—	—
Chain headquarter entry	1.528	** (4.0)	0.873	* (1.8)	—	—	1.382	** (3.9)
Prior Federal qualification	0.549	** (3.0)	0.587	** (2.2)	NA	NA	0.540	** (3.5)
Any Medicare cost enrollees	0.481	** (2.5)	0.801	** (3.5)	0.852	** (3.6)	0.417	** (2.5)
Market area attribute								
Average age in HMO market	-0.015	(1.3)	-0.056	** (3.4)	-0.059	** (3.0)	-0.017	* (1.8)
Nonelderly HMO market penetration	—	—	—	—	0.017	* (1.6)	—	—
HMO market growth rates	-0.002	* (1.9)	-0.002	* (1.9)	—	—	-0.001	* (1.6)
Wage-adjusted average per capita cost	0.007	** (2.7)	0.007	* (1.9)	0.007	* (1.9)	0.009	** (3.8)
Percent of population 65 years of age or over below poverty level	-0.049	** (2.1)	-0.098	** (2.9)	-0.095	** (2.7)	-0.042	** (2.3)
Immigrants as a percent of population 65 years of age or over	0.017	* (1.8)	—	—	—	—	—	—
Females as a percent of population 65 years of age or over	0.054	(1.3)	0.105	** (2.0)	0.093	* (1.8)	—	—
White people as a percent of population 65 years of age or over	-0.009	(1.1)	-0.019	* (1.7)	-0.027	** (2.2)	—	—
Physicians per capita	—	—	-0.001	(1.1)	-0.001	(1.4)	—	—
Competitive market structure								
Plan share of HMO market	-0.006	* (1.6)	-0.008	(1.3)	—	—	-0.007	** (2.0)
Herfindal index of HMO concentration	0.009	* (1.9)	0.011	* (1.6)	—	—	0.008	* (1.9)
Hospital days per 1,000 employees	—	—	-0.002	** (2.5)	-0.002	* (1.9)	—	—
Physician visits per enrollee	—	—	0.114	(1.6)	0.164	* (1.8)	—	—
Plan net revenue per enrollee month	—	—	—	—	0.035	** (2.5)	—	—
Plan growth rate	—	—	—	—	—	—	-0.069	(1.4)
Intercept	0.813	(0.0)	-0.855	(0.3)	1.455	(0.5)	2.155	(3.4)
Sample size	372		222		161		410	
Chi-square (df)	343 (17)		222 (17)		157 (13)		394 (12)	
Mean entry probability	0.282		0.329		0.391		0.346	
Percent of correct predictions								
Actual nonentrant	89		89		78		80	
Actual entrant	42		53		49		47	
All HMOs	76		77		67		72	

* Significant at 0.10 level (two-tailed test).

** Significant at 0.05 level (two-tailed test).

NOTES: HMO is health maintenance organization. HMOs is health maintenance organizations. (t) is the t-statistics. Model I excludes demonstration HMOs only, Model II excludes demonstration HMOs and HMOs with missing utilization data, Model III excludes demonstration HMOs and HMOs with missing financial data, and Model IV includes all HMOs.

SOURCE: Bigel Institute for Health Policy, Brandeis University: Data from the Health Maintenance Organizations Responses to the Tax Equity and Fiscal Responsibility Act Study.

Estimated mean predicted entry probabilities were derived by inserting mean values for all independent variables into the estimated reduced-variable Model I specification reported in Table 3. The same independent variables were used for all alternative supply price variables. Predicted entry probabilities are reported in the first column of Table 4. These predicted values differ from the fraction of market entrants because of the nonlinear structure of the logit model. In the other three columns of Table 4, predicted entry probabilities are shown for situations where the mean supply price is increased and all other independent variables remain at their sample mean values. The sensitivity of entry to supply price is reflected in the size of the percent increase in entry probability associated with an increase in supply price when all other factors are held constant. These percent increases are reported in parentheses in Table 4.

Several interesting patterns are evident in Table 4. First, although our findings still suggest that TEFRA period HMO market entry has remained fairly sensitive to AAPCC payment levels, they support our premise that Adamache and Rossiter's (1986) findings, based on early demonstration HMO participation, probably overstate the impact of the AAPCC on market entry since the start of the TEFRA risk program. Whereas Adamache and

Rossiter (1986) found that increasing the AAPCC by one standard deviation over the mean increased the predicted probability of market entry by 108 percent, all of our model specifications show percent increases in predicted entry probabilities of less than 70 percent under similar changed conditions. Second, entry likelihood appears to be far less sensitive to variations in FFS average lengths of stay than to FFS hospital admission rates. The percent increases in entry probabilities associated with increasing FFS hospital admission rates (holding length of stay constant) are much larger than those percent increases resulting from increased FFS lengths of stay (holding admission rates constant). Because the presumed forte of HMOs is their ability to reduce unnecessary hospitalizations, prospects for profits will be greater whenever FFS hospital utilization rates exceed the rate an HMO might expect to achieve.

The only other market area variable with consistent strong empirical performance among all four models was poverty-level population composition. In contrast to findings of Welch (1984) concerning commercial HMO market entry, these empirical results suggest that Medicare market entry was less likely in lower income markets. This could result from the fact that our income level variable, namely, the percent of elderly population

Table 4
Estimated impact of alternative supply price measures in TEFRA entry probabilities

Variable	Mean entry probability	Predicted entry probability after a supply price increase of		
		+ 10 percent	+ 20 percent	+ 1 standard deviation
Adamache and Rossiter (1986)	0.152	(¹)	(¹)	0.316
Nominal adjusted average per capita cost				
All HMOs	0.295	0.387 (+31)	0.488 (+65)	0.500 (+69)
TEFRA only	0.229	0.283 (+24)	0.343 (+50)	0.347 (+52)
Wage-adjusted average per capita cost				
All HMOs	0.297	0.375 (+26)	0.459 (+55)	0.421 (+42)
TEFRA only	0.229	0.282 (+23)	0.342 (+49)	0.310 (+35)
Fee-for-service hospital days per 1,000 beneficiaries				
All HMOs	0.311	0.356 (+15)	0.403 (+30)	0.413 (+33)
TEFRA only	0.234	0.275 (+18)	0.320 (+37)	0.332 (+42)
Fee-for-service hospital admission rate				
All HMOs	0.309	0.394 (+28)	0.486 (+57)	0.436 (+41)
TEFRA only	0.227	0.295 (+30)	0.373 (+64)	0.331 (+46)
Fee-for-service hospital length of stay				
All HMOs	0.309	0.322 (+4)	0.336 (+9)	0.339 (+10)
TEFRA only	0.227	0.250 (+10)	0.275 (+21)	0.281 (+24)

¹ Values not reported in Adamache and Rossiter (1986).

NOTES: The percent increase in average entry probabilities relative to the mean entry probability are reported in parentheses. TEFRA is Tax Equity and Fiscal Responsibility Act. HMOs is health maintenance organizations.

SOURCE: Bigel Institute for Health Policy, Brandeis University; Data from the Health Maintenance Organizations Responses to the Tax Equity and Fiscal Responsibility Act Study.

with incomes below the poverty level, could reflect aspects of health status as well as income level.

Although statistically significant parameter estimates were not found consistently in all models for other market variables, the results modestly suggest that Medicare market entry was more attractive to HMOs in markets where commercial market enrollment growth was sluggish and in less mature HMO markets, as reflected in the average age of commercial HMOs.

Competitive market structure

Overall, the empirical results lend rather weak support to hypotheses about the effects of competitive market position and market structure on market entry. We found no evidence of bandwagon effects associated with earlier market entry by Medicare demonstration participation. However, in three of the model specifications, positive coefficients were found for the Herfindal index of market concentration together with negative coefficients for a plan's share of the non-Medicare HMO market. These coefficients were generally statistically significant at the 10-percent level or higher. Taken together, these findings suggest that HMOs with small commercial market shares in relatively concentrated markets are more likely Medicare risk-market entrants, possibly because they can gain a market niche with little fear of market retaliation by the dominant local HMO. For single HMO markets, the estimated parameters virtually cancel each other out.

Plan performance attributes

Although the bias in HMO samples with utilization and financial data limit the extent to which the empirical results may be generalized to the universe of HMOs, the empirical results strongly suggest that success in controlling utilization and favorable financial performance are important factors in TEFRA risk-market entry decisions. The estimated parameters for the two HMO utilization variables suggest that HMOs successful in reducing inpatient utilization through substitution of greater outpatient care in their nonelderly enrollment exhibit greater likelihoods of market entry. The fact that statistical significance for the positive physician visit rate variable was only obtained when hospital utilization rates were simultaneously entered into the logit equations is suggestive of the importance of such substitution in controlling utilization.

The empirical findings also suggest that more fiscally sound HMOs, as reflected in higher net revenues per enrollee, are more likely TEFRA market entrants. It is not clear whether this is attributable to ACR regulations that theoretically limit HMO profit rates to those earned in their commercial markets or to rational decisionmaking, whereby a risky Medicare venture is not seen as beneficial to plans with poor financial performance.

Policy implications and concluding remarks

The empirical findings in this study have both positive and negative implications toward the future of the TEFRA program. On the positive side, it is suggested from our findings that, since the earlier Medicare HMO demonstration, TEFRA entrants reflect a much more diverse group of HMOs than their earlier demonstration predecessors did. Furthermore, it is suggested that TEFRA market entrants have been successful in controlling nonelderly hospital utilization and are financially stronger than their nonentrant counterparts. It does not appear that financially weak plans have not sought entry into the Medicare market as a means of bolstering weak commercial market performance and thereby exposing the TEFRA program to risk of contracting with plans exhibiting a greater likelihood of market failure.

The negative side of the findings pertain to the continued importance of Medicare cost-contract experience and the AAPCC as powerful determinants of TEFRA risk-market entry. The greater likelihood of Medicare cost contractors to subsequently enter into risk contracts may be quite beneficial to early program development, allowing for a rapid expansion of TEFRA risk contracts. However, the pool of potential entrant HMOs with prior Medicare experience has been diminishing just a rapidly. As of June 1988, only 33 nonentrant HMOs had cost contracts with HCFA. Our findings suggest a less rapid expansion of risk contractors in the future, as new Medicare market entrants will have to increasingly come from the pool of HMOs without Medicare cost-contract experience. As suggested previously by Adamache and Rossiter (1986), a strategy for encouraging plans to enter into Medicare cost contracts may prove to be beneficial to the longrun success of Medicare capitation.

The continued sensitivity of HMO market entry to AAPCC payment level in the TEFRA program has important implications toward the future of Medicare capitation. Although basing HMO payments on Medicare FFS reimbursement experience has probably been successful in encouraging Medicare risk contracting in markets where potential program savings may be greatest, the participation incentives of FFS-based rates may be diminishing because of the impact of Medicare's PPS on Medicare FFS hospital expenditures. Significant systematic shifts in AAPCC levels were observed between 1986 and 1987 in various parts of the country, as 1987 was the first year that the impact of Medicare's hospital PPS on Medicare FFS reimbursements was directly factored into the AAPCC. Many areas with significant Medicare at-risk HMO enrollment experienced only marginal increases, or actual decreases, in AAPCC payment levels (Schuttinga, 1987). Although the ultimate impact of PPS on AAPCC payment levels is not fully understood at this time, significant PPS-induced reductions in FFS hospitalization and reimbursements could dampen incentives for further HMO participation in the TEFRA risk program.

Some HMO response to these recent AAPCC shifts may have already occurred. In the last 3 years, 68 TEFRA HMOs discontinued their Medicare risk contracts with HCFA. Twenty-nine of these plans were members of our 1985 universe of 410 HMOs. The mean nominal market AAPCC in 1985 for these 29 plans exiting the Medicare risk market in 1986 or 1987 was \$210 per month. It was about \$226 per month for market entrants continuing participation through 1988 and \$196 per month for nonentrant HMOs. Although we have not yet formally analyzed the exit behavior of these plans, these figures would suggest that, irrespective of any subsequent relative shifts in the AAPCC since 1985 TEFRA plans subsequently exiting the Medicare risk market were more likely to have served markets with lower 1985 AAPCC rates relative to other TEFRA market entrants.

These data on the AAPCC rates for nonrenewing risk contractors suggest that our findings may actually understate the sensitivity of HMO Medicare risk contracting to AAPCC payment levels over a longer run time period. Significant Medicare HMO penetration may only be fostered in those areas of the country where Medicare FFS costs of serving Medicare beneficiaries are substantially higher than HMOs' costs. From a social efficiency standpoint, it is not currently known whether this is good or bad. It is commonly believed that high Medicare FFS reimbursement rates (controlling for input price differentials) reflect social inefficiencies of FFS medical practice. Encouraging HMOs to risk contract with Medicare in these markets through a FFS-based payment formula could facilitate high Medicare HMO market penetration in these markets over time.

However, it is not clear at what point lower FFS reimbursement rates, such as those in rural areas, reflect social inefficiency associated with inaccessibility to care. There may be differences between private efficiency from an HMO's perspective and social efficiency that would make it desirable to vigorously encourage Medicare HMO capitation in these markets, even at the possible expense of increased program outlays relative to the AAPCC in the short run.

In any event, the apparent importance of geographic location as a determinant of a Medicare risk HMO's financial success or failure suggests a need to re-evaluate some more fundamental issues about the proper policy goals of Medicare capitation. It is desirable that all HMOs have Medicare risk contracts, or should capitation be encouraged only under certain competitive market conditions? If policymakers deem that the TEFRA program should be more than a small number of HMOs serving a handful of markets with the highest AAPCCs, alternative payment methodologies that are not solely based on Medicare FFS experience may be required.

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