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Determinants of the New Entry of HMOs into A Medicare Risk Contract: A Resource Dependence-Diversification Model

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Determinants of the New Entry of HMOs into A Medicare Risk Contract: A Resource Dependence-Diversification Model

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University

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Abstract

DETERMINANTS OF THE NEW ENTRY OF HMOS INTO A MEDICARE RISK CONTRACT: A RESOURCE DEPENDENCE-DIVERSIFICATION MODEL

By Chih-Wen Pai, Ph.D.

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University

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The purpose of this study is to examine the determinants of the new entry of an HMO into a Medicare risk contract using a resource dependence-diversification model. This study is conducted through a non-experimental, panel design with one year time lag. An HMO's market is defined as the service area. The primary sample for this study is composed of 440 HMOs that do not have a Medicare risk contract as of January 1994.

Data for the variables are extracted from the 1994 and 1995 InterStudy and Group Health Association of America (GHAA) directories, the 1996 Area Resource File, the 1994 County and City Data Book, the 1993 County Business Patterns. Additional

supplementary data on adjusted average per capita cost (AAPCC) and county-level Medicare beneficiaries are obtained from the Health Care Financing Administration. The dependent variable is discrete indicating an HMO's market entry. Independent variables are grouped into four categories: market structure, resource munificence, market price, and organizational attributes. Twelve hypotheses are tested using multivariate logistic regression.

This analysis reveals that HMO enrollment size is a predominant, positive factor in predicting a new market entry. HMOs are also sensitive to the level of AAPCC rates in making a market entry decision. Results from hypothesis testing suggest that competition encourages a new market entry. The importance of resource munificence is not statistically supported.

This study demonstrates the appropriateness of a panel design to verify a cause-effect relationship and the applicability of the service area as an HMO's market. This study also contributes to the theoretical understanding of an HMO's market entry.

CHAPTER 1

INTRODUCTION

As one effort to bring Medicare costs under control, the Health Care Financing Administration (HCFA) has encouraged health maintenance organizations (HMOs) to provide Medicare coverage to enrolled beneficiaries in return for fixed, prepaid premiums. HMOs are believed to affect the health care of the nonelderly. The conventional wisdom is that HMOs are able to provide comprehensive coverage at lower total cost while maintaining adequate quality of care (Luft, 1988). Acting as both insurer and provider, HMOs have an incentive to provide care in the most cost-effective manner and reduce unnecessary services. The market power of HMOs also often enables them to negotiate favorable prices for provider services. HCFA's primary goal in establishing the risk program was to reduce Medicare costs, while maintaining or improving the quality of care (Brown, Clement, Hill, Retchin, & Bergeron, 1993). In doing so, the objective is to offer Medicare beneficiaries access to managed care available to the younger population. HCFA also hoped that costs in the fee-for-service (FFS) sector in response to competition would decline as more Medicare beneficiaries enrolled in HMOs. These expectations could not be realized without broad HMO participation. The HMO's decision to enter the high-risk Medicare market is of interest since the provision of Section 114 of the Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA) caps the net revenues allowed by contracting HMOs.

Converging Interest in Medicare Managed Care

The Medicare program was created in 1965 under Title XVIII of the Social Security Act. Since then, the growth of costs in Medicare became a dominant issue in federal health policy discussion. Beginning in 1983, the Medicare Prospective Payment System (PPS) was authorized to change the way Medicare paid for hospital services. Contrary to the retrospective, cost-based reimbursement system, PPS pays hospitals a flat amount for a given category of admissions based on Diagnosis-Related Groups (DRGs) (Phelps, 1992, p. 265). Hospitals were given a strong incentive to spend less. Subsequent to the implementation of the DRG system, declines in length of stay (Guterman, Eggers, Riley, Greene, & Terrell, 1988; Kahn, et al., 1990) and hospital admissions (Guterman, et al., 1988; Rice, 1991) have occurred.

In a further effort to contain Medicare costs, the Congress approved the Medicare Physician Payment Reform legislation that established the Resource-Based Relative Value System (RBRVS) in 1989 and implemented RBRVS in 1992. RBRVS regulates physician expenditures under Medicare (Rice, 1991).

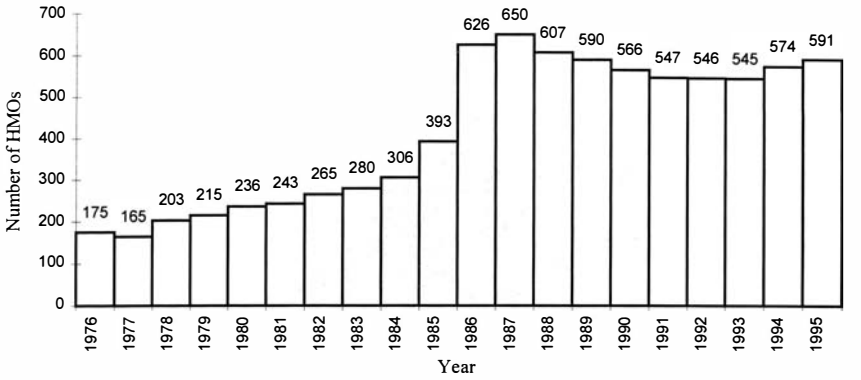
Despite progress in limiting Medicare spending, Medicare expenditures continue to increase. Between 1984 and 1993 Medicare expenditures rose at 7.7% annually, and its growth among federal spending programs is second only to net interest payment on the national debt (Physician Payment Review Commission, 1996, p. 3). It is projected that Medicare expenditures will continue to rise at an annual rate of 10% through 2005.

Compared to Medicare spending, the growth rate in the private sector that rose faster than Medicare during the late 1980s is below that of Medicare in the 1990s. The Congressional Budget Office projected average annual growth rates of 6.9% in 2000 and 6.4% in 2005 in the private sector (Physician Payment Review Commission, 1996, p. 4). One possible explanation for this differential in growth rates between Medicare and the private sector is an innovation that the private sector has undertaken. The private sector has been in transition to an integrated, capitated system of care.

With concern about the size of federal budget deficit, the success of managed care in the private sector has appealed to policymakers. The HCFA is aggressively promoting the Medicare risk program and is supportive of expanding other managed care options to Medicare beneficiaries, including point of service (POS) and preferred provider organizations (PPO) (Cunningham, 1996). The HMO industry that has renewed interest in Medicare views it as the biggest unexplored growth market (Hurley, 1996) and has responded favorably to the call from the HCFA in the 1990s. With this converging interest in Medicare managed care, almost 70,000 new Medicare beneficiaries enrolled in Medicare risk plans each month during 1995 (Cunningham, 1996), and the number of HMOs with Medicare risk contracts grew more than 40% in 1995.

Figure 1 illustrates the trend of HMO growth since 1976. By 1986, the first full year of TEFRA operation, there was a steady increase in the overall number of HMOs. The year 1986 witnessed HMO growth, indicating perhaps a catalytic effect of TEFRA risk contracting on general HMO development. The late 1980s and early 1990s denoted a

slightly declining trend in the number of HMOs, likely due to consolidation and failure in the HMO industry. Feldman, Wholey, and Christianson (1995) reported that 123 HMOs failed and 68 merged and then "disappeared" from 1987 through 1992.



Percentage Increase/Decrease

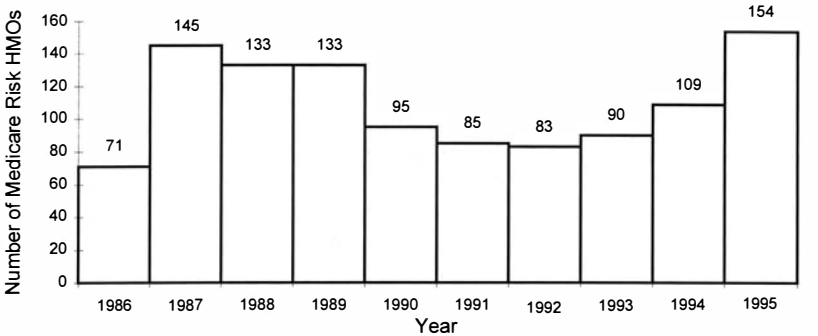
1987	1988	1989	1990	1991	1992	1993	1994	1995
3.8%	-6.6%	-2.8%	-4.1%	-3.4%	-0.2%	-0.2%	5.3%	3.0%

Source: Group Health Association of America. (1995). 1995 National Directory of HMOs. Group Health Association of America. Washington, DC: GHAA.

Figure 1. Number of HMOs, 1976-1995.

Figure 2 depicts the number of Medicare risk-contract HMOs from 1986 to 1995. It is interesting to note the coincident growth in the early years of TEFRA risk contracting implementation followed by a steady drop of HMOs in Medicare risk contract with the overall trend of HMOs in the early 1990s. Beginning in 1993, HMOs displayed an increasing interest in participating in a Medicare risk contract. As of January 1995,

there were 154 active risk contracts, representing a 41% increase from 1994. This increased rate of product development now outpaces the growth rate of total HMOs, which may be indicative of established organization diversification. As of March 1, 1996, there were 197 HMOs with Medicare risk contracts (Health Care Financing Administration, 1996).



Percentage Increase/Decrease

1987	1988	1989	1990	1991	1992	1993	1994	1995
104.2%	-8.3%	0.0%	-28.6%	-10.5%	-2.4%	8.4%	21.1%	41.3%

Source: Health Care Financing Administration (1995). Medicare Managed Care Program Update (Office of Managed Care). Rockville, MD: HCFA.
Note. Data are as of January of every year.

Figure 2. Number of Medicare Risk HMOs, 1986-1995.

The number of HMOs with Medicare risk contracts as a percentage of total HMOs shown in Figure 3 manifests the same pattern observed in Figure 2. In the pre-1990 period, the highest proportion of HMOs with risk contracts, 22.5%, occurred in 1989.

The 1995 value, 26.1%, exceeds this historical mark. The U.S. population enrolled in HMOs, referring to both the number of HMO enrollees and as a percentage of the U.S. population, shows steadily increasing trends (Figures 4 and 5). As of October of 1995, there were 56 million people, or 21% of the U.S. population enrolled in HMOs.

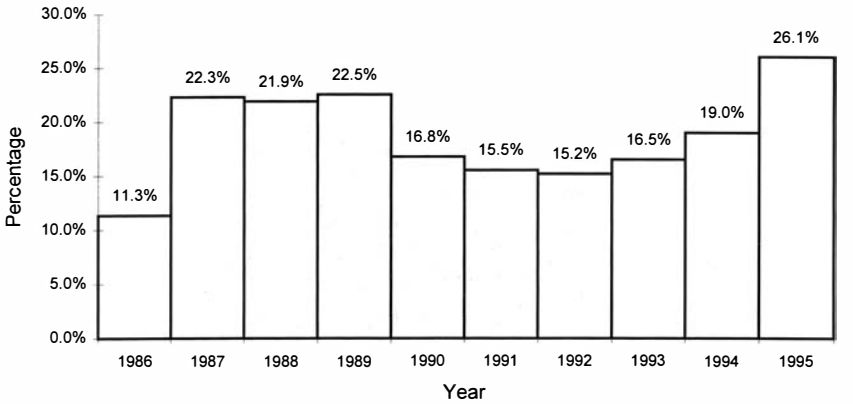
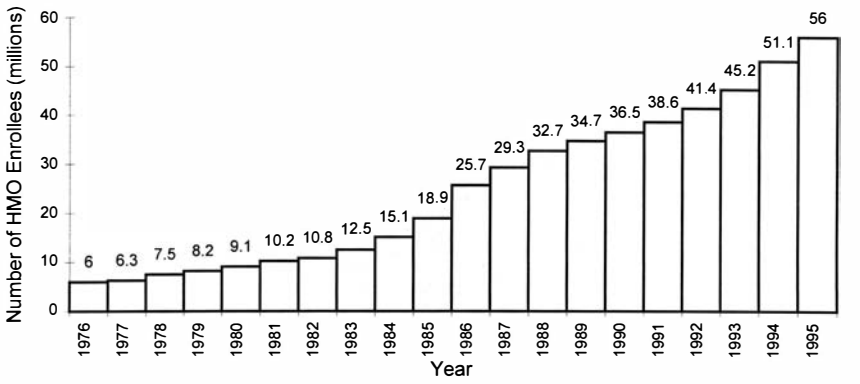


Figure 3. Medicare Risk HMOs as a Percentage of Total HMOs, 1986-1995.



Percentage Increase/Decrease

1987	1988	1989	1990	1991	1992	1993	1994	1995
14.0%	11.6%	6.1%	5.2%	5.8%	7.3%	9.2%	13.1%	9.6%

Source: Group Health Association of America. (1995). 1995 National Directory of HMOs. Group Health Association of America. Washington, DC: GHAA.

Figure 4. Number of HMO Enrollees (Million), 1976-1995.

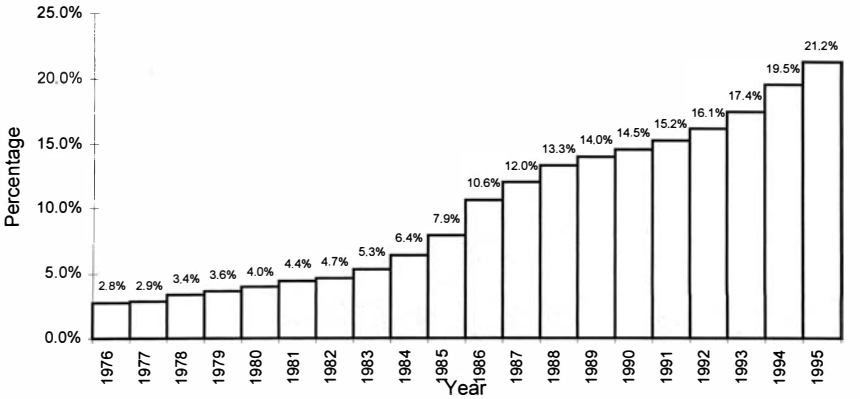
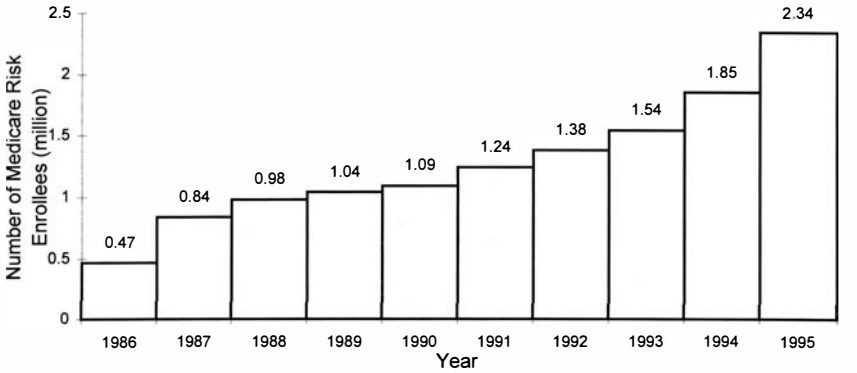


Figure 5. HMO Enrollees as a Percentage of U.S. Population, 1976-1995.

Figure 6 is a chart that reflects the increased trend of the number of Medicare beneficiaries enrolled in Medicare risk HMOs. This trend reflects a continual, albeit slow, increase, in contrast to the decline reflected in the number of risk-contracting HMOs over the period of 1988 through 1992 (see Figure 2). This contrast indicates that HMOs that discontinued their Medicare risk contract only enrolled a very small number of Medicare beneficiaries. Medicare beneficiaries who were enrolled in HMOs were concentrated in a limited number of HMOs continuing their risk contracts. The rate of increase in the number of Medicare risk enrollees surpasses the rate of increase in the number of total HMO enrollees (Figure 4). Enrollment in risk-contract HMOs increased by almost 27% from 1994 to 1995.



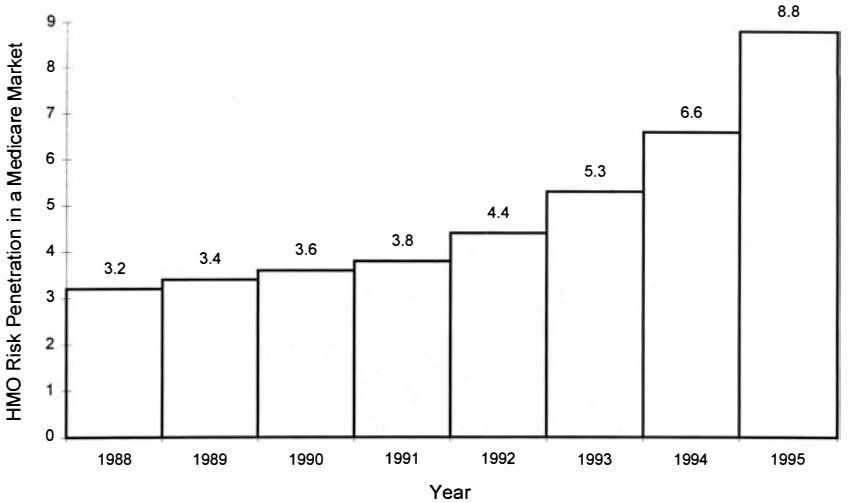
Percentage Increase/Decrease

1987	1988	1989	1990	1991	1992	1993	1994	1995
78.8%	16.7%	6.1%	4.8%	13.8%	11.3%	11.6%	20.1%	26.5%

Source: Health Care Financing Administration (1995). Medicare Managed Care Program Update (Office of Managed Care). Rockville, MD: HCFA.
Note. Data are as of January of every year.

Figure 6. Number of Medicare Risk Enrollees (Million), 1986-1995.

Figure 7 illustrates the number of Medicare risk enrollees as a percentage of Medicare beneficiaries. Medicare risk penetration rate increased from 3.2% in 1988 to 8.8% in 1995.



Source: The 1992 AAPCC 5-year master file from Office of the Actuary, HCFA (values for 1988-1990); Physician Payment Review Commission. (1996). 1996 Annual Report to Congress. Washington, DC: PPRC.

Figure 7. Medicare Risk HMO Enrollment Penetration in a Medicare Market, 1988-1995.

Definition of Health Maintenance Organizations

The prepaid arrangement for health service has its roots in the efforts to provide care to isolated, industrial workers, through the group practice movement, and through employment-related health insurance mechanisms to render more extensive health

coverage at a reasonable price (Gold, 1991; Mayer & Mayer, 1985). The early form of prepaid group practice, not then known as HMOs, was initiated by employers to offer health care to their employees working in rural areas where medical care was unobtainable (Williams, 1988).

In early 1970, Paul M. Ellwood, a Minnesota physician and the founder of InterStudy, proposed new entities called "health maintenance organizations" to restructure the health delivery system, and emphasize health maintenance as opposed to the neutral medical care or negative sickness care (Gruber, Shadle, & Polich, 1988). The term HMO was created as part of a strategy to win Nixon administration's support for prepaid health care as an alternative to the predominant fee-for-service (Luft, 1981, p. 1).

Because of its political origin, the term HMO is ambiguous, noninclusive, and not exacting in its definition which has evolved over time. Luft (1981, pp. 2-6) outlines five key features of the HMO concept that applies in the late 1970s and early 1980s:

1. An HMO is contractually responsible for the provision of a stated range of health services; enrollees have the legal right to expect treatment from the HMO.

2. An HMO serves a defined population enrolled in the plan; the demand for HMO service can be estimated for planning purposes.

3. Enrollment is voluntary, meaning that the HMO is competing with other providers.

4. Enrollees pay a fixed premium that is independent of the use of services.

5. An HMO assumes at least part of the financial risk or gain in providing services.

In further updating the definition of an HMO, a related attribute that distinguishes a managed care plan from a traditional fee-for-service plan is the selection of network providers (Miller & Luft, 1994b), or more specifically the relationship between an HMO and its providers, mainly physicians. With providers HMOs often have a close, selective relationship with a provider panel. Providers in an HMO panel are usually at direct or indirect financial risk for providing services. In contrast, health benefit fiscal or insurance intermediaries have distinct, nonexclusive relationships with virtually any provider.

Another conventional distinction among HMO types is closed- versus open-panel HMOs from a physician's perspective. In contrast to physicians in closed-panel HMOs (staff and group models), physicians in open-panel HMOs (IPA and network models) are not affiliated full time with the HMO and still maintain their fee-for-service practice.

However, as market forces drive HMOs to provide various product options, a single model definition is no longer able to accommodate the changing relationship between HMOs and physicians (Hamer & Porter, 1993). Instead, the emergence of hybrid or mixed models confirms the blurring of model type definitions and indicates the increased complexity in delivering heath care. Especially when HMOs merge or expand geographically, they establish mixed models that contract with more than one type of provider organizations or networks (Miller & Luft, 1994a).

In 1994 the Physician Payment Review Commission sponsored a telephone survey of managed-care plans including HMOs and PPOs (Gold, Hurley, Lake, Ensor, &

Berenson, 1995). This survey discovered many common arrangements between the staff or group HMOs and the network or IPA HMOs in terms of physician recruitment procedures, methods to pay physicians, and the practice of quality and utilization control. These similarities in structure indicate less extensive distinction among the four HMO models than is traditionally assumed.

Regulatory History of HMOs

The HMO movement can be traced back to the early 1970s when America witnessed social unrest on health care issues: skyrocketing costs in Medicare and Medicaid program, insufficient access to medical care, and mediocre quality of care (Gruber, et al., 1988). In 1970 the federal HMO strategy was officially revealed in the statement by the Department of Health, Education, and Welfare (DHEW) that HMOs could serve as a major component in the federal effort to restructure the health care system (Lavin, 1970). In the following year the presidential Health Message to Congress and a DHEW White Paper reinforced the endorsement of the HMO concept (McNeil & Schlenker, 1975). Accompanying this initiative were federal grant funds to assist HMO planning and development. In years 1971 and 1972, more than $10 million federal dollars were allocated (Cromley & Shannon, 1983) and 79 organizations were awarded grant funds to develop HMOs (Strumpf & Garramone, 1976).

The HMO Act of 1973 was signed into law by President Nixon on 29 December, 1973. The passage of the HMO Act facilitated HMO development by making grants

available to federally qualified HMOs; 108 feasibility projects were funded in 1975 (Strumpf & Garramone, 1976). This act also provided for a dual-choice mandate by which employers with 25 or more employees who offered health insurance benefits were required to offer an HMO option to their employees in areas where a federally qualified HMOs existed (Wrightson, 1990, p. 27). In addition, the act required employers to pay an equal dollar contribution for HMOs and other benefit options.

Since the passage in 1973, the HMO Act has been amended six times (in 1976, 1978, 1979, 1981, 1986, and 1988). The HMO Amendments of 1976 liberalized requirements for federal qualification and increased the limits on financial assistance (Gruber, et al., 1988). Both 1978 and 1981 amendments further revised grant and contract financial limitations. The HMO Amendments of 1979 merely corrected printing and other technical errors. The HMO Amendments of 1986 served to modify some rigid portions of the law, reducing an HMO's administrative burden. The HMO Amendments of 1988 were signed into law by President Reagan, allowing federally qualified HMOs to offer a limited self-referral, or open-ended, option of up to 10% of physician services. This self-referral option adds flexibility for enrollees to seek care outside the provider panel by self referral but requires additional cost sharing (Gold, 1991). The major value of this diversified strategy is the attractiveness to individuals and employers who want flexibility and greater provider choice. The 1988 amendment also allows HMOs to determine premium rates based on "adjusted community rating" methods; federally

qualified HMOs can set rates on the prior cost and utilization experience of an employer group.

Since the inception of Medicare program, HCFA has offered HMOs options to participate in the Medicare program. HMOs were first reimbursed on a cost basis under Section 1833 of the Social Security Act (McNeil & Schlenker, 1975). This fee-for-service based reimbursement method was antithetical to the HMO operational philosophies and policies of risk-based capitation mechanism and prospective budgeting procedures (Iglehart, 1985). Few HMOs participated in Medicare. It was during the time when the Nixon administration was promoting HMOs that Section 1876 of the 1972 Social Security Act first authorized risk-sharing reimbursement methods applicable to those HMOs that obtained federal qualification (Bonanno & Wetle, 1984). However, restrictions and burdensome processes severely prevented HMOs from being able to qualify for the risk-sharing method (McNeil & Schlenker, 1975). HMOs also had little incentive to join Medicare risk plans. Under the early risk-sharing rules which became effective in 1976, HMOs had to bear all losses if they lost money on Medicare enrollment. If actual costs were less than payment, HMOs might keep 50% of the savings up to a maximum of 20% of the adjusted average per capita costs (AAPCC) and return the remaining saving to the Medicare Trust Fund. The profit sharing with Medicare stemmed from the concern of Congress that HMOs encouraged underuse and sought to enroll only beneficiaries with better risk (Iglehart, 1985). Payment to HMOs was made retrospectively, and often not finally settled until two or three years after

services had been provided (Bonanno & Wetle, 1984). Because only two HMOs acquired risk contracts under Section 1876 through 1982 (Rossiter, Friedlob, & Langwell, 1985), the HCFA initiated two sets of experiments to gain experience with risk contracting for Medicare services: the Medicare Capitation Demonstration and the Medicare Competition Demonstration.

Recognizing that the provisions of Section 1876 was not attractive to HMOs, eight HMOs in five market areas were solicited in 1978 to participate in Medicare Capitation Demonstration and began enrolling Medicare beneficiaries in 1980 (Rossiter, et al., 1985). TEFRA's 95% of AAPCC approach arises from these eight demonstration projects (Rossiter, et al., 1985).

In the spring of 1982, HCFA started the National Medicare Competition (NMC) demonstration and 21 organizations in 12 market areas were first awarded risk contracts (Rossiter, et al., 1985). The first demonstration plans began enrolling Medicare beneficiaries in August 1982. Only two HMOs from the Medicare capitation demonstration participated in the NMC (Adamache and Rossiter, 1986). Additional organizations were granted permission in 1984 and 1985 and a total of 52 organizations were approved as demonstration plans. In the NMC demonstrations, HMOs operated under an 85% AAPCC contract and absorbed any loss as well as kept any savings.

Before completing the evaluation of the demonstrations, especially the reimbursement methods, Congress enacted new legislation to legitimize prospective risk contracting with HMOs and competitive medical plans (CMPs) (Nycz, Wenzel,

Freisinger, & Lewis, 1987). Without a full evaluation of these early demonstrations, it was not clear whether HMOs actually saved Medicare any money. Operational demonstrations were notified that they would have to convert to the provisions of TEFRA after the enactment of the legislation. Section 114 of the Tax Equity and Fiscal Responsibility Act (TEFRA) of 1982 became effective in April 1985 and authorized the current Medicare risk program. The delayed implementation of this policy was due to the concern of Reagan administration over short-term costs attached to the technical difficulties in determining reimbursement rates. The short term inflationary issue was whether or not to convert to a risk contract from an existing HMO cost contract for which the reimbursement rate was below that of the risk-based level (Nycz, et al., 1987).

Description of Medicare Risk Program

The current Medicare risk program, which became operational in April 1985 under the Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA), allowed all federally qualified HMOs and CMPs to participate in risk contracting for Medicare beneficiaries, provided that the plans satisfy the HCFA requirements. Before TEFRA, only federally qualified HMOs could sign Medicare contracts (Zarabozo & LeMasurier, 1993). Requirements for federal qualification include (Wrightson, 1990, pp. 27-29): (a) a contractual relationship between medical providers and the HMO, (b) designation of mandatory and optional health services, (c) community rating, (d) permissible cost-

sharing features, (e) allowable organizational forms, (f) quality assurance programs, and (g) financial solvency and fiscal soundness.

CMPs are state licensed organizations that are similar to HMOs but lack federal qualification. One major difference that distinguishes the CMP option from federally qualified HMOs is the level at which services can be provided through noncontracting providers. A CMP is required to provide at least 51% of the services defined under HCFA policy through its contracting providers, and it allows preferred provider organizations to be CMPs (Zarabozo & LeMasurier, 1993). Under the 1988 HMO Act amendments, a federally qualified HMO is allowed to provide up to 10% of physician services outside the HMO, or through enrollee self-referral options. Additionally, experience-rated premiums, copayments, and deductibles imposed on beneficiaries are permitted for CMPs (Iglehart, 1985). A federally qualified HMO, in contrast, may only charge copayments and deductibles for 10% of out-of-plan physician services. For the purpose of this study, the term HMO refers to both federally qualified HMOs and CMPs.

Under the current Medicare risk program, HMOs offer a minimum package of full-service benefits normally covered by Medicare, which precludes a beneficiary incurring Medicare's copayments and deductibles. The HMO receives a capitation payment consisting of 95% of the adjusted average per capita cost (AAPCC) of serving fee-for-service beneficiaries in the same market county. Enrollment is strictly voluntary. Medicare beneficiaries can drop out of HMOs and return to the FFS sector at any time with 30 days notice. HMOs market the Medicare risk plans to individual beneficiaries.

HMOs are not permitted to prescreen beneficiaries' health status, and an individual HMO must charge all Medicare enrollees the same monthly premium. Each HMO may set the monthly premium that it charges enrollees as low as it likes, but the premium may not exceed an HMO's cost of covering Medicare deductibles and coinsurance plus the cost of any additional benefit covered by the plan beyond those covered by Medicare. Premiums must be approved by the HCFA.

Medicare risk contracting offers HMOs a broad access to the elderly market on a very rapid basis. The most impressive feature of HMOs is that they manage care. The elderly definitely need medical management. Participating in risk contracting has accelerated the development of comprehensive, coordinated HMO utilization control programs for the elderly (Hurley and Bannick, 1993). The "forced" strengthening of the delivery system for the elderly would have a positive spillover into the whole HMO operation, such as referral management systems, utilization review systems, long-term care, and quality assurance mechanisms. Entering the Medicare market also provides HMOs an opportunity to expand and provide services that the elderly need. Incorporating with their non-Medicare business, HMOs could enjoy the economies of scale. An HMO's income per member per month for the elderly may be four times that of the under-65 population providing financial appeal for the Medicare risk program, (Bell, 1987). Combining HCFA pre-payments and member premiums, there may be significant cash flow benefits to HMOs. An HMO's image and publicity in the community as well as its negotiating power could be enhanced. An HMO that achieves a 15 to 20%

Medicare market penetration should clearly be able to maximize its negotiating effectiveness (Bell, 1987).

In spite of the positive aspects, HMOs that participate in Medicare risk program lose control over benefit coverage, payment, profit retention, and enrollment growth. Medicare risk contracting requires that HMOs behave quite differently than they do in providing services to employee groups. The covered benefits are determined largely by HCFA, not through negotiations. The payment rates (AAPCC) are based on Medicare costs in the FFS sector, not on an HMO's experience. HMOs have no control over HCFA's payment, though they can charge a premium to support additional benefits provided. Actual payments to the HMO vary according to the individual enrollee's county of residence and personal risk factors (age, gender, reason for entitlement to Medicare, whether residing in a nursing home, and whether covered by Medicaid) defined by HCFA.

HCFA also requires that HMOs limit their Medicare enrollment to not more than half of their total enrollment. To be able to participate the Medicare risk program, an HMO must have at least 5,000 commercial enrollees, or 5,000 in a parent corporation and 1,000 enrolled in the subdivision or subsidiary. If serving a rural area, 1,500 commercial enrollees have to be enrolled. In addition, HMOs must have an annual open enrollment period of at least 30 consecutive days for Medicare beneficiaries to reconsider enrollment in that organization. During an open enrollment period, HMOs have to enroll any Medicare beneficiary who resides in the HMO's service areas and is eligible for

enrollment. In one of following three circumstances may HMOs waive open enrollment requirement (Zarabozo & LeMasurier, 1993):

1. The HMO would exceed 50% of Medicare/Medicaid enrollment.

2. The HMO would enroll a disproportionate percentage of beneficiaries in a specific AAPCC cell.

3. The HMO does not have capacity to deliver service to any more members, either commercial or Medicare enrollees.

Participating HMOs are not allowed to earn a higher rate of return on their Medicare risk plan than on their non-Medicare business. Otherwise, HMOs are required to add benefits, reduce monthly premiums to offset the surplus, return the excess to HCFA, or choose some combination of these options. Retainable profit from serving Medicare beneficiaries is regulated through adjusted community rate (ACR) regulations. The community rate is the premium charged for a commercial group. The ACR is a projected premium, or financial requirement for providing the same Medicare covered benefits to a community rated group, adjusted for the higher utilization and expenditures by Medicare enrollees relative to commercial enrollees (Zarabozo & LeMasurier, 1993). The ACR calculation includes the normal profit of a for-profit HMO.

The HCFA's primary goal in establishing the risk program was to reduce Medicare costs by attracting HMOs to manage coverage of the elderly. The HCFA also pursued to provide more efficient health care while maintaining the quality of care (Brown, Bergeron, Clement, Hill, & Retchin, 1993). The HCFA hoped that costs in the

FFS sector would decrease as more Medicare beneficiaries enrolled in HMOs. One recent study by Health Policy Economics Group (1995) documented that the Medicare FFS cost per capita declined as the Medicare risk HMO penetration increased. It is apparent that the success of the Medicare risk program will rely largely on the eagerness of HMOs to enter into and maintain their risk contracts with Medicare (Porell and Wallack, 1990).

The HMO industry has responded with caution and concern to the opportunities and risks associated with Medicare participation. Nonrenewals of participating plans reflects this hesitancy (McCurren, 1991). The reliability of the public sector to pay an adequate rate for services covered is also questionable (Newhouse, 1989). Another related negative of Medicare risk contracting is the growing "public sector risk factor" (Bell, 1987), that is, what Congress will do if forced to reduce Medicare costs is highly unpredictable. Furthermore, the most significant assumption of risk is for inpatient utilization. If inpatient utilization is not effectively controlled, an HMO could find itself in serious financial trouble.

Since 1986 there had been early rapid growth in the number of HMOs participating in the Medicare risk program (see Figure 2). However, the initial growth after the TEFRA legislation was followed by a drop in the number of HMOs in Medicare risk contracts. There were more HMOs discontinuing their Medicare risk contracts than HMOs entering into new contracts by the end of the decade of the 1980s (Porell & Tompkins, 1993). This decline has been attributable to low AAPCC rates and adverse

selecting experienced by HMOs with Medicare risk contracts (Porell & Tompkins, 1993). Beginning in 1993, the HMO industry has regained interest in entering into a Medicare risk market, though the concern about the AAPCC payment method remained unsolved.

Purpose of the Present Study

Most of the health services research on Medicare risk contracting has focused on whether risk plans achieved HCFA's objectives (for example, Brown, Bergeron, Clement, et al., 1993; Carlisle, et al., 1992; Clement, Retchin, Brown, & Stegall, 1994); why Medicare beneficiaries enrolled in or disenrolled from risk plans (for example, Dowd, et al., 1994; Feinson, Hansell, & Mechanic, 1988; Sofaer & Hurwicz, 1993); whether Medicare beneficiaries were satisfied with risk plans (for example, Boles & Wan, 1992; Rossiter, Langwell, Wan, & Rivnyak, 1989); and whether risk plans experienced favorable or adverse selection (for example, Davidson, Sofaer, & Gertler, 1992; Porell & Turner, 1990; Riley, Rabey, & Kasper, 1989). Reimbursement reform has also been widely discussed (for example, Anderson, et al., 1990; Dowd, Christianson, Feldman, Wisner, & Weiner, 1992; Lichtenstein & Thomas, 1987; Rossiter, Chiu, & Chen, 1994). Relatively few studies that address the issue of why HMOs enter into or leave a Medicare market have been published (for example, Adamache & Rossiter, 1986; Porell & Tompkins, 1993; Porell & Wallack, 1990).

Due to the environmental change that continues to occur, the relevance of these studies that analyze data collected in 1985 or before the time period of the proliferation of

HMOs is not clear. Both the general health care industry and the HMO market have undergone dramatic changes. The competitive structure of the HMO market has changed as a result of growth in the number of HMOs and HMO enrollment (Christianson, Sanchez, Wholey, & Shadle, 1991). The factors that favor the entry of HMOs into Medicare market in the 1990s differ from those in the 1980s. In addition, prior studies have not explained HMO's market entry from a perspective of organizational theories.

The purpose of this analysis is to examine the determinants of the new entry of an HMO into a Medicare risk contract utilizing resource dependence and diversification perspectives. Specifically, the following research questions will be addressed:

1. Given a certain level of environmental resources and HMO attributes, how does market structure affect the participation of HMOs into a Medicare risk contract?

2. Given certain market structure and HMO attributes, how does munificence of environmental resources affect the entry of HMOs into a Medicare risk market?

3. To what extent is the market entry of HMOs sensitive to the variation in AAPCC rate?

Conceptual Model

The entry of an HMO into a Medicare risk contract can be rationalized from a resource dependence perspective. Resource dependence theory proposes that an organization has to interact with the environment in order to generate resources necessary for survival. One response that the organization adopts is diversification. The perspective of resource dependence is useful in explaining why an organization diversifies into a market in which the loss of autonomy is inevitable.

Resource dependence argues that an organization's dependence is related to importance, availability, and concentration of the resources. A dependence situation encourages diversification. A general model of diversification categorizes factors that influence a diversification decision as a strategic response to resource dependence into three groups: resources in the general environment, competitive market structure, and organizational attributes.

Based on resource dependence-diversification arguments, a conceptual model is developed in this analysis to explain why an HMO diversifies into a Medicare risk market in response to environmental munificence, competition, and organizational strengths. As shown in Figure 8, HMO market entry is examined by four groups of variables: (a) competitive market structure; (b) resources in the general environment; (c) market price; and (d) firm characteristics.

Significance of the Present Study

This investigation differs from previous studies on the entry of an HMO into a Medicare risk contract in four areas: theoretical framework, measurement of independent variables, study design, and market definition.

Studies conducted in the 1980s (Adamache & Rossiter, 1986; Porell & Wallack, 1990) employed an economic model to examine the entry of an HMO into a Medicare risk contract. In contrast, this study examines the market entry from a resource dependence-diversification perspective. This organizational framework helps identify

theoretical dimensions which are important to a market entry decision. Moreover, variables with better measurement is solicited based on the theoretical framework.

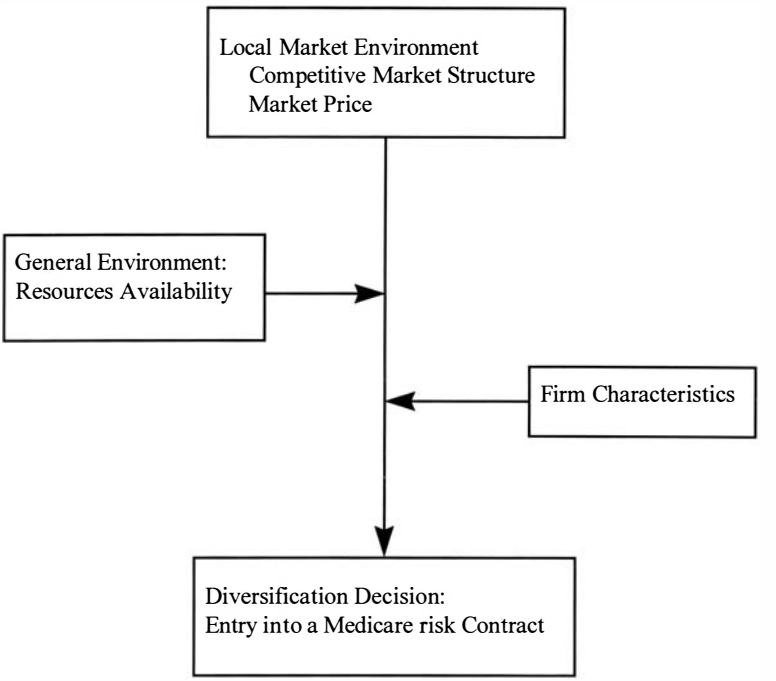


Figure 8. Simplified Conceptual Model: the Entry of HMOs into a Medicare Risk Contract.

One major limitation of prior studies (Adamache & Rossiter, 1986; Porell & Wallack, 1990) exists in the employment of the cross-sectional study design. A cross-sectional design is subject to endogeneity bias which confounds the internal validity of study results. Another limitation is the inclusion of HMOs that either start or renew their

Medicare risk contracts, resulting in a dissimilar study sample. This "indifferent" inclusion of HMOs might be due to a relatively small number of new market entrants by its nature. Recognizing these weaknesses in prior studies, the present study employs a panel design to verify cause-effect relationships. In addition, the study sample is more homogeneous, since only HMOs that did not have a Medicare risk contract at time one are included. The separation of new market entrants from renewing HMOs is feasible without compromising the statistical power to some extent because of the increased number of the initial market entrants since 1993.

The present study also differs from prior empirical work in market definition. HMO market was defined as county (Adamache & Rossiter, 1986) or Metropolitan Statistical Area (MSA) (Porell & Wallack, 1990). Both definitions may either understate or overstate the market that an HMO serves. In this analysis, an HMO's market is defined as all counties served by the HMO. The definition of service areas as an HMO's market may better approximate the HMO's true market area.

The results of this study may have several implications. Research on Medicare risk contracting has not focused on what motivates an HMO's entry into this market. The few empirical studies that addressed this issue in the 1980s suffer certain methodological weaknesses (Adamache & Rossiter, 1986; Porell & Tompkins, 1993; Porell & Wallack, 1990). This research proposes to enhance an understanding of the determinants of the entry of HMOs into a Medicare risk contract. This information is important from the HCFA's perspective, since realizing what determines the Medicare HMO market entry

will help shape policy that could encourage broader HMO participation in the TEFRA program. The information is also important to those HMOs considering the option to risk contract with the HCFA for coverage of the elderly.

This analysis is timely. Since the implementation of risk contracting in 1985, HMOs demonstrated a fluctuating interest in Medicare coverage. The number of Medicare risk HMOs steadily declined after an initial offering and began to increase in 1993. The factors behind a market entry decision in a managed care era of the 1990s may differ from those in a time when managed care still struggled for its legitimacy. This analysis will compare and contrast results from studies done in the 1980s and 1990s.

Finally, this analysis expands upon previous studies and adds to the theoretical understanding of HMOs' market entry. It empirically operationalizes a resource dependence-diversification framework in HMO research and demonstrates the utility of the organizational theory in describing HMO behavior.

Overview of the Remaining Chapters

This chapter has defined the concepts of a health maintenance organization, provided the background of the HMO movement, and historically traced Medicare HMO contracting since the 1970s. It also has described risk contracting of HMOs with the HCFA for coverage of the elderly U.S. population. It has briefly introduced the purpose and significance of the analysis of determinants of new market entry for Medicare risk contracting.

Chapter 2 reviews and critiques the literature on HMO development and the entry of HMOs into a Medicare risk contract. Studies on the supportiveness of three stakeholders (buyers, payers, and suppliers) for HMO growth are summarized. Chapter 3 first develops a resource dependence framework and conceptualization of environmental resources. A modified diversification paradigm from Ramanujam and Varadarajan's work (1989) is then illustrated. A review of the literature on organizational diversification is also presented. A conceptual model and hypotheses based on these theoretical deliberations are proposed for examining an HMO's new market entry considering four categories of determinants.

Chapter 4 describes the methods that will be used to assess the determinants of the new entry of an HMO into a Medicare risk contract. Chapter 5 presents the results of this analysis. Chapter 6 summarizes the study results with regard to hypothesis testing. Implications from this analysis are then explored. Finally, limitations of this study and directions for future studies are discussed.

CHAPTER 2

LITERATURE REVIEW

There are relatively few studies that address the issues of why HMOs enter into a particular market and what influences their subsequent growth. Even fewer studies examine the determinants of an HMO's entry into a Medicare risk contract. These earlier studies vary in terms of their analytical approaches, unit of analysis, definition of HMO market, and research focus. They also span the period from the early 1970s to the late 1980s during which the overall health care industry and the legislative climate facing the HMO sector have witnessed tremendous changes. It appears important to link background information on HMO related legislation and policies to HMO studies at corresponding points in time. Regulatory history of the HMO movement was described in Chapter 1. This chapter will summarize previous studies on HMO development and HMO's market entry. Literature on the importance of stakeholders to HMO development will also be reviewed.

Literature on HMO Development

McNeil and Schlenker (1975) examined the importance of market conditions in influencing HMO growth during the period of 1970-1973 period. Compared to states without HMOs, states with HMOs had higher mean family income, larger total and urbanized population, more physician per capita, higher hospital costs per day and per

capita, and greater insurance expenditure. However, these results from the descriptive statistics cannot be conclusive. At the Standard Metropolitan Statistical Areas (SMSA) level, regression analysis indicated that SMSA population size and hospital expenses per day were significantly and positively associated with the probability of new HMO formation in an SMSA. In a quite qualitative manner they concluded that favorable federal policy encouraged HMO development during the 1970-1973 period, but state regulations were generally unimportant. In their survey of operational HMOs, HMO administrators cited factors they perceived as significant barriers to HMO's formation and growth, including gaining access to employer and other potential member group, obtaining financial support, provider opposition, and expanding physician staff.

In examining why federal granted organizations in the early 70s terminated HMO development activities, Strumpf and Garramone (1976) summarized 12 studies and found that most frequently mentioned conditions as the essential requirement for the development of prepaid plans were an adequate population base, a favorable legal environment, provider availability, sufficient capital for planning and early operational deficits, and physician support and community receptivity. Though the significance of the descriptive information from studies in 1970s is far from decisive without empirical support, it provides a sound starting point to investigate employing more sophisticated analysis.

Goldberg and Greenberg (1981) analyzed why HMO enrollment and growth varied greatly among states. The unit of analysis was state, with which the problem of

low degrees of freedom could not be avoided. Two types of factors were examined: market and legal conditions. Market factors included economic and demographic variables that affected the demand and supply of HMO services. Legal conditions that might have hindered the development of HMOs were reflected by six state-specific policies regarding the governing body of HMOs, form of HMOs, regulation of reserves and capital, employment of physicians, prohibition of advertising, coverage of HMOs under certificate of need. The results from a Tobit analysis supported the hypotheses that a high proportion of transit population who changed county of residence was associated with high HMO market share as well as positive growth of HMO market share. Greater union strength, measured by unions as a percentage of nonagricultural employment, was also associated with greater HMO development. Cost per episode of hospital care was consistently found to impose a significant, positive effect on HMO development. The assertion that the existence of extensive group practices facilitated HMO development was partially supported. None of legal conditions were found to be statistically important.

Built on Goldberg and Greenberg's work that state regulation had little or no effect on HMO enrollment and growth, Morrisey and Ashby (1982) turned attention to the effects of market condition in determining the presence of an HMO in 1978, using several data bases for the years from 1975 to 1979. For the linear probability model that estimated the presence of an HMO, three of 16 variables were significant at the 95% confidence level. The proportions of physicians aged 45-64 as a proxy measure of

physician opposition to HMO development had a negative coefficient as predicted. It was hypothesized that physicians with well-established practices would lose most from the development of alternative delivery modes and thus strive to prevent HMOs from entering into the market. Population size in the SMSA was positively associated with HMO formation, since the probability of attracting sufficient enrollees to cover cost increased. The demand for HMO service was expected to be associated with the low income level if HMOs were inferior goods. Not as expected, per capita income had a positive effect on HMO development. It was hypothesized that large net migration and high physician/population ratio resulted in a greater probability of HMO development. However, these two variables were found to have negative, though not significant, coefficients. Along with the observation that the coefficient magnitude for two variables, percentage of employers with 250 or more employees and physician-population ratio, is small relative to their corresponding standard error, multicollinearity is speculated on, but was not addressed by Morrisey and Ashby.

Cromley and Shannon (1983) employed discriminant analysis to assess characteristics of SMSAs developing HMO from the period of initial federal involvement in 1972 through 1980. Presence of a medical school, binary geographic variable (one for Northeast, North, Central, Middle Atlantic, or Pacific census region), and SMSA population size were the most significant variables positively associated with new HMO establishment in SMSAs. The presence of a medical school was perceived as an indicator of availability of needed manpower and facilities; binary geographic variables indicated

legislative attitude toward health care regulation. Population to physician ratio and presence of HMOs in the SMSA prior to 1972 both had moderate influence on HMO development and carried expected signs. The former had a negative effect and could be considered as a measure of either resource richness or competition among physicians; the latter factor might reflect community receptivity, or information for spatial development of HMOs.

Welch (1984) employed an econometric model to estimate the determinants of the existence of prepaid group practice (PGP) and the enrollment size of prepaid group practices in a given SMSA from 1976-1980. For the equation that estimated the probability for an SMSA to have an enrollment of at least 5,000, the Probit analysis indicated that population size ($p < 0.05$) and median years of education ($p < 0.1$) were positively associated with observing a viable enrollment level; per capita income ($p < 0.1$) imposed a negative effect. For the enrollment equation, ordinary least square (OLS) estimates suggested that enrollment level be a positive function of education and hospital cost per day, and a negative function of income. One can argue that PGP enrollees faced a tradeoff between the limited choice of physicians and the lower price of PGPs. Since the freedom to choose one's physician was assumed to be a normal good, higher income enabled consumers to stay in the fee-for-service sector. Education might enhance a consumer's comprehension of HMOs as a novel, uncommon alternative and thus increase the probability of PGP joining. State regulations were generally insignificant except the

prohibition of the direct employment of physicians. This regulation denied the staff model and put restrictions on the group model.

Along with the line of income effect, immigrants would incur higher costs in searching physicians than long-time residents and might be more likely to join PGPs (Welch, 1984); however, the result was opposite to what was expected. A weak explanation was provided that net immigration was correlated with some excluded factors and length of residence was a better predictor of enrollment decisions. It was not clear how immigrants were defined: those who changed their residence within America (in-migrants) or those who migrated into their current residence from outside America (immigrants). One limitation of this study was that the study HMOs only included viable PGPs that had at least an enrollment level of 5,000, since the research interest was the formation of semi-permanent organizations that were less likely to fail than were small PGPs. No individual practice associations (IPAs) were included. External validity was lessened.

Under the 1973 HMO Act, 20% of the Office of Health Maintenance Organization's budget was set for HMO development in rural areas. By 1979, 42 rural projects were granted funding; 22 of these projects failed to develop further. To explain the lack of availability of HMOs in rural areas, Christianson, Shadle, Hunter, Hartwell, and McGee (1986) established a framework identifying several barriers to rural HMO development in 1970s, including inability to acquire start-up financing, opposition of rural physicians, inability to contain costs, and limited population in rural areas. Based

on the framework, these scholars undertook an intensive case study of seven HMOs serving rural areas in an attempt to understand the increasing availability of HMOs in rural areas since 1980.

The perception of rural hospitals that urban HMOs attracted rural enrollees to use urban hospitals facilitated rural hospitals' sponsorship of rural HMOs which were identified as one approach to protect their patient base (Christianson, et al., 1986). Along with the HMOs' effort to gain cooperation, or to reduce the hostility of rural physicians, a sense of competition from urban physicians undermined the historical reluctance of rural physicians who participated in an HMO in order to control patient flow.

Despite several general approaches to develop a positive community image that enhanced the potential for HMO enrollment, the relatively limited population and a small number of large employers in the rural areas remained a natural limitation on enrollment (Christianson, et al., 1986). To achieve a financially viable enrollment level, all of the rural HMOs in this study offered Medicare supplemental policies, but they were cautious about entering into any contract with the HCFA.

Consumers, employer groups, and providers (hospitals and physicians) were critical of rural HMO development. A perception of competition among providers facilitated their participation in rural HMOs (Christianson, et al., 1986). Though the study rural HMOs were not representative of all rural HMOs or HMO universe, findings from this case study can be viewed as interpretive and hypothesis generating.

In studying how hospital expenses influenced HMO development, McLaughlin (1987) critiqued that previous studies on this issue were subject to endogeneity bias, since they adopted single-equation specification assuming that HMO activities did not affect hospital expenses. The author applied a two-stage least-square simultaneous-equation technique to five models; each of five models had the same set of predictors except an unique variable measuring hospital expenses. The unit of observation was the SMSA.

Of five hospital expense variables, three were found to impose negative effect on HMO growth; of those three, hospital expenses per capita and hospital admission rates were significant at the 0.95 confidence level. Average area length of stay was positively associated with HMO growth. As to physician supply, increased HMO growth was associated with a higher level of patient care physicians per 1,000 population and a lower percentage of patient care physicians who were specialists. Two other variables on education level and size of elderly population had positive relationships with HMO growth (McLaughlin, 1987).

Due to data availability, the study sample consisted of 25 SMSAs that were exclusively large by population size. Thus, the study results might not be generalized to smaller SMSAs. Though pooling annual data from 1972 to 1982 yields a sufficient sample size, model overfitting was still highly possible because of the large number of predictors (15 variables plus 24 dummy variables). In addition, data pooling raised a technical concern, that is, multicollinearity for predictors measured over the 11-year time

period, and which might be manifested by the larger standard error estimate relative to the corresponding regression coefficient estimates for some predictors.

Wholey, Christianson, and Sanchez (1990) questioned the policy relevance of the studies (Goldberg & Greenberg, 1981; McNeil & Schlenker, 1975; Welch, 1984) on the effect of state regulation because the time period covered predated the dramatic changes that occurred in the HMO industry during the 1980s. In their study covering the years of 1982 through 1988, they used a Probit analysis to estimate the effects of state regulations on the probability that an HMO entered or exited a community. Among the six regulatory factors, only one factor (employers required to offer HMOs) was found to be significantly and positively related to the probability of both market entry and exit. Community factors such as MSA population and large establishments per capita also had positive effects on market entry/exit. Physician resistance, measured by population per physician, discouraged HMO formation.

Summary of Literature on HMO Development

These previous studies tend to define the MSA as the HMO market and then treat MSA as the unit of analysis. They either do not distinguish HMO development by model type (Goldberg & Greenberg, 1981; McNeil & Schlenker, 1975; Morrisey & Ashby, 1982) or only focus on prepaid group practices (PGP) (McLaughlin, 1987; Welch, 1984). There is lack of attention to HMO market entry by model type, though some effort has been made to examine HMO failures by model type in a descriptive manner (Christianson, Wholey, & Sanchez, 1991; Feldman, et al., 1995) or in an analytical way

(Christianson, Sanchez, et al., 1991; Wholey, Christianson, & Sanchez, 1992). As to HMO's market entry and market share, the significance of some factors is consistently found across the studies. As Table 1 indicates, a large population base, education, and community receptivity are positively associated with HMO development; state regulation appears to have no significant influence (Goldberg & Greenberg, 1981; McNeil & Schlenker, 1975; Welch, 1984) or have contradictory effects (Wholey, et al., 1990). Other variables such as income, physician-population ratio, migrant population, and hospital costs generate mixed results. Multicollinearity among predictors and model overfitting may lead to insignificant coefficients for some variables. In addition, employment of a cross-sectional design is subject to "endogeneity bias", which confounds the validity of study results. Moreover, much unknown remains regarding HMO development in rural areas.

Nonetheless, these early studies in the HMO sector provide a starting point of examining the entry of HMOs into a Medicare risk market, especially with respect to the importance of environmental resources. Two groups of variables that are frequently excluded from the HMO growth literature are HMO organizational attributes and HMO competitive market structure, probably because of their irrelevance to research interest that focuses on the establishment of a new HMO and the nature of relatively new or immature HMO market. Also, the importance of employer groups on HMO development has not been considered substantially significant nor empirically proved in the 1970s and early 1980s (McLaughlin, 1987; Morrisey & Ashby, 1982), but received some support

from a study in the late 1980s (Wholey, et al., 1990). As will be discussed below, the propelling force that urges the growth of managed care since the 1980s is employers.

Table 1

Summary: Resources Important to HMO Development and Growth

Population	Population size (+) (Christianson, et al., 1986; Cromley & Shannon, 1983; McNeil & Schlenker, 1975; Morrisey & Ashby, 1982; Welch, 1984; Wholey, et al, 1990)
	% population nonwhite (o), female (+, o) or black (-) (McLaughlin, 1987; Morrisey & Ashby, 1982)
	% population aged 65 or over (o, +) (McLaughlin, 1987; Morrisey & Ashby, 1982)
	Net migration (+, - , o) (McLaughlin, 1987; Morrisey & Ashby, 1982; Welch, 1984)
	% of population not changing county of residence (-) (Goldberg & Greenberg, 1981)
Education	Median years of education (+), % of high school graduate (+) (McLaughlin, 1987; Welch, 1984)
Income	Per capita income (+, -, o) (Goldberg & Greenberg, 1981; McLaughlin, 1987; Morrisey & Ashby, 1982; Welch, 1984; Wholey, et al., 1990)
Provider	% of physicians aged 45-64 (-) (Morrisey & Ashby, 1982)
	Physicians-population ratio (+, o), % specialists (-) (Cromley & Shannon, 1983; McLaughlin, 1987; McNeil & Schlenker, 1975; Wholey, et al, 1990)
	Percentage of patient-care physicians in group practice (+, o) (Goldberg & Greenberg, 1981)
Medical school	Presence of medical school (+) (Cromley & Shannon, 1983)

Table 1 (continued)

Summary: Resources Important to HMO Development and Growth

	Bed-population ratio (+) (Morrisey & Ashby, 1982)
Employment	% employers with 250 or more workers (o), large employers per capita(+) (McLaughlin, 1987; Morrisey & Ashby, 1982; Wholey, et al., 1990)
	Unemployment rate (o) (McLaughlin, 1987)
Union	Unions as a percentage of nonagricultural employment (+) (Goldberg & Greenberg, 1981)
Health care	Hospital costs per diem (+, -), cost per episode (+) admission rate (-), LOS cost (+), insurance expenditure (+) (McLaughlin, 1987; McNeil & Schlenker, 1975; Welch, 1984)
Imitation or receptivity	HMO presence (+), age of oldest HMO (+) (Cromley & Shannon, 1983; McNeil & Schlenker, 1975; Morrisey & Ashby, 1982)
Legal	State policies (+, o) (Goldberg & Greenberg, 1981; McNeil & Schlenker, 1975; Welch, 1984)
Unit of analysis	SMSA (Cromley & Shannon, 1983; McLaughlin, 1987; McNeil & Schlenker, 1975; Morrisey & Ashby, 1982; Welch, 1984; Wholey, et al., 1990)
	State (Goldberg & Greenberg, 1981)
Dependent variable	HMO presence (Cromley & Shannon, 1983; Morrisey & Ashby, 1982; Welch, 1984)
	Number of new HMOs established (Goldberg & Greenberg, 1981; Wholey, et al., 1990)
	HMO market share, change in market share of HMOs; enrollment size (Goldberg & Greenberg, 1981; McLaughlin, 1987; Morrisey & Ashby, 1982; Welch, 1984)

Note. + indicates positive results; - indicates negative results; o indicates no association.

Literature on the Entry of HMOs into a Medicare Risk Contract

Rossiter et al. (1985) examined, in an anecdotal and descriptive manner, the strategies adopted by 21 demonstration HMOs for Medicare market. Noted by HMO managers, being the first entrant into the Medicare market was a worthy consideration. However, there existed two primary concerns. First, the Medicare population was not familiar with the HMO concept. Second, the elderly had established strong ties with their fee-for-service physicians. Demonstration HMOs considered Medicare supplemental insurance offered by traditional insurers, especially Blue Cross and Blue Shield, as a very important competitive force. Compared to traditional Medicare supplemental insurance, demonstration HMOs tended to offer expanded benefits at a lower premium and reduced cost sharing. In addition to competing with traditional Medicare supplemental insurers, demonstration HMOs in the same market also competed among themselves on generosity of benefits and premiums. These scholars concluded that it was difficult for a demonstration HMO not to model itself after the most generous benefit package already available in the market.

Ellwood (1986) provided descriptive information on HMOs participating in demonstrations. It was found possible that risk enrollees switched, or "rolled over" from employed members to Medicare beneficiaries in the same health plan, and Medicare enrollees switched to risk option because it was less expensive for them. In addition, participating health plans tended to be established with a strong commitment to serving health care consumers.

In examination of the National Medicare Competition (NMC) demonstration experience, Adamache and Rossiter (1986) applied a behavioral market entry equation to assess the determinants of an HMO's entry into a Medicare risk market. In addition to market and demographic characteristics that were often considered important in previous studies on HMO development and growth, they incorporated HMO's organizational and operational characteristics into three Probit models with somewhat different specification. The unit of analysis was the individual HMO and market was defined as the county where an HMO's main office was located. Regardless of the model specification, the AAPCC rate and the proportion of population aged 65 or over always had positive and statistically significant coefficients. Prior Medicare experience was also consistently positive ($p < 0.1$). The overall accuracy rate of prediction ranged from 62.6% to 79.4 %.

To study factors related to enrollment success one year after the risk contracts were implemented, Harrington, Newcomer, and Moore (1988) conducted interviews in 1986 with 16 HMOs with risk contracts in the four areas: Los Angeles, Minneapolis-St. Paul, New York, and Portland, Oregon. It was reported by IPA HMOs that a large number of associated physicians offered greater geographical distribution, that is, a wider range of options to attract purchasing groups and individual seniors, and provided a core element in their advertising. Large, well-established multispecialty group practices were primarily targeted since they already served many patients, and some of whom could switch to HMO membership.

HMOs reported that they were able to retain members enrolled before their retirement, since relationships with HMOs and physicians had been established (Harrington, et al., 1988). HMOs with large commercial enrollment benefited from greater name recognition and word-of-mouth advertising. Plan longevity was also often used to denote security to the elderly. HMOs with early demonstration projects tended to have larger risk enrollments probably because they had more marketing experience with seniors. As indicated by HMOs or consumer representatives, the distinction between non-for-profit and proprietary ownership was not crucial in marketing HMO risk products to Medicare beneficiaries.

Either large metropolitan or state-wide areas were defined by almost all of the HMOs as in which to develop risk markets. Large service areas provided access to large employed and retiree groups. Risk contract HMOs usually set their premiums below those of Medicare supplemental insurance policies in the area in 1986 (Harrington, et al., 1988). The consensus was that price was a major factor for the elderly selecting a health plan. This price competition may have led to the perception that HMOs identified Medicare supplemental insurance carriers as their primary competitors.

Porell and Wallack (1990) examined the determinants of an HMO's entry into a Medicare risk contract in 1985, the first operational year of the TEFRA program. HMO market areas were defined as metropolitan statistical areas. Nonmetropolitan markets were defined as the major county of HMO non-risk contract operation. In the first model that included 372 TEFRA-period entrants and excluded 38 pre-TEFRA entrants, HMO

market entry was a positive function of total HMO enrollment size, prior Medicare experiences, wage-adjusted AAPCC and a negative function of HMO age, HMO market growth rates, and percentage of population aged 65 or over who were below the poverty level. The competitive market structure, defined as HMO market share and Herfindahl Index, was moderately associated with HMO market entry (significant at the 0.1 level). A large HMO market share was inversely related to the probability of a Medicare risk market entry, while a high Herfindahl Index of HMO concentration was positively related to the entry of a HMO into a Medicare risk contract. The second model that included both pre-TEFRA and TEFRA-period entrants generated similar results in terms of the effect of HMO attributes, market area attributes, and competitive market structure on a Medicare risk market entry.

Porell and Wallack's models consisted of a comprehensive set of variables that were considered relevant to a market entry decision. The sample size was large relative to the number of independent variables in the model. The predictive accuracy was greater than 80% for nonentrants, but less than 50% for market entrants. The overall model predictive accuracy was above 70%. A major limitation of their study is the adoption of a cross-section study design in which dependent and independent variables are measured at the same time point. One of three criteria that must be satisfied to establish a causal relationship is time ordering: causes must proceed effects in time. With regard to Medicare risk contracting, one can expect that it takes time for an HMO to reach a market entry decision, prepare legal documentations, and wait for the HCFA's approval. A study

design in which the measurement of the dependent variable (i.e., market entry) lags behind that of independent variables could better verify causal effects.

In a study of why HMOs discontinued their Medicare risk contracts in 1988, Porell and Tompkins (1993) shifted attention to the effects of an HMO's structure and financial performance in Medicare business on a non-renewal decision. The effects of market characteristics were not examined and not included in the models as control variables. It was found that two variables, percentage of disabled enrollees and a dummy variable of dropping drug benefit, was positively related to market exit. It was explained that prescription drug benefits attracted less healthy beneficiaries. The withdrawal of prescription drug benefits and eventually market exit reflected responses to perceived adverse selection. An HMO's projected average payment rate (APR) was used to indicate the HMO's market entry AAPCC rate. A strong interaction term between the regional component dummy variable and AAPCC level was suggestive of a deficiency in the AAPCC level for market exit.

The effective sample size of the Porell and Tompkin's study (1993) was 125 HMOs and 20 predictors were included in the logit model. Model overfitting may explain why only four variables were statistically significant at the 10% or lower level. Irrespective of overfitting, the predictive accuracy was very high: 99% for renewed HMOs and 77% for discontinued HMOs.

Summary of Literature on the HMO's Entry into a Medicare Risk Contract

Over the past ten years, although many studies have been done of the HMO risk market development and growth, little effort has been devoted to understanding an HMO's decision to participate in the Medicare risk program. Empirical studies on Medicare market entry examine the significance of HMO attributes and HMO performance as well as competitive market structure, in addition to environmental factors on which early HMO development research places focus. These studies utilize the individual HMO as an unit of analysis. However, the definition of HMO market varies from county to state by study. Depicted in Table 2, an AAPCC rate is consistently found to impose a positive effect on market entry. Model type does not have distinguishing importance on the decision to risk contract.

Due to inconsistency among prior studies in model specification, variable definition and measurement, the effect of other variables observed is not conclusive. Similar to studies on HMO development, one major limitation of market entry analysis results from the application of a cross-section study design. In addition, the "indifferent" inclusion of HMOs which either participate in Medicare risk program for the first time or renew their risk contracts leads to a somewhat dissimilar study sample. A limitation of all of these studies is an omission of variables measuring the effect of an HMO's performance in a Medicare risk contract. Omission of important variables would generate biased results. Thus, it would be better to separate initial contractors from renewing

HMOs unless it can be proven that initial market entry and the decision to renew are influenced by similar factors.

Table 2

Summary: Factors Related to the Entry of HMOs into a Medicare Risk Market

HMO Attributes	
Age	Age (+, -, o), less than 3 years (+) (Adamache & Rossiter, 1986; Harrington, Newcomer, & Moore, 1988; Porell & Tompkins, 1993; Porell & Wallack, 1990)
Size	HMO enrollment (+, o) (Adamache & Rossiter, 1986; Porell & Wallack, 1990)
Model type	Dummy variables (o) (Adamache & Rossiter, 1986; Porell & Tompkins, 1993; Porell & Wallack, 1990)
Ownership	Profit status (o) (Adamache & Rossiter, 1986)
Affiliation	Chain member (o), entry of central HMO of chain (+) (Porell & Tompkins, 1993; Porell & Wallack, 1990)
Other	Any Medicare enrollees (+), federal qualification (+) (Adamache & Rossiter, 1986; Porell & Wallack, 1990)
HMO Performance	
Growth	HMO net enrollment increase (o) (Porell & Wallack, 1990)
Revenue	HMO net revenue PMPM (+) (Porell & Wallack, 1990)
Utilization	Hospital days per 1,000 members (-, o), physician visits per enrollee (+, o) (Adamache & Rossiter, 1986; Porell & Wallack, 1990)
Market Resource	
Population	% population aged 65 or over (+) (Adamache & Rossiter, 1986)

Table 2 (continued)

Summary: Factors Related to the Entry of HMOs into a Medicare Risk Market

	% white elderly (-, o), elderly female (+,o), elderly black (-) (Adamache & Rossiter, 1986; Porell & Wallack, 1990)
	Immigrant population aged 65 or over (+) (Porell & Wallack, 1990)
	In-migrant per 1,000 population (o) (Adamache & Rossiter, 1986)
Income	% aged population below poverty level (-) (Porell & Wallack, 1990)
Provider	Physician per capita (-, o), large group practice (descriptively reported) (Adamache & Rossiter, 1986; Harrington, et al., 1988; Porell & Wallack, 1990)
Receptivity	Weighted average age of HMOs (-), nonelderly HMO penetration (+), % growth in total HMO enrollment (-) (Porell & Wallack, 1990)
Market Structure	
Market share	Plan share of HMO market (-, o) (Adamache & Rossiter, 1986; Porell & Wallack, 1990)
Concentration	Herfindahl Index of HMO concentration (+) (Porell & Wallack, 1990)
Market growth	HMO market growth rates (-) (Porell & Wallack, 1990)
Medigap	Medicare supplementary insurance (descriptively reported) (Harrington, et al., 1988; Rossiter, et al., 1985; Porell & Wallack, 1990)
Market price	Wage-adjusted AAPCC (+) (Adamache & Rossiter, 1986; Porell & Wallack, 1990)
Unit of analysis	Individual HMO (Adamache & Rossiter, 1986; Porell & Tompkins, 1993; Porell & Wallack, 1990)
Definition of market	County (Adamache & Rossiter, 1986); MSA (Harrington, et al., 1988; Porell & Wallack, 1990); state (Harrington, et al., 1988)

Note. + indicates positive results; - indicates negative results; o indicates no association.

Literature on HMO Enrollment: Stakeholder Analysis

In developing a strategic vulnerability model for HMO analysis, Whitehead, Blair, Smith, and Savage (1989) identified three types of stakeholders of HMOs: buyers, payers, and suppliers. Buyer stakeholders are HMO enrollees as well as potential enrollees who are presently in the fee-for-service sector. Payer stakeholders include employers, federal government (Medicare HMOs), and state governments (Medicaid HMOs). Supplier stakeholders consist of physicians who are contracting with HMOs and those who are involved only in FFS practice. Support of stakeholders determines the strategic vulnerability of HMOs that depend on the relative strength of the market to survive. Early studies also descriptively confirm the significance of these stakeholders to HMO development (Christianson, et al., 1986; Morrisey, Gibson, & Ashby, 1983; Office of Health Maintenance Organizations, 1980). Thus, the following will focus on how these stakeholders influence HMO development.

Buyer: Enrollment Decision by Medicare Beneficiaries

This section on buyer stakeholders will review the literature on HMO enrollment choice by Medicare eligible elderly. In order to be successful in a Medicare risk market, Medicare HMOs have to attract Medicare beneficiaries who are entering retirement or in the FFS sector. To attract new enrollees, Medicare HMOs tend to provide a service spectrum beyond traditional Medicare insurance coverage and charge no additional premium for the basic option offered (Ellwood, 1986). In 1994, 56% of Medicare risk enrollees incurred zero additional premiums for HMO coverage. Medicare beneficiaries

are still assessed a premium for Part B coverage. Fifty percent of risk contracts charge no additional premium (Health Care Financing Administration, 1995). In addition, 96% of risk contracts provide routine physicals. Almost 50% of HMOs with risk contracts cover outpatient drugs. From the viewpoint of out-of-pocket expense and service coverage, Medicare risk HMOs act like "true" Medigap carriers. In reality, Medicare HMOs also perceive Medicare supplementary policies (Medigap), mainly Blue Cross/Blue Shield plans, as a primary competitive force (Feldman, Wisner, Dowd, & Christianson, 1993; Harrington, et al., 1988; Langwell, et al., 1987; Rossiter, et al., 1985), or vice versa (Clement, Brown, Retchin, Stegall, & Thompson, et al., 1992; Goldberg & Greenberg, 1980). The impact of Medicare supplementary insurance on the entry of HMOs into a Medicare risk market has been qualitatively documented but not empirically examined due to data limitations (Clement, et al., 1992; Harrington, et al., 1988; Porell & Wallack, 1990; Rossiter, et al., 1985).

In addition to Medicare beneficiaries who have individually purchased Medigap policies, another target population is retirees who receive an employer-sponsored group retirement benefit. The Medicare Current Beneficiary Survey (MCBS) conducted in 1991 observed that 38% of surveyed Medicare elderly had employer-sponsored supplementary health insurance. Of those with supplemental coverage, 42% purchased individual Medigap policies; 12% qualified for Medicaid; and 2% received coverage from other sources. Approximately 11% had no supplemental coverage (Chulis, Eppig, Hogan, Waldo, & Arnett, 1993).

In one study on choice of health plans in the Medicare Capitation Demonstration, Garfinkel et al. (1986) conducted a survey of aged Medicare beneficiaries in three sites (Minneapolis-St. Paul, Minnesota; Worcester, Massachusetts; and Marshfield, Wisconsin). Two types of beneficiaries were distinguished: (a) rollover, who would not have to change providers to enroll in the demonstration; (b) switcher, who would have to change providers to enroll. Beneficiaries with supplementary insurance were found significantly less likely to participate in a capitation program in two of six equations. Beneficiaries in a family in which any household member belonged to an HMO were more likely to join a HMO ($p < 0.05$). HMO enrollment was also a positive function of several information sources, including friend or relative, HMO meeting, media, and medical profession. In general, medical risk measured by perceived health status, functional limitations, and chronic condition was not statistically significant in an enrollment choice. None of the personal characteristics (age, gender, and education) were systematically important to choice behavior. Satisfaction with prior usual source of care was in general negatively related to HMO enrollment for switchers but positively related to HMO enrollment by rollovers.

Siddharthan (1990) conducted a telephone survey of elderly aged 60 or over in Southeast Florida in 1986 to determine HMO enrollment by Medicare beneficiaries. Because of the nature of heterogeneous communities, the study sample was broken down to two groups: native and foreign-born population. For both U.S.-born and foreign-born elderly, the probability of enrolling in an HMO significantly declined as income

increased ($p < 0.05$). Problems with physical access to health care providers were also positively related to HMO enrollment. Discrimination with respect to gender (female=1) in selecting health plans was moderate for U.S.-born elderly ($p < 0.1$), but did not occur for immigrants. Younger immigrants were somewhat more likely to choose an HMO ($p < 0.1$). Employment status was not statistically important in either elderly population.

Davidson et al. (1992) evaluated the relationship between health insurance knowledge and the demand for Medicare supplementary coverage. The study sample was a group of Medicare beneficiaries participating in an educational workshop held between October 1986 and May 1987 about their insurance options including the basic Medicare, private supplementary policies, and Medicare HMOs. Data collected before and after the workshop were pooled for analysis. In the Medicare HMO versus Medicare-only comparison, better health status and higher Medicare knowledge were significantly related to HMO enrollment. This observation indicated that Medicare HMO experienced favorable selection. However, healthier beneficiaries with a higher level of Medicare knowledge were less likely to join HMOs than to have basic Medicare coverage. This finding was reflected by a significant, negative interaction term between health status and Medicare knowledge. Surprisingly, a long-term physician relationship significantly encouraged HMO enrollment by sicker beneficiaries. This may be due to no differentiating between rollovers and switchers in the study sample. A negative interaction term between physician relationship and health status was also significant.

Healthier beneficiaries with a longer physician relationship were less likely to have HMO membership.

In private supplementary policies versus basic Medicare comparison, having a private supplement was a positive function of better health status but a negative function of higher Medicare knowledge. An insulated interaction term between health status and Medicare knowledge were significantly negative. A negative interaction term between physician relationship and health status was also observed. In the Medicare HMO versus private supplement comparison, neither health status nor Medicare knowledge was an important factor. Two interaction terms, Medicare knowledge-health status and physician relationship-health status, were negative but not significant. In the three comparison pairs, none of personal characteristics (age, gender, race, year of education) was significant except that the female beneficiaries were more likely to choose a Medicare HMO over private supplement policies.

Dowd et al. (1994) examined the relationship between characteristics of Medicare beneficiaries and their choice of health plan in the Twin Cities in 1988. In the equation for the aggregate FFS sector (the basic FFS with or without a supplementary policy) and TEFRA risk contract HMOs, beneficiaries who significantly favored HMO plans were those who were employed during the past year ($p < 0.05$), lived alone ($p < 0.01$), and had family income between 10,000 and 20,000 ($p < 0.01$). However, beneficiaries who purchased any of their coverage through a group policy or received a premium subsidy were more likely to have FFS plans than to join TEFRA-risk HMOs ($p < 0.01$). This may

be due to the fact that employment-based supplemental arrangements were historically limited to traditional insurance options, exclusive of HMO options. Age and gender were not related to choice behavior. Though statistically not significant, "mobile" beneficiaries, that is, those who did not live in the Twin Cities all year, seemed to have enough income to reside elsewhere during the winter and preferred FFS sector to HMOs, since FFS sector provided an easier access to nationwide physicians. Only one of 18 variables measuring health conditions of Medicare beneficiaries was significant in choosing a health plan.

Garfinkel et al. (1986) found that having supplementary insurance coverage discouraged enrollment in HMOs by Medicare beneficiaries. Thus, Wilcox-Gök and Rubin (1994) shifted focus to decisions to purchase private health insurance by elderly Medicare beneficiaries. The study sample was derived from wave 3 (1984) of the Survey of Income and Program Participation (SIPP). Beneficiaries who were white, female, younger, and had higher household income held higher probability of having private health insurance. In contrast to what would have been expected, the presence of an employed family member was significantly and negatively related to the probability of having private health insurance.

Summary of Buyer: Enrollment Decisions by Medicare Beneficiaries

To summarize, an HMO enrollment decision is conditioned by economic risk. HMOs attract low income Medicare beneficiaries. The obverse of this relationship can be demonstrated by the fact that beneficiaries with high household income are more likely to

have private supplementary health insurance coverage (Wilcox-Gök & Rubin, 1994) and those with supplementary insurance are less likely to enroll in the HMOs (Garfinkel, et al., 1986). Beneficiaries with insurance purchased through a group policy or subsidized by another source are less likely to join HMOs (Dowd, et al., 1994), probably because of the fact that HMOs were less likely to be offered to retirees by employers. In addition, an employer-sponsored retiree health benefit is usually cheaper and more generous than an individually purchased policy. Word-of-mouth advertising for HMO coverage definitely encourages HMO enrollment (Garfinkel, et al., 1986).

A possible explanation of a positive effect of physician relationship on HMO enrollment (Davidson, et al., 1992) is the matter of lack of differentiation between rollovers and switchers. If a beneficiary with a long-term relationship with his physician who is on HMO panel, the beneficiary does not have to change providers in order to enroll in the HMO. Better understanding of the Medicare program promotes HMO enrollment. Medicare HMOs experience either neutral selection (Dowd, et al., 1994; Garfinkel, et al., 1986) or favorable selection (Davidson, et al., 1992). With a higher level of Medicare knowledge, however, healthier beneficiaries are less likely to have HMO membership than to have basic Medicare coverage. In general, other personal attributes (age, gender, race, marital status, education) indicate no, or mixed influence. A summary of empirical results for studies related to HMO enrollment choice is listed in Table 3.

Table 3

Summary: Factors Related to HMO Enrollment Choice by Medicare Beneficiaries (Compared to FFS Enrollment)

Personal Characteristics	
Age	Age groups (○), age in year (○) (Davidson, et al., 1992; Dowd, et al., 1994; Garfinkel, et al., 1986)
Gender	Female (○,+) (Davidson, et al., 1992; Dowd, et al., 1994; Garfinkel, et al., 1986; Siddharthan, 1990)
Race	White vs. Asian (○), black vs. Asian (+), White vs. nonwhite (○) (Davidson, et al., 1992; Siddharthan, 1990)
Education	Years of school complete (○), education level (○) (Davidson, et al., 1992; Dowd, et al., 1994; Garfinkel, et al., 1986)
Knowledge	Medicare knowledge (+) (also see interaction terms) (Davidson, et al., 1992)
Marital status	Married (○,+) (Davidson, et al., 1992; Dowd, et al., 1994; Garfinkel, et al., 1986)
Live	Live alone (○,+) (Dowd, et al., 1994; Garfinkel, et al., 1986; Siddharthan, 1990)
MD relationship	Physician relationship > 5 years) (+) (Davidson, et al., 1992)
Migration	Foreign-born (+) (Siddharthan, 1990)
	Living in the area all year (○) (Dowd, et al., 1994)
Information source	Friend, relative, medical profession, HMO meeting, media (+) (Garfinkel, et al., 1986)

Table 3 (continued)

Summary: Factors Related to HMO Enrollment Choice by Medicare Beneficiaries

(Compared to FFS Enrollment)

	Household member who belong to an HMO (+) (Garfinkel, et al., 1986)
Economic Risk	
Income	Family income below $ 7K vs. other income groups (+), below $10,000 vs. $10K-20K (+) (Dowd, et al., 1994; Siddharthan, 1990)
Employment	Being employed (o, +) (Dowd, et al., 1994; Siddharthan, 1990)
Insurance coverage	Covered by supplemental insurance (-) (Garfinkel, et al., 1986)
	Insurance purchased through a group policy (-) (Dowd, et al., 1994)
	Contribution to premium by others (-) (Dowd, et al., 1994)
Medical Risk	
Health status	Perceived better health status (o,+), functional limitations (o), chronic condition (o) (also see interaction terms) (Davidson, et al., 1992; Dowd, et al., 1994; Garfinkel, et al., 1986)
Utilization	Office visit (o) (Siddharthan, 1990)
Interaction Term	
	(better health status better) x (Medicare knowledge) (-) (Davidson, et al., 1992)
	(better health status) x (physician relationship > 5 years) (-) (Davidson, et al., 1992)

Note. + indicates positive results; - indicates negative results; o indicates no association.

Payer: Employer

Noted in the first chapter, HMOs have their origin in industry efforts to deliver broad and affordable health services. Since the second World War, employees in the U.S. have obtained their health insurance through voluntary, employer-sponsored group insurance. Under the 1973 HMO Act, employers were required to offer their employees with HMOs options if they had more than 25 employees and offered health insurance, and there was a federally qualified HMOs in their market. This law attempted to provide HMOs increased market access to employer groups. However, empirical studies of HMO development in the 1970s and early 1980s did not observe a significant effect through employer groups (McLaughlin, 1987; Morrisey & Ashby, 1982). During the recession in 1981-1983, many employers either shifted to self-insurance through the provisions of the Employee Retirement and Income Security Act (ERISA) of 1974 (McDonnell, Guttenberg, Greenberg, Arnett, 1986) or began to require higher cost sharing from their employees (Gabel, Jajich-Toth, deLissovoy, Rice, & Cohen, 1988). ERISA exempts employers that choose to self-insure from state regulation of health insurance. Thus, employers could offer lower cost coverage that excludes otherwise mandated benefits. In response to rising medical claims cost from 3.1 to 7.1% of total compensation between 1970 to 1990, employers, particularly large ones, increasingly encouraged their employees to join managed care plans (Miller & Luft, 1994a). To sustain their market share, indemnity insurance intermediaries that served these large employers have become increasingly involved in managed care health care, including HMOs, preferred provider

organizations (PPO), point-of-service (POS), or managed fee-for-service plans. In spite of the lack of empirical studies, information obtained from the survey tends to link HMO enrollment growth to changes in employer-sponsored health benefits (Gabel, et al., 1988).

Taylor and Kagay (1986) summarized a poll conducted by Louis Harris and Associates in 1984 attributing the growth of HMOs and HMO membership to substantial improvements in HMO image with employers and physicians. Among corporate employers who offered an HMO option to their employees, employers who reported that at least 10% of their employees were enrolled in HMOs changed from 26% in 1980 to 45% in 1984. The perception of the cost-effectiveness of HMOs by employers was the main reason reported for HMO growth over this period of study. Taylor and Kagay suggested an increasing attractiveness of prepaid practice to consumers during a period of rising health insurance premiums and cost sharing.

Gabel et al. (1988) analyzed the data from the Health Insurance Association of America (HIAA) survey conducted in 1987. These scholars discovered that among employees with group health insurance, 16% were enrolled in an HMO and 11% were enrolled in a PPO, compared to 4% of the enrollees in either an HMO or a PPO plan surveyed by the Bureau of Labor Statistics in 1981. Managed care enrollment growth was attributable to (a) an increasing number of employers who offered a choice of managed care plans to their employees; and (b) an increasing and substantial proportion of employees selected managed care plans when making selection among choices. As to firm size, public and larger employers were more likely to offer an HMO option to their

employees. Over 62% of large firms offered an HMO plan, compared to 14% of small firms and 33% of mid-sized firms. As firm size increased, employees were less likely to select an HMO plan when it was offered along with conventional and PPO plans. In addition, HMO enrollees were found more concerned about the cost of health care, while conventional subscribers valued their relationship with their physician. As to favorable selection, the HIAA survey in 1988 found that the proportion of employers who thought HMOs enroll younger, healthier population was substantially higher than in 1987 (Gabel, DiCarlo, Fink, & deLissovoy, 1989).

The HIAA survey in 1991 (Sullivan, Miller, Feldman, & Dowd, 1992) documented that more employees were enrolled in managed care plans than in conventional health plans. Fifty-four percent of employees joined managed care plans (25% in HMOs, 22%t in PPO, and 7% in POS), compared to 49% (20% in HMOs, 24% in PPO, and 5% in POS) in 1990, 33% in 1989, and 29% in 1988. The proportion of employers who offered HMO or managed care plans was higher among large firms. In contrast to the finding in 1987 (Gabel, et al., 1988), employees in larger firms were more likely to select HMOs. KPMG Peat Marwick's 1992 survey also found that a majority of employees in firms with 200 or more workers joined a managed care plan (Gabel, 1992).

A 1985 study of strategies for controlling health benefit costs adopted by employers in Minnesota (Gifford, Feldman, Dowd, & Finch, 1991) used a two-stage least squares model to examine the probability of offering an HMO plan as one health benefit option. Consistent with the prior survey information (Gabel, et al., 1988; Sullivan, et al.,

1992), larger firms were significantly more likely to offer an HMO plan ($p < 0.01$). Unionized firms and firms with high health care premiums also carried significant and positive coefficients, indicating a higher probability of offering an HMO option.

Despite the fact that employers offered post-retirement health insurance to their retirees, it was unknown how many workers were promised benefits in the future, or the number of workers that actually received promised benefits. The issue here is called vesting, that is, the conditions under which a worker becomes eligible for retiree health benefits. Morrisey, Jensen, and Henderlite (1990) used the 1988 Employer Survey and Retiree Follow-up Survey conducted by HIAA to explore the above questions. By firm size, more than 60% of firms that had more than 100 workers offered post-retirement health benefits, compared to 21% of firms that had fewer than 100 workers. About 69% of employees in firms of 100-999 workers and 80% of those in firms of 1,000 or more workers were promised retiree coverage. Among all retirees covered by employer-sponsored post-retirement health insurance, 94% had retired from a firm with 1,000 or more employees. Almost 80% of retirees promised post-retirement health insurance had benefits' pledges identical to the coverage for active workers. One may expect that if HMO options are offered to active workers, the same options would be made available to retirees, in spite of retiree mobility. For a Medicare risk HMO, retirees promised post-retirement health insurance by companies which offer HMO options to their active workers represent potential to increase the number of enrollees under risk contracts.

Based on a 1993 survey conducted by Hewitt Associates, Greenwald (1994) observed that 91% of 123 major U.S. companies offered gatekeeper plans (POS, HMOs, POS-HMOs) to active employees, only 63% offered these options to early retirees, and 51% offered them to retirees aged 65 or over. Only five companies in the survey reported that their largest number of post-65 retirees were in gatekeeper plans. The survey also found that fewer companies than expected were aware of HMO programs aimed at retirees. Companies with more than 10,000 employees were more familiar with Medicare risk contracts.

In addition to pressure from skyrocketing health care costs and a growing pool of retirees, the new Financial Accounting Standards Board rule, No. 106 (FAS 106) has pushed employers to reconsider and ensure funding of their retiree health benefits (Barr, 1993; Koco, 1992). As of January 1, 1993, FAS 106 requires that employers who offer retiree health care benefit set aside funding for the projected health care costs of their future retiree population as well as to cover eligible retirees. This new regulation has imposed a greater degree of financial burden on giant companies who have a larger employee/retiree pool with future-promised health benefits.

Companies are making changes in their retiree benefit policies by requiring their retirees to pay more of the premium (Shea & Stewart, 1994) or expand the use of managed care plans (Morrisey, 1993; Wise, 1995). Responding to this regulation change, some HMOs have expanded to the retiree health care market (Koco, 1992). Medicare risk HMOs declare their ability to reduce employer's cost and liability under FAS 106

(Hammer, 1995), which appears to be the biggest lure of a Medicare risk HMO. It is believed that more companies, especially big ones, will look at coverage under risk contracts as an optimal supplement for their pensioners (Greenwald, 1994; Wise, 1995). Though it is far from clear to determine, merely based on anecdotal evidence, what the combined impact of rising health care cost and FAS 106 will have on employer-sponsored retiree health benefits or on HMO enrollment, the future looks promising that more companies will offer managed care plans to their retirees.

Summary of Payer: Employer

To summarize, several trends are observed. Larger firms are more likely to offer an HMO option to their active employees (Gabel, et al., 1988; Gifford, et al., 1991; Sullivan, et al., 1992), and employees in larger firms are more likely to enroll in an HMO plan if offered (Sullivan, et al., 1992). Enrollment in HMO plans by employees with group health insurance is increasing (Gabel, et al., 1988). As to post-retirement health insurance, larger firms are more likely to offer retirement benefits (Morrisey, et al., 1990). The majority of retirees who actually receive retirement benefits have retired from larger firms. Compared to benefits offered to active workers, managed care plans are less available to retired workers. However, a legitimate expectation is that FAS 106 opens a door for HMOs to employer-sponsored retirement health insurance business (Greenwald, 1994; Wise, 1995).

Supplier: Physician

The third group of HMO stakeholders is physicians. Physicians control 80% of the resource input decisions in the health care industry (Eisenberg, 1986, p. 3) and are definitely pivoting players. Historically, HMOs have experienced difficulty in recruiting physicians because of the perception of inferior quality care rendered by HMOs (Taylor and Kagay, 1986). In addition, a significant loss of professional autonomy and independence in organized settings such as HMOs has been perceived by physicians (Linn, et al., 1985; Lichtenstein, 1984). Though the concept of managed care is still unpleasant to and not philosophically supported by physicians, physicians feel forced to associate with managed care organizations out of financial survival (Berenson, 1991; Jensen, 1991). Contracting physicians have begun to accept reduced reimbursement in exchange for increased numbers of patients. Physician recruitment remains a challenge confronting HMOs (Fisher, Smith, & Pasternak, 1993). This section will discuss the supply and demand sides of physician-HMO dynamics, though limited research is available.

As part of a comprehensive effort to analyze the development of HMOs, one research team interviewed physicians and representatives of HMOs to understand the interaction in the Twin Cities, Minnesota (Kohrman, 1985). It was recognized that the impact of physicians and HMOs on each other was reciprocal. In other words, resistance from physicians was partly responsible for the slow growth of HMOs; yet, as more physicians were associated with HMOs, the HMOs gained more competitive power and

then more physicians joined. In general, primary care physicians felt more powerless and confronted irresistible pressures to join HMOs. Specialists were less cooperative because they knew that their services were needed. One important source of strength for an HMO's growth was the development of strong multispecialty group practices which socialized physicians to work cooperatively and offered a simultaneous source of leadership and competition. Proactive physician leadership alleviated among physicians the worry of bureaucracies managed by nonphysicians. In spite of the concern regarding potential change in practice behavior and decline in income, physicians who joined HMOs were unwilling to leave HMOs because of the competitive pressure (Kohrman, 1985). Additionally, it was noted that the greater the HMO penetration, the greater the impact on physicians. One should be cautious regarding the generalizability of these findings from a case study, especially in Minnesota where HMOs have early development compared to the rest of country.

Goodman and Swartwout (1984) assessed socioeconomic differences between four physician practice modes: solo FFS, group FFS, IPA, and prepaid group practice (PGP). HMO practice modes included IPA and PGP. It was found that physicians in PGPs were younger than their FFS counterparts. There were twice as many female physicians in a PGP as in any other practice form. Three fourths of physicians in group FFS, IPA, and PGP practices were board-certified, compared to 55% of the physicians in solo FFS practice. It was observed that HMO physicians were in the areas with a high

physician-to-population ratio and high per capita income, suggesting that physicians responded to supply surplus by joining HMOs.

In the early 1980s, Wisconsin experienced a dramatic change in how the state sponsored employee health insurance benefits. With the fear of losing patients, the majority of physicians in Dane County formed new HMOs or joined existing HMOs. Schulz, Scheckler, Girard, and Barker (1990) directed a survey in Dane County to examine what factors affected the level of support for HMOs among physicians. Compared to specialists, primary care physicians was more supportive of HMO development ($p < 0.05$). The finding that a large number of HMO patients treated by a physician was positively related to HMO support ($p < 0.01$) was expected, since surveyed physicians declared the main reason for associating themselves with HMOs was to keep their patients.

Jacobs and Mott (1987) conducted a survey in February 1986 to determine the physician characteristics HMOs considered important in recruiting and hiring. Board certification and/or eligibility was considered very or somewhat important by all of the respondents. Over 90% of the respondents indicated the following criteria very or somewhat important: the physician's motivation and bedside manner, adaptability to the changing environment, ability to work in a team, the reputation of residency program, being trained in an American medical school, and ability to relate to nonphysician staff. The least important were the physician's age and gender balance on the HMO staff.

To study HMO physician staffing patterns, Dial, Palsbo, Bergsten, Gabel, and Weiner (1995) surveyed staff or group model HMOs in December 1993 which were members of Group Health Association of America (GHAA). IPA and network model HMOs were excluded because obtaining accurate data on both clinical staffing and the population they served were difficult. HMOs that held any Medicare contract were found to have lower full-time-equivalent (FTE) median physician-to-member ratios and FTE primary care physician-to member ratios than those that did not. An explanation may be that Medicare members only constituted a small share of total enrollment of HMOs that had Medicare contracts. However, Medicare enrollment as a percentage of total enrollment was correlated with the number of FTE physicians per 100,000 members (correlation $r = 0.55$). Medicare HMOs maintained a much higher ratio of FTE primary care physician to total FTE physicians than non-Medicare HMOs. HMOs added about one and a half to two times as many primary care physicians to care for Medicare members as for an equal number of non-Medicare members. The other finding related to staffing patterns was that an inverse relationship was found between nonphysicians per primary care physician and primary care physicians per 100,000 members. The use of nonphysician providers, especially advanced practice nurses (APNs) and physician assistants (PAs), was one HMO strategy to control costs. No further exploration was done regarding the use of nonphysician providers and Medicare contracts. In addition, a main criterion that HMOs used to determine clinical staffing needs was planned enrollment growth.

Summary of Supplier: Physician

Partly due to physician's self interest and partly due to an HMO's recruitment efforts, physicians who join HMOs are younger and board-certified and practice primary care. Participation in HMOs could be the response to competition resulting from a physician surplus. It is expected that the growth of managed-care organizations will result in increased job opportunities for primary care physicians and fewer positions for specialists (Physician Payment Review Commission, 1995). A recent trend also suggested that senior medical students expressed increased interest in primary care. Age and gender are not important attributes of physicians when being recruited by HMOs. As to provider composition, nonphysician providers are used by HMOs as physician substitutes. To accommodate Medicare beneficiaries, HMOs with any Medicare contract have more primary care physicians as a percentage of total physicians. Only descriptive trends have been studied which leaves the importance of group practice open to empirical testing.

Summary

Literature on HMO development constantly finds that a large population base and high community receptivity significantly favor HMO development (Christianson, et al., 1986; Cromley & Shannon, 1983; McNeil & Schlenker, 1975; Morrisey & Ashby, 1982; Welch, 1984). Built on the research of HMO development, few studies have been done to investigate factors related to the entry of an HMO into a Medicare risk contract and

confirm the significance of the general elderly population and the elderly immigrant population on an HMO's market entry (Adamache & Rossiter, 1986; Porell & Wallack, 1990). One study of HMO enrollment choice found that foreign-born Americans are more likely to join HMOs (Siddharthan, 1990). The importance of HMO attributes and market structure have also been explored but are not constantly found to be influential, which may be due to a small sample size and inconsistency in model specification. However, a high AAPCC rate is invariably an encouraging factor for market entry (Adamache & Rossiter, 1986; Porell & Tompkins, 1993; Porell & Wallack, 1990).

Though in the literature on both HMO development and the entry into a Medicare risk contract the effect of the income level is contradictory (McLaughlin, 1987; Morrisey & Ashby, 1982; Porell & Wallack, 1990; Welch, 1984), empirical studies of HMO enrollment choice by Medicare beneficiaries tend to suggest that low income beneficiaries are more likely to be HMO members (Dowd, et al., 1994; Siddharthan, 1990). This disparity may occur because the variability of the income measured on the individual beneficiary level declines when aggregated to a higher, market level, resulting in an insignificant coefficient. It is also possible that the relationship between income level and HMO enrollment is bimodal. Low income beneficiaries are covered under Medicaid and high income ones can afford supplemental insurances. Both have less financial incentive to join HMOs, and historically the Medicaid-eligible elderly have not had an option to choose an HMO.

The effect of employer group has not been considered substantially nor statistically important on both HMO development and market entry studies done in the 1970s and early 1980s. However, descriptive survey results provide indirect evidence that large employers are critical to HMO enrollment. Large firms offer HMOs a potentially sizable population of enrollees or rollovers after becoming eligible for Medicare, especially with FAS 106 accountability (Gabel, et al, 1988; Gifford, et al, 1991; Morrisey, et al, 1990; Sullivan, et al, 1992).

Descriptive information tends to suggest that competition among physicians force them to affiliate with HMOs and, in turn, contribute to HMO growth (Goodnam & Swartwout, 1984; Kohrman, 1985; Schulz, et al, 1990), though it is not consistently supported by empirical studies (Adamache & Rossiter, 1986; Cromley & Shannon, 1983; McLaughlin, 1987; Porell & Wallack, 1990). The influence of physicians or, particularly, group practice, on an HMO's market entry requires further empirical investigation.

No single study is able to include a comprehensive set of factors affecting a market entry or diversification decision partly because of data limitations and research interest. Chapter 3 will develop a resource dependence framework to identify theoretically important dimensions for the entry of an HMO into a Medicare risk contract. Due to insufficient empirical exploration in an HMO's strategic planning, literature on diversification will be reviewed to help understand the factors influencing an organization's strategic response to resource dependence, that is, decision for the entry of

an HMO into a Medicare risk contract. This resource dependence-diversification conceptual model is used to formulate hypotheses, incorporating measures that reflect the consistent or contradicting findings from studies reviewed in this chapter.

CHAPTER 3

THEORETICAL FRAMEWORK

The conceptual framework for this analysis is based on a resource dependence perspective (Pfeffer & Salancik, 1978) and a general framework of diversification (Ramanujam & Varadarajan, 1989). The resource dependence perspective contends that organizations are dependent on environments for obtaining resources to survive. The aspiration of survival compels organizations to respond to environmental changes through internal or external adjustments, though they desire to sustain their autonomy. This aspect of resource dependence is particularly relevant in explaining why, in response to the dynamics of a competitive market structure, an HMO diversifies into a Medicare risk market in which HMOs confront many constraints to provide coverage for the elderly. A general model of diversification is modified to complement the resource dependence perspective in order to explain how environmental munificence and organizational strengths can affect a decision of an HMO to diversify into a Medicare risk market.

Resource Dependence Theory

Resource dependence theory proposes that an organization's survival is contingent upon its ability to gain control over environmental resources. A major assumption in resource dependence theory is that organizations cannot internally generate

all the resources necessary to accomplish the tasks of the organization. Therefore, organizations must interact with the environment in order to generate resources needed for survival.

From the resource dependence perspective, organizations are viewed as being able to change to meet environmental requirements, or act to alter the environment so that it fits the organization's capabilities (Pfeffer & Salancik, 1978, p. 106). For the first type of adaptive changes, one key question is how organizations can achieve stability and reduce uncertainty without increasing dependency on other organizations (Gray & Wood, 1991). Thompson (1967, pp. 66-82) argues that organizations behave rationally and seek to seal off, or buffer their technical core from environmental influences. Such intraorganizational responses include several buffering strategies that are aimed at reducing uncertainty for the technical core (Scott, 1992, p. 195).

For the second type of adaptive changes, the key question asked is under what circumstance organizations will adopt external linkages (Gray & Wood, 1991). Different from intraorganizational responses, interorganizational responses, or bridging strategies, involve establishing external linkages with other organizations to modify the organization's environment. These adaptive responses are viewed as organizations' attempt to strategically manipulate their environment. Another form of environmental transformation (or modification) occurs through the development of diversification. Pfeffer and Salancik (1978, p. 107) view diversification as a more radical form of avoiding dependence Cook, Shortell, Conrad, and Morrisey (1983) develop a similar

argument that faced with regulation hospitals have incentives to reduced the use of "taxed" resource by making compensatory changes in the unregulated resources. The risk of remaining in existing markets in which resources are relatively scarce increases the need to expand operations into new markets to reduce dependencies on existing domains (Hannan & Freeman, 1977). Thus, organizations engage in diversification into markets with more munificent environments, or excess capacity in order to balance overall risk (Thompson, 1967, pp. 46-47).

Kotter (1980) asserts that external dependence can be managed through organizational choice of what outputs to produce. Organizations can carve out environmental niches where little or no competition exists. They can also diversify their current domains in the form of vertical integration, geographical expansion, or development of new products and services. Kotter also recognizes that not all organizations use the same approach to managing external dependence due to internal or external constraints. For example, some organizations maintain more resources that can be used to expand or change a domain.

While organizations desire to maintain their autonomy and remain relatively independent of their environment, they also recognize the need to form certain networks to pool resources. The disadvantage of developing an interdependent relationship is loss of autonomy. Thus, organizations only develop interdependencies that are necessary for survival. If the expected benefit from resource exchange outweighs the loss of autonomy,

organizations will enter into exchange. Entering into exchange relationships is one method of acquiring needed resources.

Resource dependence argues that environmental pressure, such as competition, regulation, and social forces, will lead organizations to pursue external linkages (Boyd, 1990). When the environment is considered as a stock of resources, the basic concept is dependence (Aldrich & Pfeffer, 1976). An organization's dependence on the environment is determined by several factors (Pfeffer & Salancik, 1978, pp. 46-51). One factor is the importance of the resource to organization's operation. A resource that is not important to the organization cannot be considered part of a situation of dependence. The availability of resources is a second factor determining the organization's dependence on the environment. Organizations that require scarce resources are very dependent on the environment. If there is a large supply of the needed resources from a variety of organizations, the focal organization will not be particularly dependent upon any of them. Along with the availability of resources, the third factor is the concentration of control over the resources. If resource allocation is controlled by few organizations, or the extent to which input or output transactions are made by a relatively few significant organizations, which have a monopoly of it, the dependence of the focal organization on the environment is great. General propositions state that an organization's dependence is positively related to increased importance, decreased availability, and increased concentration of the resource. Furthermore, Cook (1977) adds that the availability of

alternative resources increases an organization's power and autonomy by decreasing its dependence upon other organizations.

In the HMO sector, if resources in traditional markets are relatively scarce or the competition is perceived high, an HMO's dependence on its environment is high. Resource concentration in commercial markets also leads to a dependence situation. To avoid environmental dependence, HMOs could diversify into a Medicare market, especially when resources in the Medicare market are perceived as abundant in relation to the commercial market.

Conceptualization of Environment as a Pool of Resources

Resource dependence theory views the environment as a pool of resources, and the degree of resource abundance is called environmental munificence. Specht (1993) provides an extensive review of environmental resources cited in the organization formation literature. Along with the following discussion on diversification that can be defined as the entry of a firm or business unit into new lines of activity, it is justified to apply Specht's work to resource conceptualization on the issue of diversification or market entry.

Specht (1993) summarizes environmental resources into five categories: social, economic, political, infrastructure development, and market emergence. Firm formation is a positive function of social factors such as network, support of sociopolitical elites, and cultural acceptance. Under economic categorization, industrialization and household

income have positive effects on firm formation. Government support as a political force is found to have positive association with industry development. Education level, community size, and accessibility of suppliers and customers tend to support positive relationships with organizational infrastructure formation. Market emergence, such as niche development, and technological innovation also influence firm formation positively. Table 4 presents limited examples of description or operationalization for these factors from both empirical and descriptive literature (Bar-El & Felsenstein, 1989; Boyd, 1990; Bull & Winter, 1991; Gartner, 1985; Hamilton, 1989; Keats & Hitt, 1988; Manning, Birley, & Norburn, 1989; Romanelli, 1989; Whittington, 1984).

Conceptualization of Diversification

There does not exist a general theory of diversification. Diversification as a corporate strategy appears to be justified based on some related themes. Diversification is considered as a means to achieve growth in profits, size, sales, and assets (Chenhall, 1984; McDougall & Round, 1984); it enables firms to capitalize on economies of scales. Another motivation in pursuing diversification activities is to reduce an organization's susceptibility to the risks inherent in its current line of activities (Ward & Krentz, 1988). Through diversification an organization's resources can be allocated to new activities which, either directly or indirectly, contribute to the mission of the organization. Thus, diversification should ensure the stability of the organization's overall cash flows.

Table 4

Examples of Environmental Resources

Social: community attitude (Bull & Winter, 1991; Gartner, 1985)
- number of survey responses
- number of days until the survey response
- number of related articles in newspaper

Economic (Bar-El & Felsenstein, 1989; Bull & Winter, 1991; Hamilton, 1989; Whittington, 1984)
- unemployment rate
- percentage change in unemployment rate over the previous year
- per capita income
- capital per worker

Political (Gartner, 1985)
- support of government

Infrastructure Development (Bar-El & Felsenstein, 1989; Boyd, 1990; Bull & Winter, 1991; Gartner, 1985; Hamilton, 1989; Keats & Hitt, 1988; Romanelli, 1989; Whittington, 1984)
- % of population by race
- % of 65 years of age or over
- % of migrants, % of immigrants
- % of population with 12 years or more
- % of highly educated and skilled labor to total labor
- % of firms by size
- proportion of expenses on R & D from total revenue in the industry
- Market opportunity/competition
  - the presence of large local organization
  - the growth in industry sales over a 5-year period
  - the three-year average of percentage changes in sales
  - the Herfindahl Index
  - the three-year average of percentage changes in four-large firm sales
  - concentration ratio

Market Emergence (Bull & Winter, 1991; Gartner, 1985; Manning, et al., 1989; Romanelli, 1989)
- niche emergence
  - market segments engaged (specialist vs. generalist)
- Technological innovation
  - presence of high quality universities, research institutes
  - number of 4-year colleges within 20 miles

There is a great deal of variation in how diversification is defined. In research done three decades ago, industry or market boundaries are used to conceptualize diversification. For example, Gort (1962) defines diversification as heterogeneity of products in terms of the number of markets served by that product. Two products are considered to serve different markets if their cross-elasticities of demand are low. According to Berry (1975, p. 37), diversification is perceived as an increase in the number of industries in which firms operate. Kamien and Schwartz (1982, p. 74) define diversification as the extent to which firms classified in one industry have products classified in another industry.

In contrast to these early definitions of diversification, Pitts and Hopkins (1982) use "business" to define diversification as the extent to which firms are active in different businesses simultaneously. Three different approaches to defining business are resource independence, market discreteness, and product difference. Abell (1980, p. 169) uses a different three-dimensional framework to define business: customer functions (needs) a firm seeks to satisfy, customer groups it targets, and technologies it uses to satisfy the customer function.

In the view of Ansoff (1957), diversification represents the entry of firms into new markets with new products. A broader definition of diversification is inclusive of the goals of diversification, its direction, and the means by which it is achieved. A Booz, Allen, and Hamilton study (Booz, Allen & Hamilton, 1985) incorporates the multidimensional nature of the diversification phenomenon and defined diversification as

a means that firms adopt to improve growth and/or reduce overall risk. Diversification may take the form of new products, services, customer segments, or geographic markets. It may be accomplished, for example, by internal development, acquisitions, joint ventures, or licensing agreements.

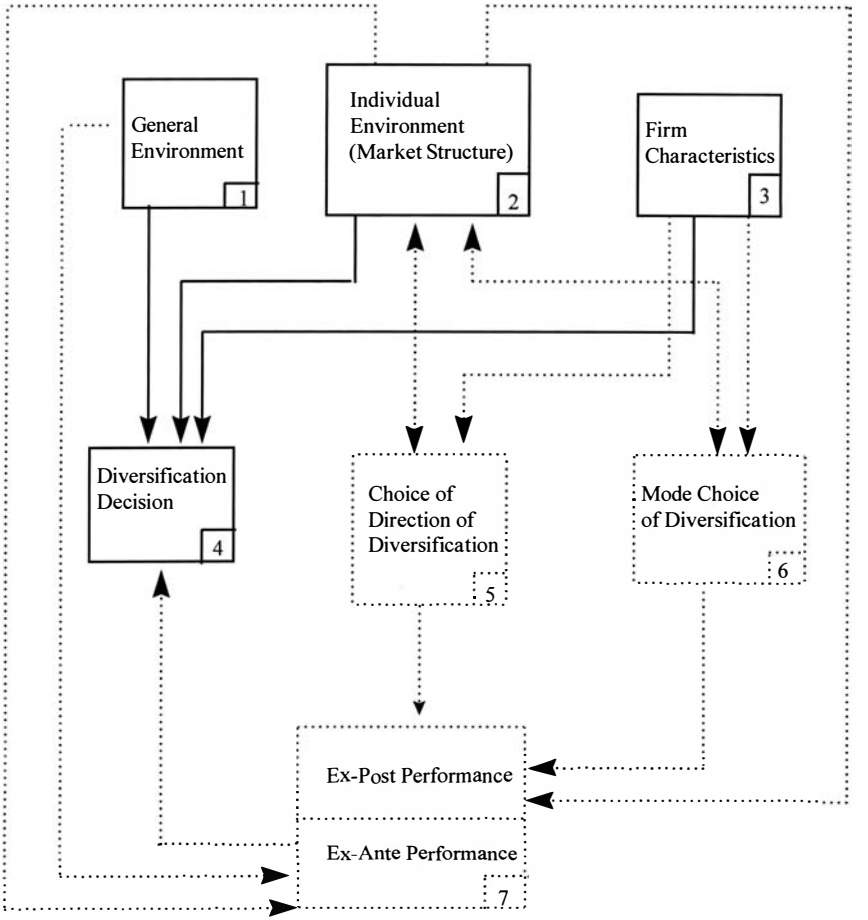
Most health care organizations when seeking to diversify still focus on health related activities. A similar purpose of diversification within the health care industry is to obtain more control over entry points (Ward & Krentz, 1988). Hospitals, for example, are traditionally involved in acute, inpatient business. Diversified businesses, such as an ambulatory care center, subacute care units, and home health care, help hospitals assure efficient throughput in the acute care segment and then control patient flow.

Likewise, HMOs may diversify in order to cover more lives. HMOs have developed an integrated set of managed care options incorporating self-referral options (Gold, 1991). HMOs also have engaged in geographical diversification, expanding from urban to rural areas (Christianson, et al., 1986). On the dimension of the product or service package, HMOs can penetrate into a long-term care business through social HMOs (S/HMOs) (Taylor, 1993), or diversify from a non-Medicare market to a Medicare market through a risk or cost contract.

Ramanujam and Varadarajan (1989) define diversification as "the entry of a firm or business unit into new lines of activity, either by processes of internal business development or acquisition, which entail changes in its administrative structure, systems, and other management processes." These scholars develop a framework for classifying

research on diversification. Only elements of their original framework which are relevant to a diversification decision are depicted in Figure 9. Boxes 1 to 3 portray general environment, market structure, and firm characteristics. Boxes 4 through 6 denote the diversification decision, choice of diversification direction, and mode choice of diversification. Box 7 represents firm performance. Four elements that reflect diversity status and diversity management are excluded from Figure 9, since these elements are subsequent to the choice to diversify.

The starting point of research on diversification is to understand the factors that influence a firm's decisions to diversify (box 4). As shown in Figure 9, four categories of factors have received particular attention in the literature: the general environment (legal, political, economic, technological, social, or ecological), the industry's competitive environment, a firm's characteristics, and a firm's performance. Once a firm decides to diversify, the next issue is in which direction to diversify (box 5). Diversification that is aimed at realizing technological and marketing synergies is commonly described as related diversification. Diversification that is to obtain vertical economies or reduce cost is considered unrelated diversification. Hill and Hansen (1991) define related diversification as operation in several segments within an industry; unrelated diversification is operation across industries. Salter and Weinhold (1981) state that related diversification through acquisition involves entering into new markets where a firm is able to use its existing resources, while unrelated diversification engages in new business with key factors unrelated to existing activities.



Source: Adopted from "Research on corporate diversification: A synthesis," by V. Ramanujam and P. Varadarajan, 1989, Strategic Management Journal, 10 (6), p. 526.
Note. Solid line: incorporated in the conceptual model; dotted line: not incorporated in the conceptual model.

Figure 9. Research on Diversification: Themes and Linkages.

Box 6 concerns the mode of diversification. Two extreme modes are internal development versus acquisition or merger. In developing an acquisition screening system, Salter and Weinhold suggest that acquisition is more attractive unless firms have both organizational and technological features for successful diversification through internal development.

Only boxes 1 to 4 are included in this analysis, reflected by solid lines in Figure 9. An HMO's diversification into a Medicare risk market (box 4) is influenced by resource availability in the general environment and capitation rate (box 1), competitive structure in both non-Medicare and Medicare markets (box 2), and the HMO's attributes (box 3).

Literature on Diversification

Few empirical examples of diversification exist in health care, and none relate to the discussion of HMOs to diversify into new product lines such as Medicare risk contracts. This section will review literature on diversification in non-health care industries.

To understand the formation of diversifying strategy, mainly acquisition, in the tobacco industry in the United States, Miles (1982, pp. 154-195) conducted interviews with three tobacco companies in the mid-1980s. Catalytic factors in the strategy to diversify indicated by executives included a decline in industry growth rate, market-share erosion in traditional business, and risk from smoking-and-health controversy. Tobacco companies also mentioned a need to reinvest excess cash from traditional business. As to

acquisition criteria, two types of businesses were most often targeted: those growing and profitable in the industry and businesses that promoted synergies or economies. Though qualitative information obtained from an interview study is limited in establishing association between motives and diversification decisions, it provides a sound foundation on which future empirical study can be based. One can expect that market structure such as growth opportunity across the industry and market share of the individual organization would influence diversification decisions.

In an effort to compare diversifying and nondiversifying Australian firms, McDougall and Round (1984) asked firms to identify the major reasons behind their diversification decisions. The most popular reasons cited were "reduction in firm's risk" and "suitable opportunity arising." Other common motivating factors included "poor growth prospects in traditional markets," "strong cash flow from traditional activities," and "difficulties in maintaining market share in traditional markets." This qualitative study suggests that both market opportunity and the perception of "risk" encourage firms to diversify. However, operationalization of these motivators requires empirical exploration.

Chenhall (1984) interviewed senior executives based on a structured format and applied a liner discriminant model to investigate the extent of diversification among 75 Australian manufacturing companies. A factor analysis was employed to derive latent constructs. High diversification was significantly related to several organizational attributes such as large firm size and sophisticated marketing. It was explained that firm

size acted as a surrogate for a wide variety of factors such as economic power, innovative efforts, or an ability to attract resources and to enter capital intensive industries. Marketing strength enhanced a firm's capacity to develop new products. A firm's age also served as a surrogate variable, reflecting managerial conservatism or stocks of knowledge and experience. Because of these counterbalancing interpretations, an association between firm's age and diversification was not observed.

Organizational goals were also significantly associated with high diversification, especially those goals that achieved favorable portfolio risk adjustment and concerned product innovation in the area where potential demand for new products were promising. One unexpected finding was that goal of growth in size did not appear influential. As to strategic orientation, a proactive-aggressive orientation, as opposed to a reactive-defensive mode, was related positively to high diversification. A restricted environment induced firms to search for alternatives. Contrary to the expectation that unpredictable environmental conditions urged organizations to diversify, an association between environmental uncertainty and high diversification was not evident.

This study pointed out the differential importance of various organizational goals as well as strategic planning orientation (proactive versus reactive) on the extent of diversification. However, information on both organizational goals and strategic orientation is not generally available unless a specific survey is conducted. Lack of such information may explain the exclusion of these two sets of variables from most of the empirical studies on diversification.

Mitchell (1989) examined the probability of diagnostic imaging manufacturers' entry into emerging industrial subfields such as nuclear medical imaging. The study sample consisted of 436 firms manufacturing x-ray and electrodiagnostic instruments before the emergence of the nuclear medical imaging subfield. A firm that possessed more industry-specialized assets was hypothesized to have competitive advantages over firms lacking them. The specialized firms would be more likely to enter an emerging subfield. Three variables reflected industry-specialized assets: possession of a direct distribution system, industry experience, and industry market share. The direct-distribution-system was 1 if a firm used direct distribution, and 0 if it used independent sales representatives. To measure industry experience, the year that a firm began its diagnostic imaging business was subtracted from the year that products in a new subfield were first sold. Industry market share was measured by the firm's share of sales during the year before a new subfield emerged. The results from a logistic regression confirmed the predicted positive association; the coefficients of firm's market share ($p < 0.05$) and possession of direct distribution system ($p < 0.01$) were statistically significant. Compared with firms that used independent sales representatives, firms with a direct distribution system were 19 times more likely to enter into new imaging-industry subfields.

A second hypothesis concerned the effect of competitors on market entry (Mitchell, 1989). It was predicted that the more firms that possessed industry-specialized assets in the market, the less likely an industry incumbent was to enter an emerging

subfield. Potential rival was defined as the number of multiple-subfield incumbents during the year before a subfield emerged, since this measure was positively correlated with possession of specialized assets. A significantly negative coefficient ($b = - 0.48$, $p < 0.05$) was observed.

Several covariates were also included. The size of market for imaging products was measured by aggregate sales in the first seven years and had a statistically significant and negative effect. Firm size was recorded as the natural log of firm sales during the year before a subfield emerged. The negative, though insignificant, effect of firm size seemed to confirm that a large firm sustained bureaucratic inertia (Mitchell, 1989). One opposite argument was that by entering into a subfield large firms could reduce their risk through obtaining diversification economies or spreading costs. The coefficient of experience with similar products was found to be positive but not significant.

Hill and Hansen (1991) adopted a risk avoidance view of diversification to examine the cause of change in diversification in the U.S. pharmaceutical industry. A pooled time-series methodology was used to analyze the data. The change in diversification was measured by the ratio of the entropy indices of diversification at two points in time. The entropy index was comprised of two components, related and unrelated diversification. A firm's asset beta reflected its business risk; a high asset beta indicated that a larger proportion of a firm's income depended on few major products. Current ratio represented a firm's ability to afford diversification. These two variables were found to be positively significant at the p value of 0.05 or lower. Diversification

was also a negative function of the market to book value ratio. A low ratio conveyed a negative signal and motivated the firm to diversify. These results suggested that diversification by pharmaceutical firms was an attempt to reduce risk. Both R & D intensity (measured by R & D expenditure divided by total firm sale) and advertising intensity (measured by advertising expenditure divided by total firm sale) were anticipated to impose competing claims on the funds available for investment and proved to have a negative sign ($p < 0.01$).

To investigate the entry of United Kingdom banks into a wide range of financial service markets after the financial system was deregulated, Ingham and Thompson (1995) took a resource-based view of the firm to establish an entry model. The resource-based theory argued that the extent of diversification was related to the relative abundance of firm-specific assets relevant to the provision of the new products. Forty-seven banks and 13 new financial products yielded 611 entry decisions as the study sample. A set of firm-specific assets were anticipated to produce economics of scope and then generated positive coefficients. Firm size was measured by total assets and carried a significantly positive sign. However, the square of size had a significantly negative coefficient. This finding reflected an inverse U-shape relationship between firm size and diversification decision.

Other firm-specific assets such as brandname capital (measured by advertising expenditures divided by size) and branch network (measured by number of branch divided by size) attracted significantly positive coefficients, indicating that possession of

these assets encouraged diversification. Human capital asset, another variable for firm-specific assets, was measured by headquarters employee numbers divided by size and carried a statistically significant and negative sign. It was possible that headquarters staff numbers failed to be a good proxy for relevant human capital assets (Ingham & Thompson, 1995).

This banking study sheds light on the significance of firm-specific assets on diversification. Firm-specific assets are defined by several variables, some of which are pertinent to the health care industry or, particularly, the HMO sector. Brandname capital may be parallel to the community receptivity of an HMO concept, or specifically analogous to an HMO's commercial enrollment. The size of the physician network in an HMO shares a similar meaning with the size of the branch network that represents selling force.

Summary of Literature on Diversification

To summarize, a firm's diversification or entry into a new market is a strategic response in order to spread or reduce a perceived risk such as a decline in industry growth, market to book value, and market share in traditional activities, or increased concentration of income sources. Internal specialized assets such as general experience (measured by age of a firm), experience in similar product/market, direct distribution system, sound financial performance, brandname capital, and branch network enhance a firm's ability to afford diversification and enable firms to capitalize on economics of scope (Hill & Hansen, 1991; Ingham & Thompson, 1995; Mitchell, 1989). Depending on

the driving force behind diversification, diversification is found to be a positive function of a firm's market share (Mitchell, 1989), while McDougall and Round (1984) and Miles (1982, p. 163) reported that market share erosion encourages diversification. Firm size, measured by total sales or total assets, has a positive, negative, or an inverse U-shape relationship with diversification decision (Chenhall, 1984; Ingham & Thompson, 1995; Mitchell, 1989). An aggressive strategic orientation is positively associated with high diversification (Chenhall, 1984). As to new market entry, firms tend to target a growing and profitable industry. Competition which is measured by the number of incumbents in the targeted industry discourages market entry in that industry.

Based on these diversification studies, one can expect that an HMO's entry into a Medicare risk contract will be motivated by a decline in enrollment growth rate across the HMO sector. A growing Medicare population enrolled in HMOs represents an opportunity and encourages an HMO's market entry. However, the high number of HMOs with Medicare risk contracts in the local market may discourage market entry. An HMO's market share in a non-Medicare market will be related to the market entry decision. Specialized assets, particularly those relevant to Medicare such as federal qualification and Medicare non-risk contracts, will influence an HMO's market entry favorably.

Conceptual Model and Hypotheses

The focus of this study will be placed on what factors influence HMOs to diversify their current operation in a commercial market to a Medicare risk market (boxes 1-4 in Figure 9). An assumption is made through this study that HMOs choose to remain independent. Only situations that threaten their survival and acquisition of resources in doing non-Medicare business will lead them to seek contractual relationships with Medicare as a diversification strategy. Meanwhile, abundance of resources in a Medicare market encourages an HMO's entry into a Medicare market. That is, the decision to participate in the Medicare risk program is conditioned on both an HMO's dependence on the non-Medicare environment and resource availability in the Medicare market. HMO characteristics also influence the diversification decision. Once participating as a risk contractor, the regulatory intensity for HMOs is considered great and the loss of control and autonomy is inevitable. HMOs have no control over basic service coverage and the reimbursement method for the risk contract portion of their business. They are restricted both in the premiums they are allowed to charge, and profits they are allowed to make in a Medicare business. In addition, administrative requirements and marketing activities of a Medicare business are very different from the commercial business. Furthermore, HCFA's oversight is burdensome in relation to patient control. Considering the differences in customers, control for reimbursement, administration, and regulatory process, the entry into a Medicare risk contract is not merely market expansion. Instead,

it is a different product targeted to a different consumer group. That is, HMOs decide to diversify into an elderly market as a new line of business.

In the HMO industry, members, including both the elderly and nonelderly, are definitely a critical resource for managed care survival. Other resources, such as capital for expansion to serve Medicare beneficiaries and favorable regulation, are also important. The decision to participate in Medicare risk contracting is rooted in the HMO's expectation of direct benefits from resource exchange, such as cash flow, enhanced image and negotiating power, and potential expansion, especially when HMOs face resource scarcity and uncertainty as well as competition. In the current investigation, HMO market entry is examined in terms of four dimensions: (a) competitive market structure, (b) resources in the general environment, (c) market price, and (d) firm characteristics. Figure 10 pictorially presents the conceptual model. In the subsequent sections of this analysis, the hypotheses, drawn from the literature and the model, are presented for these four areas.

HMO Competitive Market Structure

From the perspective of resource dependence, an organization's decision to enter a contractual arrangement will depend on the stability and availability of the environmental resources. Favorable market conditions such as those that promote stable and available resource supply will allow the organization to remain self-sufficient and autonomous (Alexander & Morrisey, 1988). Environmental capacity (Aldrich, 1979, p. 63), or munificence labeled by Dess and Beard (1984), refers to the availability of

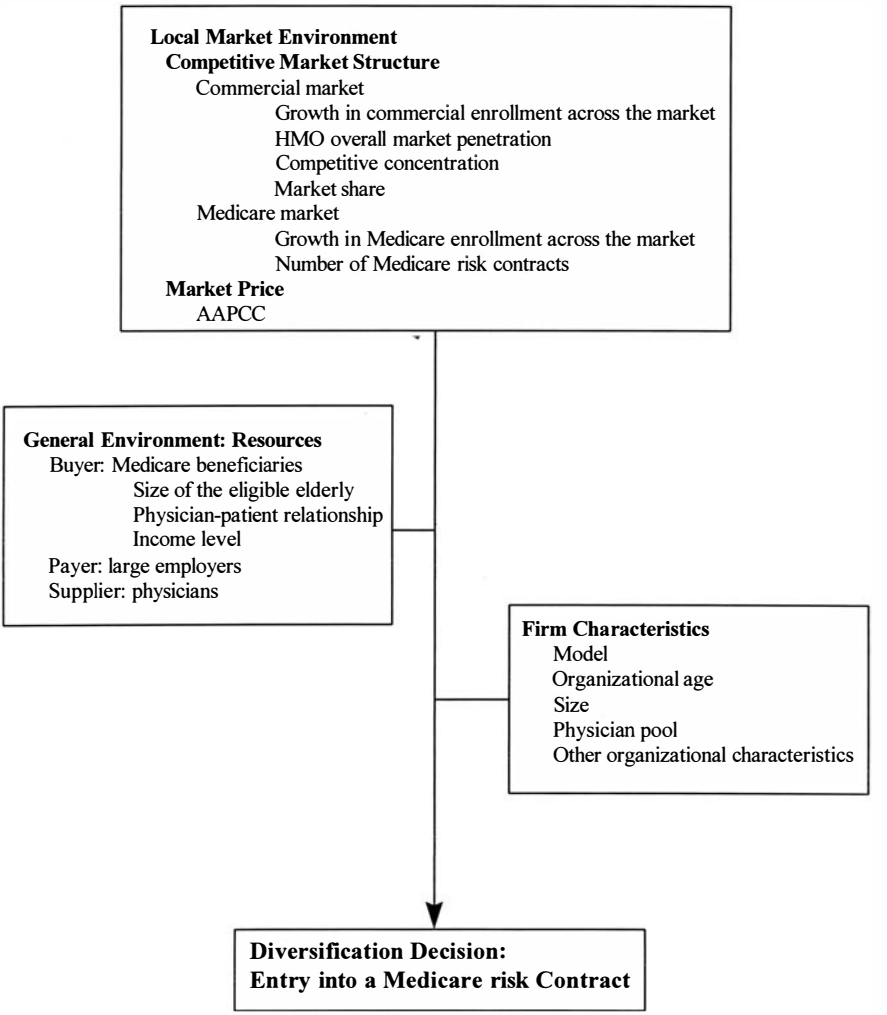


Figure 10. Conceptual Model of the Entry of HMOs into a Medicare Risk Contract.

environmental resources to support growth. According to Boyd (1990), munificence is defined as the relative level of resources available in an environment and is measured by growth at the industry level. Keats and Hitt (1988) used five-year average growth in net sales and operating income to measure munificence. They found that growth in existing markets had a negative, though insignificant, effect on diversification strategy. Boyd (1990) employed the same measure of munificence in 9 different industries and observed a significantly negative effect on environmental linkage activities. A decline in industry growth rate was earlier cited as one of facilitators to diversify (Miles, 1982, p. 163). Regarding an HMO's decision to participate in Medicare risk contract, there are two types of markets in which HMOs are operating and may consider to enter: commercial and Medicare markets. These are discussed in the subsequent sections.

Commercial or Non-elderly Market

Traditionally, HMOs have operated in the non-elderly market. Favorable conditions in this market can lead to industry-wide growth in HMO total enrollment. If the enrollment growth in the HMO industry as a whole is slow, the opportunities for an individual HMO to grow is limited so that the HMO is motivated to undertake strategic changes. One strategy HMOs can adopt is to modify their current domain by seeking other environment's niches (Kotter, 1980). The Medicare market provides them an opportunity to increase the lives to cover. Porell and Wallack (1990) found a low HMO market growth rate encouraged the entry into a Medicare risk contract. The hypothesis is,

H_1: Holding other variables constant, in a service area with low growth rate of HMO enrollment, an HMO is more likely to enter into a Medicare risk contract.

The overall market penetration reflects community receptivity, where many persons in communities have been exposed to HMOs. The concept of HMO care is more accepted by community members who are likely to consider HMOs when getting old through their experience with HMOs, or, due to word-of-mouth advertising (Garfinkel, et al., 1986; Harrington, et al., 1988). With different interpretation for HMO penetration, Wholey, Feldman, and Christianson (1995) argue that as HMO market penetration increases, competition among HMOs intensifies, since the HMO could not avoid competing with other HMOs in addition to the competition with indemnity insureres. U.S. General Accounting Office (1996) reported that HMO overall market penetration appeared to influence the market entry by HMOs, though exceptions existed. In either interpretation of HMO penetration (community receptivity or competition), high market penetration would encourage HMOs to enter into a Medicare risk market. Indirect evidence from Welch's (1996) study indicated that general HMO market penetration was the most important, positive factor in predicting HMO penetration in the Medicare market.

H_2: Holding other variables constant, in a service area with higher HMO penetration, an HMO is more likely to enter into a Medicare risk contract.

Market competition can be operationalized as resource concentration. According to Aldrich (1979, p. 68), concentration, as one of six dimensions of organizational environments, is the degree to which resources are evenly distributed over the environment. Competitive concentration will be interpreted as dominance by a local HMO over resources due to the definition of HMO's operating area used in this study, which will be explained in Chapter 4. A high level of competitive concentration reflects that, given the existence of other HMOs, a local HMO would be more dominant in its service area, and thus will be less motivated to diversify. The hypothesis follows that,

H_3: Holding other variables constant, in a service area where enrollment concentration is high, an HMO is less likely to enter into a Medicare risk contract.

The effect of market share of the individual organization on an organization's diversification decision has also been investigated (Adamache & Rossiter, 1986; Miles, 1982, p. 163; Mitchell, 1989; Porell & Wallack, 1990). Results from empirical studies on the individual organization's market share are mixed. One study in the diagnostic imaging industry (Mitchell, 1989) found a significant, positive effect of a firm's market share on diversification, while two studies in Medicare risk HMOs (Adamache & Rossiter, 1986; Porell & Wallack, 1990) reported a negative effect, insignificant or moderately significant. Thus, the significance of the individual HMO's market share rather than its sign is hypothesized.

H_4: Holding other variables constant, an HMO's entry into a Medicare risk contract is associated with its market share.

Medicare Market

In addition to non-elderly market structure, participation in the Medicare risk program also depends on the relative attractiveness of the Medicare market. The following discussion will focus on the competitive structure of a Medicare market. Similar to a non-elderly market, the appeal of the Medicare risk market to HMOs depends on the growth of HMO elderly enrollment across the market. A positive growth rate implies that HMOs can expect more Medicare beneficiaries to switch from the fee-for-service sector to an HMO plan. One descriptive study suggested that organizations targeted a growing business as one diversification criterion (Miles, 1982, p. 190). Therefore, it is hypothesized that,

H_5: Holding other variables constant, in a service area where the growth rate of HMO Medicare enrollment is higher, an HMO is more likely to enter into a Medicare risk contract.

Competition measured by the number of incumbents in a market discourages the entry of organizations into the market (Mitchell, 1989). Similarly, HMOs in a market where there already exist Medicare risk contractors are less likely to enter the market. In addition, the first HMO entering into the local Medicare market may enjoy a competitive advantage of establishing its niche and credibility (Bell, 1987; Langwell, et al., 1986). With different explanation, Wholey et al. (1990) argue that the number of HMOs reflects

the legitimacy of HMOs in the community. Along with this interpretation, the greater number of risk plans indicates a higher level of acceptance of the Medicare risk program by Medicare beneficiaries, and would encourage market entry. Since the expected effect is opposite from different interpretations, the relevance of the number of Medicare risk plans is hypothesized but not the direction of its effect.

H_6: Holding other variables constant, the number of Medicare risk plans in a service area is associated with an HMO's entry into a Medicare risk contract.

Resource Availability

The abundance of resources in a new market encourages diversification, or entry into the market. This section will focus on resources important to HMOs: buyers, payers, and suppliers (Whitehead, et al., 1989).

Buyer: Availability of Eligible Elderly Population

As the population ages, Medicare beneficiaries as a group will consume more health resources and dominate the health care market. The Medicare market could provide a huge pool of potential enrollees, which is important to an HMO's survival. Early studies documented that the proportion of the population aged 65 or over in an area was positively associated with an HMO's entry into a Medicare market (Adamache & Rossiter, 1986). Therefore, the hypothesis is:

H_7: Holding other variables constant, in a service area where the size of elderly population is large, an HMO is more likely to enter into a Medicare risk contract.

Despite the existence of an eligible elderly population, whether the elderly population will enroll in HMOs is subject to several factors, such as physician-patient relationship, health status, migration activity, income level, and other personal characteristics. The following will discuss the relative choice of Medicare beneficiaries to join HMOs.

Physician-patient relationship. The conventional belief is that people are less willing to switch their physicians to enroll HMOs if they are satisfied with their current physician (Garfinkel, et al., 1986). Davidson et al. (1992) observed a positive effect of a long-term physician relationship on HMO enrollment, which might be due to a rollover effect when enrollment occurred with a physician joining an HMO. Three factors that moderate a physician-patient relationship are discussed below: health status, gender, and migration activity.

Health status. There is research evidence showing that HMOs experience favorable selection in their enrollment of the general population (Luft, 1981) and among Medicare beneficiaries under a risk contract. (Brown, Bergeron, Clement, et al., 1993; Davison, et al., 1992; Eggers, 1980; Lichtenstein, et al., 1992; Wilensky & Rossiter, 1986), or neutral selection (Dowd, et al., 1994; Garfinkel, et al., 1986). Favorable selection might result from a patient decision or an HMO's skimming, that is, the HMO targets healthy segments of the Medicare market. Two conflicting arguments regarding

the effect of health status prevail. Persons who are in worse health and expect high utilization of medical care are more likely to enroll in HMOs with the desire to minimize their out-of-pocket expenses. Alternatively, individuals in poor health are more likely to have a consistent relationship with their physicians that they want to preserve. Due to data limitation on health status, no hypothesis regarding the effect of Medicare beneficiary's health status is proposed.

Gender. Past research also suggests that women are more likely to have a regular physician (Wilensky & Cafferata, 1983). Therefore, it would be expected that with a higher proportion of elderly women in a market area, the less likely HMOs will enter into Medicare market. However, gender has not been consistently found important in an enrollment decision among health plans (Davidson, et al., 1992; Dowd, et al., 1994; Garfinkel, et al., 1986; Siddharthan, 1990), nor in the entry of HMOs into a Medicare risk (Adamache & Rossiter, 1986; Porell & Wallack, 1990). Though inconclusive, the affect of gender should be controlled.

Migration activity. Another indicator of established ties to existing FFS physicians is the proportion of immigrants in a service area. Depending on time since immigration, an immigrant population that migrate from other countries to America is less likely to have a regular source of care due to sociocultural and language barriers (Chavez, Cornelius, & Jones, 1985; Quesada & Heller, 1977). Chi-square statistics indicated that among Medicare beneficiaries a higher percentage of foreign-born American or immigrants enrolled in HMOs (Siddharthan, 1990). Porell and Wallack

(1990) also asserted a positive association between immigrant population and HMO's entry into a Medicare risk contract. The hypothesis is:

H_8: Holding other variables constant, in a service area where immigration activity is higher, an HMO is more likely to enter into Medicare risk contract.

It is also anticipated that in-migrants, that is, those who move from places outside the focal market but within America, are less likely to have a regular physician, at least in a short term period and thus face relatively lower costs of switching physicians. However, previous studies generate mixed results regarding the effect of in-migration activities on HMO development (Adamache and Rossiter, 1986; Goldberg & Greenberg, 1981; McLaughlin, 1987; Morrisey & Ashby, 1982; Welch, 1984). One possible explanation is that mobile elderly who can afford to move temporarily are attracted to the FFS sector due to its unrestricted choice of physicians (Dowd, et al., 1994). Another barrier for HMOs to attract mobile Medicare beneficiaries exists in the current requirement that Medicare beneficiaries must disenroll if they leave the service area for more than three months. New features of HMO products that make benefits portable for their senior members who travel may counterbalance FFS superiority and encourage these beneficiaries to join HMOs (Jaklevic, 1995). Nonetheless, much unknown remains to be empirically tested on reasons that may impede the entry of HMOs in certain markets.

Income effect. Medigap policies have been descriptively recognized as a primary competitive force to Medicare HMOs (Feldman, et al., 1993; Harrington, et al., 1988; Porell & Wallack, 1990; Rossiter, et al., 1985). In order to attract the elderly as an important resource to HMOs, Medicare HMOs must compete with Medigap insurers by setting monthly premiums for enrollees lower than those of rival insurance firms. It is speculated that a higher premium charged by Medigap insurers has a positive impact on HMO enrollment. Because of lack of consistently available Medigap premium information, however, the direct impact of Medigap premium rates on HMO's market entry cannot be incorporated in this analysis. Instead, the focus is on beneficiaries' ability to purchase Medicare supplemental insurance. The income effect on their choice among health plans is investigated in this analysis.

In 1991, about 38% of Medicare beneficiaries purchased individual Medigap policies (Chulis, et al., 1993). Beneficiaries with an average higher household income were found to be more likely to have private insurance coverage (Wilcox-Gök & Rubin, 1994) and those who were covered by supplemental insurance were found to be less likely to enroll in HMOs under the Medicare Capitation Demonstration (Garfinkel, et al., 1986). Thus, there seems to be an indirect linkage between income level and HMO enrollment.

Given the fact that 69% of Medicare beneficiaries have annual incomes less than $20,000 in 1990 (Darnay, 1994, p. 4), one might expect that part, if not all, of the senior population are cost conscious. Evidence from the previous survey indicated that

compared to conventional insurance subscribers, HMO enrollees were more concerned about costs (Gabel, et al., 1988), and that low out-of-pocket costs were one of the most attractive features to HMO members (Taylor & Kagay, 1986). One empirical study observed that disenrollment from the HMO was associated with increases in premiums charged by HMOs (Long, Settle, & Wrightson, 1988). Beneficiaries who were poor but not eligible for Medicaid had a higher probability to enroll in HMOs (Dowd, et al., 1994; Langwell & Hadley, 1990; Siddharthan, 1990).

From a macro perspective, firm formation is positively associated with the level of average household income in a firm's market (Specht, 1993). However, empirical studies of the effect of per capita income on HMO establishment do not generate consistent results (Juba, Lave, & Shaddy, 1980; McLaughlin, 1987; Morrisey & Ashby, 1982; Welch, 1984). Porell and Wallack (1990) used another measure, percent of population 65 years of age or over below poverty level and found that a higher percentage of the elderly population below poverty level was significantly associated with a higher probability of an HMO's entry into a Medicare risk market. It is possible that the relationship between the income level and the market entry is non-linear, or inverse U-shaped. Poor beneficiaries are covered by Medicaid and those with higher income can afford a supplemental insurance. These two segments of Medicare population are less likely to join HMOs. The hypothesis is:

H_9: Holding other variables constant, the income level in a service area is non-linearly related to the entry of HMOs into a Medicare risk contract.

Payer: Employers

Studies in the late 1970s and early 1980s do not find a significant effect of large employers on HMO development (McLaughlin, 1987; Morrisey & Ashby, 1982). However, information obtained from a survey conducted in late 1980s and early 1990s tends to suggest that large employers are more likely to offer an HMO plan to their active employees; workers in larger firms are more likely to join an HMO plan if it is offered as a benefit (Gabel, et al., 1988; Sullivan, et al., 1992). One empirical result that the possibility of HMO disenrollment by active employees declined as length of enrollment increases (Long, et al., 1988) might indirectly suggest that active employees who currently enroll in an HMO have a higher probability to stay in the HMO after becoming eligible for Medicare, or roll-over to the Medicare risk program if their physician joins an HMO that develops a risk contract, regardless of whether employers offer HMOs as an option for retirement health insurance. From this perspective, HMOs appeal to large employers who are able to provide a large pool of a potential roll-over population.

Another phenomenon attributable to large employers is that they are more likely to promise retirement health benefits (Morrisey, et al., 1990). HMO options, being relatively new, are not frequently offered to retired employees (Greenwald, 1994), and not chosen by Medicare beneficiaries whose health insurance is employer-sponsored and may not include HMO options (Dowd, et al., 1994). This lower choice of HMOs by employers and their retired employees might be altered due to the new FAS 106 which

requires the accounting of future retirement benefits as liabilities in the balance sheet. This requirement especially concerns large employers who have a sizable retiree population eligible for health insurance benefits. Along with the rising health care costs, anecdotal evidence indicates that employers, particularly large ones, will seek HMO risk coverage for their retirees (U. S. General Accounting Office, 1996; Greenwald, 1994; Wise, 1995). Thus, attracted by both the potential roll-over effect and an employer's cost conscious response to new regulation, HMOs are anticipated to be likely to enter a Medicare risk market.

H_{10}: Holding other variables constant, an HMO's entry into a Medicare risk contract is positively associated with the existence of large employers in the service area.

Supplier: Physicians

Descriptive case studies suggested that primary care physicians were more supportive of HMO development (Schulz, et al., 1990) and were more likely to join HMOs (Kohrman, 1985). Competition among physicians compels them to join HMOs. However, empirical studies on either the HMO development (Cromley & Shannon, 1983; McLaughlin, 1987; McNeil & Schlenker, 1975) or the entry of HMOs into a Medicare risk contract (Adamache & Rossiter, 1986; Porell & Wallack, 1990) do not generate consistent results. As survey information indicates that HMOs with any Medicare contract have a higher primary care physicians-total physician ratio (Dial, et al., 1995),

abundance of primary care physicians as an important resource will encourage the market entry of HMOs. Thus, the hypothesis is,

H_{11}: Holding other variables constant, an HMO's entry into the Medicare risk contract is positively associated with primary care physicians per 1,000 population in the service area.

Market Price

One important factor affecting a participation decision is the payment rate, AAPCC, that an HMO will receive for coverage. The AAPCC reflects both the costs of medical resources and service use rates of the FFS elderly population of an area. Markets with high AAPCC rates may indicate high discretionary medical care use in local Medicare FFS delivery systems and, subsequently, may afford great savings opportunities for HMOs. This expected profit where the AAPCC rate is high is anticipated to have a positive effect on market entry. In addition, high AAPCC rates represent a high federal cost control priority, thus, participation in these areas as a risk contractor should facilitate competition which in turn could reduce geographical variation in Medicare costs (Nycz, et al., 1987) and is encouraged by HCFA. One can expect that the processes for obtaining HCFA approval in these areas may be expedited relative to areas with low AAPCC rates. Therefore, it is hypothesized that,

H_{12}: Holding other variables constant, an HMO in a service area with higher AAPCC rates is more likely to enter into a Medicare risk contract.

Firm Characteristics

As Table 2 indicates, the effects of HMO attributes on market entry are not necessarily determinant. In addition, it is very possible that there is high correlation among several HMO characteristics. As to a market entry decision, two contradictory arguments are presented below. Note that the main purpose of including HMO attributes into the conceptual model is to control their effect, rather than for hypothesis testing.

Opportunity versus Buffer

Given the fact that a high proportion of Medicare expenditures is attributable to inpatient hospitalization, effective utilization control should enable HMOs to realize expected cost-savings benefits from entering into a risk contract. Financially strong plans may be more prone to enter the Medicare market, since they can generate necessary capital for expansion and absorb the risks of serving the Medicare population. Since the profit from serving Medicare enrollees cannot not be greater than profit for HMO's commercial business as restricted by ACR regulation, higher profit in the commercial market means more retainable profit in a Medicare market. Literature on diversification suggests that the abundance of internal resources affords a firm the opportunity to diversify (Ingham & Thompson, 1995; Mitchell, 1989). One study on HMO's entry into a Medicare risk market partially confirms that the relationship between effective management control of hospital utilization and high revenue per commercial enrollee is positive and related to market entry (Porell & Wallack, 1990).

A relevant counter-argument is related to organizational slack. Although organizational slack makes it easier to implement change, it lowers the motivation to undertake changes (Hedberg, 1981), since organizations with slack resources are cushioned from the factors that might compel change. An abundance of slack resources can breed contentment and limit the range of problematic search and incentives for improvement. Excessive slack tends to dull an organization's sensitivity to environmental variance and discontinuity, and tends to strengthen resistance to change (Thompson, 1967). In one study of HMOs' response to the termination of federal assistance, Ginsberg and Buchholtz (1990) found a demotivational response of HMOs with efficient utilization. For an HMO that has a prepayment arrangement, the level of resources used directly contributes to organizational slack. Additional use of resources does not bring in additional revenues, but only adds costs. Alexander and Morrisey (1989) contend that organizations with more slack choose to remain independent and autonomous, instead of getting involved in an interorganizational exchange.

The above two competing arguments show that the effect of an organization's slack on market entry is ambiguous. Evan and Klemm (1980) suggest that if growth is not an organizational goal hospitals pursue, hospitals will not respond to environmental "opportunities and needs" but maintain their autonomy as a primary strategy. Similarly, if the concern for organizational autonomy outweighs an HMO's goal for market expansion, an HMO that has more organizational slack is less likely to enter the Medicare

market. In contrast, if a goal of an HMO is to expand its market, the HMO that exhibits better financial performance is more likely to enter into Medicare risk contracting.

Since an organization's goal and strategic planning orientation is a matter of managerial value, the lack of survey effort will avoid direct measurement of an organization's goal and orientation. No hypothesis is proposed in this analysis to test how organizational slack influences an HMO's market entry.

HMO Model Type

Compared to open-panel HMOs such as IPA and network models, staff and group models are more likely to have effective organizational structures for controlling utilization. Open-panel HMOs traditionally have greater problems of internal control over utilization since resources can be less effectively controlled. As discussed above, the effect of organization's slack on market entry is not definite. However, closed-panel HMOs face the greatest entry barriers, since most persons joining them would have to change their personal physicians. Open-panel HMOs could have members enrolled without switching their personal physicians. One would anticipate that open-panel HMOs are more likely to enter into a Medicare risk market. However, studies found that HMO model type had no effect on market entry (Adamache & Rossiter, 1986; Porell & Tompkins, 1993; Porell & Wallack, 1990).

Additionally, HCFA has authorized pilot point-of-service plans, which would allow seniors to use providers outside an HMO network. Several HMOs are also creating strategies that make benefits portable or transferable for their senior enrollees. Some

HMOs are accommodating different model types or transforming to a mixed model, reflected in the surveys conducted by InterStudy and Group Health Association of American. These changes blur the distinction of model type, and nullify the effect the variable might have on market entry. Many similarities in HMO structures are also observed (Gold, et al., 1995). Thus, it is anticipated that model type will have no effect on the entry of an HMO into a Medicare risk contract.

Organizational Age

Presumably, older HMOs are able to benefit by their experience to control utilization, possess a number of cost advantages, and consequently, retain more slack resources. Young HMOs may view an entry into a Medicare risk market as a means to expand their overall market share, though they are less experienced in utilization control. The same opportunity-versus-buffer argument made above applies here. Effect of age on market entry, or diversification, is not necessarily consistent across empirical studies. One study in the imaging industry (Mitchell, 1989) documented a positive coefficient of age, while two studies in an entry of an HMO into a Medicare risk contract (Adamache & Rossiter, 1986; Porell & Wallack, 1990) reported a negative effect. Porell and Tompkins (1993) found a positive effect of HMO's age on market exit. Thus, no hypothesis is proposed. Instead, the effect of organizational age should be controlled.

Size

Size of an organization is usually considered an important factor determining an organization's response to the environmental change. Resource dependence theory

proposes that the need for environmental linkage will increase as a direct function of firm size. However, empirical results related to size have often been contradictory (Allen, 1974; Boyd, 1990; Ingham & Thompson, 1995; Mitchell, 1989; Pfeffer, 1972), and such contradiction may be due to different operationalization of the variable reflecting size. Jackson, Morgan, and Paolillo (1986, p. 216) suggest that the measure of size should depend on the subject of an investigation.

Enrollment size is most often used to measure HMO size (Adamache & Rossiter, 1986; Clement, 1995; Ginsberg & Buchholtz, 1990; Porell & Wallack, 1990; Wholey, et al., 1992). Existing enrollees are an important resource in that they have regular sources of care from an HMO and may be more likely to choose HMOs as they age into Medicare.

Ginsberg and Buchholtz (1990) used the logarithm of the number of members enrolled in an HMO to measure HMO's size and found that large HMOs responded to environmental changes quicker than small HMOs. Porell and Wallack (1990) found a positive effect of HMO's enrollment size on risk contract participation. They argued that larger HMOs could capitalize on the economies of scale if they entered into a Medicare risk market. However, Adamache and Rossiter (1986) found a negative effect of enrollment size on an HMO's entering Medicare Competition Demonstration, a finding at odds with the requirement that before they can do risk contracting HMOs have to reach a minimum size of commercial enrollment (at least 5,000 commercial enrollees if serving an urban area and 1,500 commercial enrollees if serving a rural area) and that can take

years (Serafini, 1995). From this aspect, young and small HMOs are legally prevented in effect from market entry, despite their intention for market expansion.

Size may also represent other dimensions such as amount of slack resources (Alexander & Morrisey, 1989). In the HMO industry, large nonprofit HMOs have a greater debt capacity and are somewhat cushioned from the influence of low access to capital (Birnbaum, 1987). Enrollment size of HMOs could also be correlated with how long they stay in the market. Thus, no specific hypothesis regarding the effect of enrollment size is proposed, but the effect of size will be controlled.

Physician Pool

Physicians have been thought to be valuable liaisons for the sales force (Jaklevic, 1995). Evidence indicates that medical professional knowledge of the Medicare HMO program promotes HMO enrollment for rollovers (Garfinkel, et al., 1986). Some health plans use personalized letters from their physicians to encourage senior patients to enroll, or rollover, in the HMO in which the physician joins. One way to ease the transition to an HMO for Medicare beneficiaries is to expand its physician pool. Though evidence on the significance of physician pool tends to be anecdotal and nonempirical, one may expect that HMOs that have a larger physician pool can better benefit from the rollover effect, and could encourage the entry into a Medicare risk market. However, it is worthy of note that the size of an HMO's physician pool could be positively correlated with enrollment size and thus, a concern regarding collinearity arises.

Other Organizational Characteristics

Profit status of HMOs is not found to be statistically significant in HMOs' participation in the Medicare risk program (Adamache & Rossiter, 1986). It is worth noting that for-profit institutions are thought to be cost efficient and have access to capital at lower costs (Schlesinger, Blumenthal, & Schlesinger, 1986). For-profit HMOs typically own plans in several areas and are pressured by stockholders to achieve growth goals. They have been able to enter lucrative AAPCC markets (Iglehart, 1995).

If an HMO already has a Medicare contract, either on a cost or Health Care Prepayment Plan (HCPP) basis, marketing HMO products to the potential risk enrollees would be easier and less expensive. Entry barriers are at least partially overcome. Early studies demonstrate that experience in similar products is directly associated with diversification or market entry (Adamache & Rossiter, 1986; Mitchell, 1989). Hence, prior favorable Medicare experience should increase the likelihood that an HMO will enter into the risk contracting. It is also interesting to examine the effect of an HMO's involvement in Medicare, or the size of Medicare enrollment as a percentage of total HMO enrollment. In contrast, for health plans such as Blue Cross with huge Medigap market, one might expect an opposite effect.

Federal qualification involves establishment of insolvency insurance, quality assurance procedures, insurance and other arrangements against loss and liability, community rating within risk categories, and submission of quarterly reports to the government (Wrightson, 1990, p. 27-29). HMOs that hold federal qualification have

overcome entry barriers and established their credit in dealing with HCFA, minimizing the regulatory impact. Thus, federally qualified HMOs should be more likely to enter into the Medicare risk contracting.

Summary

This chapter develops a resource dependence framework and a modified diversification paradigm. Based on the theoretical structures and the literature on the HMO development and market entry, supportiveness of stakeholders, and diversification, hypotheses regarding the new entry of an HMO into a Medicare risk contract are proposed under three major dimensions: competitive market structure, resources in the general environment, and market price. Firm characteristics are included in this analysis mainly as control variables.

The first research question inquires how the market structure influences the entry of an HMO into a Medicare risk contract. Hypotheses 1 to 4 explore this issue proposing that the lack of favorable conditions in the HMO's traditional market encourages an HMO to participate in the Medicare risk program. Hypotheses 5 and 6 predict that an attractive Medicare market encourages the market entry.

The second research question is raised to explain the affect of the environmental resources on the market entry. The environmental resources important to an HMO's survival are conceptualized in terms of three stakeholders, that is, the elderly population, employers, particularly the large ones, and physicians. It is hypothesized that a large base

of the elderly population (Hypothesis 7) and a high level of immigration activity (Hypothesis 8) are associated with the high probability of the market entry. Hypothesis 9 suggests that the average income level in the market might have an inverse, U-shape relationship with the market entry. Hypotheses 10 and 11 propose that resource munificence, such as the existence of the large employers and more primary care physicians per capita, are associated with the entry into a Medicare risk contract.

The third research question is important, particularly in the policy aspect, to understand how the market entry is influenced by the level of the AAPCC rate. Hypothesis 12 addresses this issue proposing that an HMO is more likely to enter into a market in which the AAPCC rate is higher.

The affect of gender of the elderly population and organizational attributes are inconclusive, or ambiguous, and no hypothesis is proposed. Instead, these factors will be incorporated in the proposed analysis as control variables. Due to data limitation, two factors, health status of the elderly population and the level of Medigap premiums, are not included in this analysis.

Chapter 4 introduces the research design, data sources, and variable measurement used in this investigation to test the hypotheses. Chapter 5 presents the results of this analysis. Chapter 6 discusses the findings and implications.

CHAPTER 4

METHODS

This chapter discusses the research design of this analysis. Data sources are enumerated and discussed. The measurement of the study variables is presented. The analytical methods used to test the hypotheses are described.

Research Design

The purpose of this study is to identify factors associated with an HMO's decision to participate in a Medicare risk contract. The unit of analysis is the individual HMO. The entry into a Medicare risk contract involves a process that occurs over a period of time, rather than a discrete event marked by the HCFA's approval, and which makes inappropriate the use of the cross-sectional design. This investigation uses a non-experimental, retrospective, time-lagged panel design. The measurement of the independent variables precedes that of the dependent variable, that is, the entry of an HMO into a Medicare risk contract. Though causal effect can be best illustrated in an experimental study, the approach of a time-lagged, panel design used in this analysis can better assess association of cause compared with a cross-sectional study design. Additionally, the theory-based nature of this study and multivariate analytic strategies, which are commonly used in organizational research, enhance verifying cause-effect relationships (Veney & Kaluzny, 1984, pp. 56-59).

Definition of Market

In the previous studies of HMO development done in the late 1970s and early 1980s (Cromley & Shannon, 1983; McLaughlin, 1987; McNeil & Schlenker, 1975; Morrisey & Ashby, 1982; Welch, 1984) and other HMO studies conducted with data collected prior to 1991 (Schlesinger, et al., 1986; Wholey, et al., 1992), market area for an HMO was defined as the standard metropolitan statistical area (SMSA). It was believed that most HMO activities were focused in cities and suburbs, and an SMSA better approximated the true market for an HMO's services than counties (Morrisey & Ashby, 1982).

Two empirical studies of the entry of an HMO into a Medicare risk contract defined HMO market area variously. In examining the Medicare Competition Demonstration, Adamache and Rossiter (1986) defined the market as the county in which an HMO's main office was located. Porell and Wallack (1990) defined HMO market areas as metropolitan statistical areas (MSA); nonmetropolitan markets were defined by the major county of HMO operation.

Harrington et al. (1988) reported that almost all of the Medicare risk-contract HMOs included in their study targeted services in large MSAs or a state-wide area. In a study of an HMO's conversion to for-profit status, Ginsberg and Buchholtz (1990) argued that it was not necessary to restrict an HMO's operation to one community or metropolitan area. Instead, they measured task and institutional environment variables on a state level. Each HMO was assigned to the state in which its headquarters were located.

The definition of the major county of HMO operation as market area may be too narrow. The great majority of HMOs serve more than one county. Only 33, or 6% of 535 HMOs in this study sample served one county. Another definition of the HMO market area is an MSA. It was found that over 85% of all HMO members resided in the 57 largest MSAs, while 56% of the nation's total population resided in these 57 MSAs in 1991 (Bergsten & Palsbo, 1993). Of all HMOs in the InterStudy census as of January 1995, 22% HMOs reported that they served rural counties only. About 44% of all HMOs served more than one MSA and operated as a single entity. The definition of a single MSA as the market area is not appropriate for HMOs that serve multiple MSAs or a primarily rural area.

It is clear that the definition of the HMO market as one county or MSA may either understate or overstate the service area of an HMO. The predominant employment of single MSA (Cromley & Shannon, 1983; McLaughlin, 1987; McNeil & Schlenker, 1975; Morrisey & Ashby, 1982; Schlesinger, et al., 1986; Welch, 1984; Wholey, et al., 1992) or multiple MSAs (Christianson, Sanchez, et al., 1991; Feldman, et al., 1993; Wholey, et al., 1990) as an HMO's market in HMO studies based on data before 1991 may be in part due to the historical way HMO information was summarily reported. Before 1991, only the MSA in which the HMO was headquartered was reported by the InterStudy Census. Since 1991, InterStudy has listed all counties which an HMO claims to serve. In one study of HMOs' premiums for Medicare supplementary benefits, Feldman et al. (1993) adopted the concept of market area, or all counties in which the HMO had Medicare

enrollees to measure some variables. In a serial of longitudinal studies of HMOs (for example, Feldman, et al., 1995; Feldman, Wholey, & Christianson, 1996; Wholey, et al., 1995), researchers used lists of an HMO's claimed counties to define the HMO's "market area," or "operating locations" since 1989. The use of multiple MSAs as an HMO's market area is closer to the concept of a service area than prior measurements. However, there may be some bias against HMOs that serve primarily rural counties or urban-rural mixed areas, though it can be argued that separate analysis of these areas is needed irrespective of designated service area.

In this analysis, an HMO's market is defined as all service counties reported to InterStudy as an HMO's self-declared service area. The unique market or service area for an organization has been employed in hospital studies (for example, Melnick & Zwanziger, 1988; Melnick, Zwanziger, Bamezai, & Pattison, 1992). This definition of service area as the HMO market is not without problem *per se*, but may be a better approximation of an HMO's true operating area than prior definitions (see Appendix A). Morrisey and Ashby (1982) argue that no operational definition of HMO market is appropriate for all purposes. The purpose of this study is to examine how resource availability or dependence influences the market entry of an HMO. The service area of an HMO is the environment from which the HMO obtains resources such as enrollees and employer group. In addition, the HMO forms its network of providers who provide services to those who reside in the service area. From this perspective, the employment of service area as an HMO's operating locations is legitimate for this study.

Sample

The study population includes all HMOs responding to the semi-annual census conducted by InterStudy. In 1981, the federal government gave InterStudy the responsibility for conducting a census of HMOs. Since then, InterStudy has been an official source of information about the HMO industry.

For any given year, the total number of HMOs with risk contracts consists of HMOs that renew a risk contract and those that start a risk contract. In this analysis in which a time-lagged, panel design is applied, it is appropriate to include only those HMOs without a risk contract at the first time point, and examine factors measured at the first time point which are associated with their initial risk contract identified at a second time point. Therefore, the study sample includes HMOs that do not have a Medicare risk contract at the first time point, and still remain in business at the second time point. The next section on time window will discuss the length of time lag for measuring the study variables.

Time Window

The process of contracting with the HCFA starts with an HMO's decision to participate in risk contracting. This decision is followed by preparation of legal documentation and applications to obtain the HCFA's approval before an HMO can enroll Medicare beneficiaries. It usually takes about two weeks for an HMO to investigate market and organizational factors before making a market entry decision, and the HMO spends about two months to prepare legal documentation (C. Thomas, personal

communication, April 1, 1996). J. LeMasurier (personal communication, April 1, 1996) in the Office of Managed Care, HCFA, indicates that on average it takes HCFA 25-26 weeks to review and approve an HMO's application. An estimate of the length of the entire application-approval process would be more than 6 months. A one-year time lag is adopted in this analysis to allow for the application-approval process. Recognizing the continuous growth of Medicare business for HMOs since 1993, it will be of most interest to analyze the most recent data available for market entry. The most recent data which are available, to some extent, can also obviate the analytical limitation of a small number of HMOs with risk contracts during the time period of the late 1980s and early 1990s. Considering the data limitations, the time window of January 1994-January 1995 is selected for this analysis. The study sample consists of HMOs that did not have a Medicare risk contract as of January 1994 and still remained in business as of January 1995. That is, January 1995 is the time point to measure the entry of an HMO into a Medicare risk contract, and the independent variables will be measured using data for 1994 or before.

Data Sources

Data are extracted from several sources. The details of each data source are discussed below.

InterStudy Competitive Edge (as of January 1994-1995): HMO Directory

This is the primary source of data for measuring HMO-specific attributes. InterStudy conducts semi-annual surveys with a mailed questionnaire. The response rate is around 95% (S. D. Schwartz, personal communication, April 22, 1996). InterStudy contacts state insurance departments to get partial information for HMOs that InterStudy fails to contact by either mail or telephone. The HMO Directory contains information on HMO characteristics, service area, and enrollment size.

Group Health Association of America Directory of HMOs (1994, 1995)

Group Health Association of America (GHAA), now named the American Association of Health Plans (AAHP) after merging with American Managed Care Review Association (AMCRA), is a national organization for HMOs. Each year GHAA /AAHP contacts all member HMOs included in the previous year's directory by mail for annual updated information, with telephone follow-up if necessary. The GHAA directories for 1994 and 1995 are used to supplement and validate information obtained from the InterStudy survey.

Other Data Sources

Environmental resource data are from the 1996 Area Resource File (ARF), the 1994 County and City Data Book, and the 1993 County Business Patterns (CBP). The ARF is a compilation of county-based information on health professions, health facilities, income statistics, demographics broken down by gender, race, and age groups, and vital statistics. The County and City Data Book contains information on county-based

migration activities and foreign-born population (U.S. Department of Commerce, 1994). The CBP includes state- and county-level mid-March employment data (U.S. Department of Commerce, 1993).

Additional supplementary data are obtained from the HCFA. AAPCC data are from the Office of Managed Care, HCFA. Data on county-level Medicare beneficiaries are obtained from the Office of the Actuary, HCFA.

Measurement of Variables

Variables for this analysis are selected based on the literature and theory. The definitions and measurement of the study variables are discussed in this section.

Dependent Variable

The dependent variable is an HMO's market entry into a Medicare risk contract during 1994. It is coded as 1 for Medicare market entry and 0 for others (denoted as RISK95). Having a risk contract as of January 1, 1994 is reflected by the variable RISK94. The decision to enter a market is viewed as a function of four groups of independent variables (competitive market structure, resource availability, market price, and organizational attributes), which is specified by the following model:

$$\text{Market entry } (1, 0) = f(\text{CMS, RA, MP, OA})$$

where,

CMS is a set of variables representing competitive market structure;

RA is a set of variables measuring resource availability;

MP is a variable indicating market price; and,

OA represents variables measuring organizational attributes.

Independent Variables

Independent variables are grouped into four categories: competitive market structure, resource availability, market price, and organizational attributes. Most of the variables in the first three categories are measured at the level of service area which is unique to each HMO, and the last category is HMO-specific data.

A list of study variables with their definition is presented in Table 5. Since data used to measure most of the variables are originally available at county level, the method of data aggregation from county level to an HMO's service area is explained in Appendix B. It should be noted that if calculating the weighted average of the variables is necessary, county population is used as the weight, unless otherwise mentioned. The process of prorating an HMO's enrollment over counties in its service area is illustrated in Appendix C. After prorating, HMO enrollment in the county is then treated like other county-level data in calculating market share for each HMO, HMO penetration, and resource concentration in the service area unique to each HMO.

Table 5

Definition of Independent Variables, Data Sources, Expected Effects on Market Entry

Variable (data source)	Definition	Notation	Hypothesis (exp. sign)
Competitive Market Structure: Non-Elderly Market			
Growth in enrollment (e)	A three-year average of percentage change in HMO enrollment	GROW	H_1 (−)
HMO penetration (e)	Total HMO enrollment in the service area divided by the total population in the same service area	PENE	H_2 (+)
Market dominance index (a, e)	The sum of the squared market share for all HMOs in the service area	MDI	H_3 (−)
Market share (a, e)	The individual HMO's enrollment divided by the total HMO enrollment in the service area	SHARE	H_4 (?)
Competitive Market Structure: Medicare Market			
Growth in Medicare enrollment (f)	A three-year (1992, 1993, 1994) average of percentage change in Medicare HMO enrollment under risk contracts	G_MCR	H_5 (+)
Number of risk plans (a, h)	The number of HMOs with Medicare risk contracts in the service area	N_RISK94	H_6 (?)
Resource Availability			
% of elderly population (e)	Percentage of population 65 years old or over in the service area	OLD	H_7 (+)
% of foreign-born population (d)	Percentage of foreign-born population in the service area	FOREIGN	H_8 (+)
% of female elderly (e)	Percentage of female population aged 65 or over in the service area	OLD_F	
% of in-migrants (d)	Percentage of population aged 5 or over living in different states	MOVER	
Income (e)	Per capita income ($1,000), adjusted for wage index	A_INCOME	
Income^2 (e)	(adjusted per capita income)^2	A_INCOM2	H_9 (−)
Large employers (c)	Proportion of employers with 250 or more employees in the service area	EMPLOY	H_{10} (+)

Table 5 (continued)

Physician per 1,000 population (e)	Primary care physicians per 1,000 population in the service area	MD_POP	H_{11} (+)
Market Price			
AAPCC (f, g)	(Part A aged AAPCC) + (Part B aged AAPCC), adjusted for wage index	AAPCC	H_{12} (+)
Organizational Attributes: Control Variables			
Model (a, b)	Two dummy variables for open-panel and mixed types (closed-panel HMO as reference group)	OPEN MIX	
Age (a, b)	The number of years in business	AGE	
Size (a)	Total HMO enrollment	SIZE	
Physician pool (a)	The number of physician contracts (both for primary care and specialty service) per 1000 enrollees	DOC_EN	
Profit status (a)	Dummy variable: profit HMOs (1); others (0)	TAXSTAT	
Prior Medicare (a) experience	Dummy: having cost contract or HCPP (1); others (0)	ROLLCARE	
	Continuous: the number of Medicare enrollment as the percentage of total HMO enrollment	MCR_P	
Medigap policy (a)	Dummy: having Medigap (1); others (0)	MEDIGAP	
Federal qualification (a)	Dummy variable: federally qualified (1); others (0)	FEDQUAL	
Chain member (c)	Two dummy variables indicating the BC/BS and other national managed care firms (1); others (0)	AFFIL1 AFFIL2	
Noncontiguity of the service area (a)	Dummy variable indicating the noncontiguous service area (1); other (0)	MARKET_C	

Data sources: a = InterStudy Competitive Edges (as of January 1994 and 1995); b = GHAA directory (1994, 1995); c = County Business Patterns (1993); d = County and City Data Book (1994); e = Area Resource File (1996); f= 5-year AAPCC master file; g = wage index tape; h = monthly reports of Medicare managed care plans, HCFA.

Competitive Market Structure

In one study of an organization's survival in the minicomputer industry (Romanelli, 1989), market demand was measured as a three-year average of percentage changes in unit sales. Feldman et al. (1995) used two measures of the HMO's growth: the raw enrollment change and the percentage enrollment change. In this analysis, the market demand for the HMO services, or the potential enrollment growth, is measured by the three-year (1992, 1993, 1994) average of percentage changes in HMO enrollment.

HMO penetration is usually defined, from the HMO perspective, as the total HMO enrollment in the service area divided by the total population in the same area (Adamache & Rossiter, 1986; Feldman, et al., 1996; McLaughlin, 1987; Morrisey & Ashby, 1982; Porell & Wallack, 1990; Wholey, et al., 1990; Wholey, et al., 1992). One alternative measure of market penetration defines the total HMO market as the number of the insured population (Bergsten & Palsbo, 1993; Goldberg & Greenberg, 1980). Due to data limitations of the availability of the number of insured people, HMO penetration in this analysis is reflected by the total HMO enrollment in the service area as the percentage of total population in the same area.

Structural competition is often specified by concentration measures. The Hirschman-Herfindahl Index (HHI), or the Herfindahl Index, is widely used to represent competitive vigor in market research (Melnick & Zwanziger, 1988; Melnick, et al., 1992; Phibbs & Robinson, 1993; White & Chirikos, 1988). It has been used as well in HMO studies (Feldman, et al., 1993; Porell and Wallack, 1990; Wholey, et al, 1990). In this

study, an index is constructed as the sum of the squared market shares for all HMOs in HMO_i's service area, similar to an HHI. An HMO is considered to be a competitor of HMO_i if its service area overlaps that of HMO_i by at least one county. HMOs with smaller market shares in HMO_i's service area contribute relatively less to HMO_i's index. Rather than the more usual competition definition, analysis of the construction of this measure indicates that it may be better interpreted as dominance of each HMO (that is, HMO_i) in its unique service area. Thus, it is referred to as a market dominance index (MDI) in this analysis (see Appendix C).

The concept of the uniqueness of HHI , or market dominance in this study, for an organization has been employed in previous studies that defined unique market areas for organizations such as hospitals (for example, Melnick & Zwanziger 1988; Melnick, et al., 1992) and HMOs (for example, Feldman, et a., 1993; Feldman, et al., 1996; Wholey, et al., 1995). The major difference between this study and previous studies exists in how the index is calculated. In previous HMO studies, a county-level HHI is first calculated. A weighted average of the index over all counties in the service area is then calculated, with an HMO's enrollment in a county divided by its total enrollment over all counties constituting the service area of the HMO as the weight. Comparatively, the approach used in this study is simpler and more straightforward, avoids weighting procedures, and directly uses service area-level data to construct the indices. It merits notice that county-level HMO enrollment data are not available either from InterStudy or ARF but calculated from the prorating process (see Appendix C) in which measurement inaccuracy

may be inevitable. The use of county-level HMO enrollment as the weight to construct the MDI may further introduce measurement errors. This difference in calculation also applies to the measurement of HMO penetration.

It has been argued that the use of HHI to measure market structure is not appropriate when organizations in the industry, such as HMOs practicing product differentiation, do not produce a standardized commodity with a single price (Feldman, Finch, Dowd, & Cassou, 1989; Wholey, et al., 1995). Thus, another measure of competitive structure used in some HMO studies (Feldman, et al., 1996; Schlesinger, et al., 1986; Wholey, et al., 1990; Wholey, et al., 1992) is the number of HMOs in a service area. In this study, the weighted number of HMOs in the service area is included as a measure of structural competition.

An individual HMO's market share is calculated as the individual HMO's enrollment divided by the total HMO enrollment in the service area (see Appendix C). Similar to the measure of the growth rate of HMO enrollment, the growth rate of HMO Medicare enrollment in the service area is measured by a three-year average of percentage changes in Medicare HMO enrollment under risk contracts. Competition in a Medicare risk market is measured by the number of Medicare risk-contract HMOs in the service area.

Resource Availability

The measurement of resource availability is based on the previous studies (summarized in Tables 1 and 2). Resource measures are also somewhat limited by data

availability. The elderly population eligible for Medicare and able to participate in a risk-contract HMO is measured by the proportion of population aged 65 or over in the service area. Two variables are used to reflect a physician-patient relationship: the proportion of the foreign-born population and the proportion of in-migrants. The foreign-born population is expected to have a less stable physician-patient relationship, and thus is more likely to join HMOs. An in-migrant population is less likely to have a regular physician but its impact on an HMO's entry into a Medicare risk contract remains to be empirically tested. To control for the potential effect of gender on the physician-patient relationship, the proportion of female population aged 65 or over is included. Wage index-adjusted per capita income of the service area is used as a proxy measuring the income level of Medicare beneficiaries. A squared term of adjusted per capita income is created to examine a non-linear relationship between the income level and market entry. The use of a squared term to test a non-linear relationship has been adopted in a prior empirical study on diversification (Ingham & Thompson, 1995). The existence of large employers who are more likely to offer health insurance as a benefit is measured by the proportion of employers with 250 or more employees in the service area. To measure primary care physicians per 1,000 population, physicians who are in either general practice or family practice and are involved in patient care are included in the numerator; the denominator is total population in the service area; then the measure is multiplied by 1,000.

Market Price

Adamache and Rossiter (1986) used the sum of Part A and Part B AAPCC rates to represent the AAPCC rate in a county. The county-level combined value was then aggregated to the service area which an HMO applied to serve as a risk plan, using the number of county-level Medicare beneficiaries as a weight. Porell and Wallack (1990) measured the AAPCC rate by the Medicare wage-adjusted AAPCC in an MSA, but there is no explanation how Part A and Part B AAPCCs were summed and how the county-level AAPCCs were aggregated to the MSA-level AAPCC. In a study of HMOs' premiums for Medicare supplemental benefits, Feldman et al. (1993) calculated weighted AAPCC for a Medicare HMO using the share of its total enrollment in the county as the weight.

In this analysis, the Medicare payment rate is the wage index-adjusted sum of Part A and Part B aged AAPCCs, weighted by the number of county-level Medicare beneficiaries over all counties in the service area of an HMO. The pitfall of using county-level HMO enrollment as the weight was explained in the previous section. The weighted average of Part A (or Part B) AAPCC for HMO_j in $Service\ Area_j$ is:

$$AAPCC_j = \sum AAPCC_i \times \frac{\text{Medicare beneficiaries in County}_i}{\text{Total Medicare beneficiaries in Service Area}_j}$$

Organizational Attributes

Organizational attributes are measured at the individual HMO level. HMO model type is measured by two dummy variables indicating two model types, respectively: open-panel and mixed types. Closed-panel HMO is the reference group because it accounts for the smallest proportion in the study sample. Organizational age is measured as the number of years an HMO has been in business. Total HMO enrollment reflects the size of an HMO. The number of physician contracts, both for primary care and specialty service, captures the size of the physician pool in an HMO. The size of an HMO's physician pool may be highly correlated with enrollment size. To avoid collinearity, the number of physician contracts is divided by total enrollment and then multiplied by 1,000. Tax exempt status of an HMO is measured by one dummy variable: 1 indicating those that are for-profit HMOs, and 0 for others.

Prior Medicare experience is measured by a dummy variable indicating whether an HMO had a cost contract or Health Care Prepayment Plan before entering into a risk contract. A continuous variable, the size of Medicare enrollment as the proportion of total HMO enrollment, is an alternative measure of prior Medicare experience. Another dummy variable denotes whether an HMO offers Medicare supplemental insurance. If an HMO is federally qualified, the value of 1 is coded, and 0 for those not federally qualified.

About 66% of total HMOs are affiliated with national managed care firms, which would violate a regression assumption (i.e., independence of observations). To control

for this, n-1 dummy variables (plus one reference group) that reflect n national chains should be included in a regression model (Friedman & Shortell, 1988). There are 37 national managed care firms recognized in the InterStudy survey. Each of 37 national managed care firms accounts for less than 10% of the total HMOs in the 1995 InterStudy census, except the Blue Cross and Blue Shield Association which accounts for 14.2% of the HMOs. In this analysis, two dummy variables are created: one for HMOs affiliated with the Blue Cross/Blue Shield Association and the other for those affiliated with other national managed care firm, respectively, with the independent HMOs as a reference group. This approach has been adopted by previous HMO studies (Feldman, et al., 1996; Wholey, et al., 1992).

An HMO's operating locations are defined as the HMO's self-claimed service area, which is not necessarily contiguous. Since this may reflect a difference from a closely contained market, a dummy variable is included in the models indicating the service areas that are noncontiguous.

Analytical Methods

The primary analytic strategy for this investigation is multivariate logistic regression. A logistic regression model is an appropriate technique when the dependent variable is binary. Additionally, logistic regression has the advantage of being less affected when basic assumptions for multiple regression, particularly multivariate normality, are violated (Hair, Anderson, Tatham, & Black, 1992, p. 91). This

investigation begins with a univariate analysis of the 1994-1995 panel sample and bivariate analyses of both 1994 cross-section sample and panel sample. That is, a comparison will be made between HMOs that had Medicare risk contacts and those that did not. Factor analysis and multiple regression analysis will be employed to examine multicollinearity problems among continuous independent variables. Factor scores will be used in place of groups of correlated variables in order to avoid multicollinearity. Before discussing the logistic model, one analytical concern regarding model fitting is discussed first.

Model Fitting Issue

In multiple regression, the desire to avoid a Type I (false positive) error is an important reason for choosing a parsimonious model (Kleinbaum, Kupper, & Muller, 1988). A Type I error in a regression analysis is caused by including a predictor that has a zero regression coefficient. In contrast, there is also a good reason to choose a large model in order to avoid making a Type II (false negative) error (Kleinbaum, et al., 1988). A Type II error corresponds to omitting a predictor that has a truly nonzero regression coefficient in the population. Model underfitting will lead to biased estimates of regression coefficients. However, model overfitting does not introduce bias. In general, the smaller sample size, the smaller the model should be.

There are different criteria with regard to the concern of sample size and the number of the independent variables. One loose requirement is for a minimum of 10 degrees of freedom (Kleinbaum, et al., 1988) such that:

$$n - k - 1 \geq 10 \quad \text{or} \quad k \leq n - 11$$

where,

n is sample size; and,

k is the number of predictors.

Another rule of thumb used in multiple regression is to have at least 5 or 10 observations per predictor (Norman & Streiner, 1994, p. 116). The third, and the most stringent requirement specific to the logistic model is that the number of independent variables should be less than 10% of the number of subjects that experience the event of interest (Daley & Shwartz, 1994), that is for this analysis, HMOs that participate in a Medicare risk contract. There is no absolute standard regarding which criterion discussed above is most appropriate.

Due to the nature of the HMO industry that less than 600 HMOs existed and much fewer HMOs started a Medicare risk contract in 1995, model overfitting is inevitable, if the third criterion is adopted. If the first two criteria are employed, model overfitting will not cause a serious concern in this analysis. Since this analysis is based on a theoretical framework, it is not to select a relatively small set of variables among a large number of variables through factor analysis.

Multivariate Logistic Regression

Logistic regression estimates the probability of an event occurring (i.e., entry into a Medicare risk contract for this analysis). The specification of the logit model is as follows:

$$\ln [P/(1-P)] = \beta_0 + \sum_{i=1}^{k} \beta_i x_i$$

The probability function is specified as:

$$P = e^{\beta_0 + \sum_{i=1}^{k} \beta_i x_i} / (1 + e^{\beta_0 + \sum_{i=1}^{k} \beta_i x_i})$$

Where,

ln is a natural logarithm;

P is the probability of entering into a Medicare risk contract;

β_0 and β_i are coefficient estimates;

x_i refers to the dependent variables; and,

e is the base of the natural logarithm.

In a more straightforward way of understanding the coefficient estimate (β_i), the probability of an event occurring can be written as an odds ratio:

$$\text{Odds Ratio} = e^{\beta_i}$$

If β_i is positive, the odds ratio will be greater than one, or vice versa, if β_i is negative it will be less than one. If β_i is statistically significantly, the upper and lower limits of the confidence intervals of an odds ratio do not span one. An odds ratio is

interpreted as: for one unit increase in the independent variable (x_i), an HMO is e^{β_i} times more or less likely to enter into a Medicare risk contract. For a discrete independent variable (x_i), the estimated coefficient (β_i) means that compared to the reference group (x_i=0) HMOs that have x_i =1 are β_i times more likely to enter into a Medicare risk contract.

If the estimated coefficient of the independent variable corresponding to the respective hypothesis has the expected sign and is significant at the p value of 0.05, it is confident to conclude that the hypothesis is statistically supported.

Summary

This chapter describes the study design, data sources, the measurement of the variables, and analytical method used in this investigation. This study differs from previous work on an HMO's entry into a Medicare risk contract in the aspect of study design, market definition, and measurement of variables. A non-experimental, time-lagged panel design, rather than cross-sectional design, is used in this investigation. The HMO market is defined as a unique service area, rather than an MSA as in prior analyses. An individual HMO is the unit of analysis. The study sample is comprised of HMOs that do not have Medicare risk contracts as of January 1994 and continue to exist in business as of January 1995.

Several sources provide data for better measurement of variables. The InterStudy January semi-annual census of HMOs is the primary data source for the variables of the

competitive market structure and organizational attributes. Variables that measure the environmental resources are extracted from the 1994 ARF and 1994 County Business Patterns. The AAPCC rate is available in the AAPCC master file from the HCFA. Multivariate logistic regression is the analytical method in this study where the dependent variable is binary.

The results of this study are presented in Chapter 5. In Chapter 6, study findings are discussed with their implications, limitations, and applicability to future research.

CHAPTER 5

RESULTS

This chapter presents the findings of the study, including descriptive statistics of the study sample and results from the bivariate analyses for both the 1994 cross-section sample and 1994-1995 panel sample. Before model building, factor analysis and multiple regression for several independent variables are conducted to examine the multicollinearity among the independent variables and, subsequently, to modify the analytic model. The findings of the multivariate logistic regression from the two approaches are then presented.

Study Sample

The unit of analysis is the individual HMO. To be included in this study, the HMO had to be operational as of January 1994 and remained in business as of January 1995. For HMOs that appeared in the 1994 InterStudy census but disappeared in the 1995 census, several possibilities might provide an explanation. The HMO may have (1) terminated its operation; (2) merged into other HMO under a different name; (3) consolidated its operation or combined data reporting to the 1995 InterStudy census with other HMOs in different operating locations but under the same national firm; or (4) did not respond to the 1995 InterStudy census. The InterStudy directories provide information on HMO termination, merger, and consolidation activities. Information on

the fourth group was obtained through cross-validation with the 1995 GHAA directory. If an HMO appeared in the 1995 GHAA directory but not in the 1995 InterStudy census, it was considered a nonrespondent to the 1995 InterStudy survey. HMOs that terminated or merged-"disappeared" were dropped from the sample. HMOs in the last two groups were retained.

Alternatively, some HMOs appeared only in the 1995 census. This may be because that the HMO (1) reported to InterStudy for the first time even though it had been in business for several years; (2) disaggregated combined data reporting in 1995; or (3) started its operation in 1994. For HMOs in the first two groups, GHAA directories were used to supplement and proportionally allocate 1994 enrollment data to HMOs under the same national firm. Forty HMOs that became operational after January 1, 1994 were excluded from the sample. When compared to the panel sample of this study with regard to tax-exempt status, national firm affiliation, and model type, no significant difference was observed between these 40 new HMOs and those in the panel sample.

In total, 535 HMOs in the 50 states and the District of Columbia were identified for the 1994 cross-sectional sample. Out of the 535 HMOs, 95 had Medicare risk contracts as of January 1, 1994. That is, the 1994-1995 panel sample retained the 440 HMOs that did not have Medicare risk contracts as of January 1, 1994. Of these 440 HMOs in the 1994-1995 panel sample, 43 HMOs started a new risk contract as of January 1, 1995.

Univariate Analysis

Since the primary study sample is the 1994-1995 panel sample, this section reports the results from the univariate analysis of this sample. Descriptive statistics of the continuous independent variables are first described, followed by frequency of the discrete independent variables.

Continuous Independent Variables

The results from the univariate analysis of the continuous independent variables for the panel sample are divided into four major groups and presented in Table 6.

Competitive Market Structure

The average enrollment growth an HMO faced in its service area was 10% from 1994 to 1995. Some service areas experienced a decline in HMO enrollment. HMO penetration ranged from 1% to almost 70%. The maximum value for the market dominance index or market share was equal to 1, reflecting that there was no other competing HMO in the service area. The mean number of competitors of a local HMO was 13, although this average was reduced to 8 when it was weighted to reflect the market share of each competitor in the service area.

The growth rate for Medicare enrollment in HMOs in a service area demonstrates a greater degree of variability, compared with that of HMO general enrollment. The number of HMOs with a Medicare risk contract in a typical service area was 2.4, spanning from 0 to 16.

Table 6

Univariate Analysis of Continuous Variables: 1994-1995 Panel Sample

Variables	Mean	Standard Deviation	Minimum	Maximum
Competitive Market Structure: Non-elderly Market				
Growth in HMO enrollment	0.10	0.09	-0.15	0.44
HMO penetration	0.30	0.13	0.01	0.69
Market dominance index	0.24	0.14	0.06	1.00
Number of competitors	13.31	7.59	1.00	48.00
Weighted number of competitors	8.07	6.35	0.52	34.82
Market share	0.16	0.19	0.00	1.00
Competitive Market Structure: Medicare Market				
Growth in Medicare enrollment	1.65	11.59	-0.50	101.25
Number of risk plans	2.35	2.80	0.00	16.00
Resource Availability				
% elderly population	12.18	2.35	7.24	24.77
% foreign-born population	6.87	7.43	0.66	45.10
% in-migrants	9.98	4.51	2.42	31.20
% female elderly	7.31	1.39	4.32	13.41
Income	21423	3402	13755	32777
Wage index adjusted income	21490	2201	14697	27664
Large employers (×1,000)	0.17	0.04	0.00	0.36
Physicians per 1,000 population	0.06	0.03	0.01	0.23
Market Price				
Part A AAPCC	246.08	44.03	145.82	427.83
Part B AAPCC	137.09	32.69	75.61	283.52
Part A+B AAPCC	383.17	69.95	232.91	604.49
Adjusted Part A AAPCC	248.65	37.51	158.65	367.53
Adjusted Part B AAPCC	126.90	27.86	75.16	261.99
Adjusted Part A + B AAPCC	375.55	57.08	233.81	555.46
Organizational Attributes				
Age	9.90	7.62	0.01	65.00
Log (age)	2.17	0.72	0.01	4.19
Size	94458	201874	0.00	2426746
Log (size)	10.41	2.02	0.00	14.70
Physician pool	1734	2020	11.00	17204
Physicians per 1,000 enrollees	197.55	760.47	0.10	12177
Medicare enrollment in an HMO	1272	10143	0.00	204986
% Medicare enrollment	1.22	4.55	0.00	59.50

Resource Availability

As to resource availability, a typical HMO operated in a service area where 12% of the population were the elderly, or 7% were the female elderly; foreign-born and in-migrant population counted for almost 7% and 10% of the total population, respectively. The average wage-index adjusted per capita income was higher than the unadjusted value. In addition, the minimum adjusted per capita income was higher than the minimum unadjusted per capita income, and the opposite was true for the maximum values. On average, there were 6 primary care physicians per 100,000 population in a typical service area.

Market Price

In general, the average Part A AAPCC rate was higher than the average Part B AAPCC rate, adjusted or unadjusted. The standard deviations of Part A AAPCC rates (44.03 and 37.51) were also greater than those of Part B AAPCC rates (32.69 and 27.86), meaning that the distribution of Part A AAPCC rate was more disperse than that of Part B AAPCC. On average, the adjusted Part A AAPCC rate (248.65) was slightly higher than the unadjusted AAPCC rate (246.08), but the adjusted Part B AAPCC rate (126.90) was lower than the unadjusted value (137.09). Overall, the adjusted combined (Part A+B) AAPCC rate (375.55) was lower than the unadjusted combined rate (383.17).

Organizational Attributes

The average age of HMOs in this study was 10, with a wide range between minimum and maximum values. This wide variation is due to the fact that there were

several true outlier HMOs which have stayed in business for a long time. The same situation is true for HMO enrollment size. To control for extreme data skewness, the natural logarithm of both HMO age (LN_AGE) and size (LN_SIZE) was used. The total enrollment in an HMO was composed of 1.2% of Medicare enrollment in the HMO, with a wide range from 0% to nearly 60%.

On average, a typical HMO had 1734 physician contracts, or almost 200 physician contracts per 1,000 enrollees in the HMO. Dial, et al. (1995) reported that full-time equivalent (FTE) physicians per 100,000 enrollees in closed-panel HMOs were 191.5, or 87.6 FTE primary care physicians per 100,000 enrollees. The physician ratio found in this study is 100 times higher than that reported in the study by Dial et al. (1995). This difference is mainly due to the variable measurement that includes open-panel HMO physician contracts.

It should be noted that a clinical staffing pattern is often calculated as an FTE staffing ratio. In the HMO industry, however, accurate data on staffed physicians are only available in closed-panel HMOs (staff- and group-models) which account for a small proportion of the study sample. In contrast, open-panel HMOs (IPA- and network-models) do not employ physicians but contract with physicians who may contract with several HMOs, and do not report accurate working hours for each HMO. The calculation of FTE physicians in open-panel HMOs, therefore, is not feasible with available data. In addition, the GHAA directory was used to provide information on physician contracts for 19 HMOs in which such information was missing from the InterStudy directory. The

GHAA directory does not report physician contracts separately for primary care and specialty care. Therefore, total physician contracts (both primary and specialty care), instead of FTE staffing, are used in this study.

With regard to the calculation of physician contract ratio, further adjustment was made. Ten new HMOs that just started their operation yet had no enrollment reported a number of physician contracts as of January 1, 1994. In order to obtain a non-missing value for the physician contract ratio, physician contracts reported, rather than physician contracts divided by enrollment, were used as physician contract ratio for these 10 HMOs, reflecting the fact that there existed "idle" physicians in HMOs that did not have any enrollment. This approach introduced a upward bias to the physician contract ratio. In addition, an extreme outlier for the physician contract ratio was created from this approach, which is shown as the maximum value in Table 6. Deletion of this HMO from the study sample did not generate much statistical difference in the bivariate comparison and regression analysis, even though the value of physician contracts per 1,000 enrollees would decline to 170. Thus, this HMO was retained.

Discrete Independent Variables

The frequency of discrete independent variables is presented in Table 7. Among all HMOs in the panel sample, 72% were in a service area in which plans with risk contracts already existed. About 70%of all HMOs were open-panel HMOs and 70% were for-profit. It should be noted that these two 70%s were not composed by the same mix of HMOs. About 77% of all for-profit HMOs were open-panel HMOs, and 77% of

all open-panel HMOs were for-profit (not shown in Table 7). Though the percentage (15.7%) of HMOs with any Medicare experience was the same for those with a Medigap product, less than three percent of all HMOs had both. Having Medicare experience means that HMOs already have a Medicare contract, either on a cost or Health Care Prepayment Plan (HCPP) basis, before they participate in Medicare risk programs. A Medigap product refers to a Medicare supplemental insurance policy.

Table 7

Frequency of Discrete Variables: 1994-1995 Panel Sample

Variables	Number	%
Service area with any existing risk plan	316	71.8
Model type:		
closed-panel	56	12.7
open-panel	308	70.0
mixed	76	17.3
Tax-exempt status	308	70.0
Medicare experience	69	15.7
Medigap product	69	15.7
Federal qualification	198	45.0
Affiliation:		
independent	156	35.2
BCBS	71	16.1
other national firms	214	48.6
Noncontiguous service area	57	13.0

Bivariate Analysis

The results for the 1994 cross-section sample are first presented to provide a basic picture of association between the dependent and independent variables, before reviewing

the bivariate analysis for the 1994-1995 panel sample. Organizational attributes are also compared for HMOs with risk contracts by sample year.

The 1994 Cross-Sectional Sample

A comparison was done between HMOs that had Medicare risk contracts as of January 1, 1994 (RISK94=1, n = 95) and those that did not (RISK94=0, n = 440). These results are presented in Table 8 for continuous variables and in Table 9 for discrete variables.

HMOs with risk contacts in the 1994 cross-sectional sample signed an agreement with the HCFA prior to January 1994. Variables that use 1994 data do not reflect the situation in the previous year when HMOs decided to participate in a Medicare risk program. In addition, becoming a risk plan can result in Medicare enrollment and Medicare experience for the year 1994. Thus, the differences in variables such as number of risk plans in a service area, percentage of Medicare enrollment in an HMO (Table 8), any existing risk plans in the service area, and having any Medicare experience and federal qualification (Table 9) are subject to endogeneity in a cross-sectional sample and are not discussed, though they appear statistically significant.

Competitive Market Structure

HMOs having Medicare risk contracts were found to exist in the service areas with higher HMO penetration, a lower market dominance index, and more competitors. The differences in these three competitive market measures were statistically significant (at least $p < 0.05$). No significant differences were detected between the two groups in

Table 8

Bivariate Analysis of Continuous Variables by Risk Contract Status: 1994 Cross-Sectional Sample

Variables	RISK94=0 (n = 440)	RISK94=1 (n = 95)	T Statistic
Competitive Market Structure: Non-elderly Market			
Growth in HMO enrollment	0.10 (0.09)	0.10 (0.05)	0.15
HMO penetration	0.30 (0.13)	0.38 (0.19)	3.92 ***
Market dominance index	0.24 (0.14)	0.22 (0.10)	2.07 **
Weighted number of competitors	8.07 (6.35)	12.15 (9.53)	3.99 ***
Market share	0.16 (0.19)	0.18 (0.17)	0.86
Competitive Market Structure: Medicare Market			
Growth in Medicare enrollment	1.65 (11.59)	2.41 (14.24)	0.49
Number of risk plans	2.35 (2.80)	5.95 (4.23)	7.94 ***
Resource Availability			
% elderly population	12.18 (2.35)	12.25 (2.75)	0.22
% Foreign-born population	6.87 (7.43)	10.80 (8.55)	4.55 ***
% in-migrants	9.98 (4.51)	11.21 (5.88)	1.93 *
% female elderly	7.31 (1.39)	7.26 (1.61)	0.28
Income	21423 (3402)	21723 (2714)	0.93
Wage index adjusted income	21490 (2200)	20452 (2130)	4.19 ***
Large employers (×1,000)	0.17 (0.04)	0.15 (0.03)	4.90 ***
Physicians per 1,000 population	0.06 (0.03)	0.07 (0.02)	2.57 **
Market Price			
Part A AAPCC	246.08 (44.03)	255.42 (48.70)	1.84 *
Part B AAPCC	137.09 (32.69)	153.69 (33.55)	4.47 ***
Part A+B AAPCC	383.17 (69.95)	409.11 (72.56)	3.26 ***
Adjusted Part A AAPCC	248.65 (37.51)	240.55 (36.46)	1.92 *
Adjusted Part B AAPCC	126.90 (27.86)	136.15 (29.11)	2.91 ***
Adjusted Part A + B AAPCC	375.55 (57.08)	376.70 (55.38)	0.18
Organizational Attributes			
Log (age)	2.17 (0.72)	2.59 (0.57)	5.28 ***
Log (size)	10.41 (2.02)	11.79 (1.20)	8.82 ***
Physician pool	1734 (2020)	3766 (4889)	3.98 ***
Physicians per 1,000 enrollees	197.55 (760.47)	36.07 (66.08)	4.38 ***
% Medicare enrollment	1.22 (4.55)	16.20 (25.27)	5.64 ***

Note. Standard deviation in parentheses.
* $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.

Table 9

Bivariate Analysis of Discrete Variables by Risk Contract Status: 1994 Cross-Sectional Sample

Variables	Percentage RISK94=1	Likelihood Ratio χ^2
Service area with any existing risk plan		
risk plan exists	23.11	56.01 ***
no risk plan exists	0.00	
HMO model type		
1. open-panel	11.49	25.58 ***
all others	29.41	
2. mixed	35.04	27.14 ***
all others	12.92	
Tax-exempt status		
for-profit	17.43	0.09
non-for-profit	18.52	
Medicare experience		
with Medicare experience	57.14	245.60 ***
no Medicare experience	0.80	
Medigap product		
with Medigap product	18.82	0.08
no Medigap product	17.56	
Federal qualification		
federally qualified	27.21	35.59 ***
not federally qualified	7.98	
National firm affiliation		
1. BCBS affiliated	10.13	4.15 **
all others	19.08	
2. non-BCBS national firm affiliated	23.02	11.21 ***
all others	12.06	
Noncontiguous service area		
contiguous service area	19.72	0.21
noncontiguous service area	17.46	

* $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.

the growth rate of HMO enrollment or market share. Concerning the measures for Medicare market structure, the difference in the growth rate of Medicare enrollment in the service area was not statistically significant.

Resource Availability

Regarding resource availability, risk plans appeared in the service area where there were a higher proportion of foreign-born population and more physicians per 1,000 population, but a lower adjusted income level and a lower proportion of large employers.

Market Price

Risk plans were in the service areas with higher AAPCC rates, indicating market price differences. In addition, risk plans were in areas that had higher Part B AAPCC rates but lower Part A AAPCC rates after being adjusted for wages. The significant difference was no longer observed in the combined sum of Part A and Part B rates.

Organizational Attributes: Continuous Variables

HMOs with risk contracts were significantly older (2.59 vs. 2.17) and had proportionately larger enrollments (11.79 vs. 10.41). In addition, risk plans contracted with more physicians (3766 vs. 1734), but had fewer physician contracts per 1,000 enrollees (36.07 vs. 197.55).

Organizational Attributes: Discrete Variables

Table 9 reflects the percentage of HMOs observed with Medicare risk contracts given a discrete attribute. The likelihood ratio x^2 statistics test whether the association exists between having a risk contract and a given discrete variable.

About 35% of mixed-type HMOs had Medicare risk contracts, compared to 13% of all other HMOs. In contrast to HMOs affiliated with Blue Cross Blue Shield which had a lower percentage of being a risk plan, those affiliated with other national firms had a higher percentage of being a risk plan when compared to all other HMOs (23.02% vs. 12.06%). No significant differences were observed in tax exempt status, having a Medigap product, or having a noncontiguous service area.

The 1994-1995 Panel Sample

The results from the bivariate analysis for the 1994-1995 panel sample are illustrated in Tables 10 and 11. The significance of results from the bivariate comparison is generally consistent with what was observed in the 1994 cross-section sample. However, there are some interesting differences.

Competitive Market Structure

Similar to the results from the 1994 cross-section sample, new risk plans existed in the service areas with higher HMO penetration, a lower market dominance index, and more competitors (see Table 10). New risk plans also confronted a higher number of HMOs that already had a Medicare risk contract in the service areas.

Table 10

Bivariate Analysis of Continuous Variables by Risk Contract Status: 1994-1995 Panel Sample

Variables	RISK95=0 (n = 397)	RISK95=1 (n = 43)	T Statistic
Competitive Market Structure: Non-elderly Market			
Growth in HMO enrollment	0.10 (0.09)	0.09 (0.05)	1.51
HMO penetration	0.29 (0.13)	0.33 (0.13)	1.98 **
Market dominance index	0.24 (0.14)	0.21 (0.09)	2.09 **
Weighted number of competitors	7.74 (6.08)	11.12 (7.84)	2.74 ***
Market share	0.16 (0.19)	0.17 (0.17)	0.25
Competitive Market Structure: Medicare Market			
Growth in Medicare enrollment	1.53 (11.11)	2.73 (15.45)	0.50
Number of risk plans	2.22 (2.68)	3.47 (3.57)	2.21 **
Resource Availability			
% elderly population	12.15 (2.28)	12.47 (2.90)	0.69
% foreign-born population	6.59 (7.28)	9.46 (8.35)	2.42 **
% in-migrants	10.06 (4.51)	9.23 (4.46)	1.14
% female elderly	7.29 (1.34)	7.51 (1.73)	0.80
Income	21341 (3368)	22177 (3653)	1.53
Wage index adjusted income	21511 (2193)	21296 (2289)	0.61
Large employers (× 1,000)	0.18 (0.04)	0.16 (0.04)	0.76
Physicians per 1,000 population	0.06 (0.03)	0.063 (0.02)	0.96
Market Price			
Part A AAPCC	243.88 (44.53)	266.33 (33.19)	4.06 ***
Part B AAPCC	135.36 (33.01)	153.14 (24.67)	4.33 ***
Part A+B AAPCC	379.24 (70.94)	419.47 (46.81)	5.04 ***
Adjusted Part A AAPCC	247.52 (37.49)	259.08 (36.50)	1.93 *
Adjusted Part B AAPCC	125.68 (27.83)	138.12 (25.87)	2.80 ***
Adjusted Part A+B AAPCC	373.21 (57.13)	397.20 (52.42)	2.64 ***
Organizational Attributes			
Log (age)	2.15 (0.72)	2.36 (0.70)	1.85 *
Log (size)	10.28 (2.05)	11.56 (1.33)	5.61 ***
Physician pool	1604 (1820)	2935 (3127)	2.74 ***
Physicians per 1,000 enrollees	212.14 (797.63)	62.78 (160.06)	3.19 ***
% Medicare enrollment	1.22 (4.65)	1.17 (3.46)	0.09

Note. Standard deviation in parentheses
* $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.

Table 11

Bivariate Analysis of Discrete Variables by Risk Contract Status: 1994-1995 Panel Sample

Variables	Percentage RISK95=1	Likelihood Ratio X^2
Service area with any existing risk plan		
risk plan exists	11.39	3.68 *
no risk plan exists	5.65	
HMO model type		
1. open-panel	9.09	0.53
all others	11.36	
2. mixed	11.84	0.43
all others	9.34	
Tax-exempt status		
for-profit	10.39	0.46
non-for-profit	8.33	
Medicare experience		
with Medicare experience	10.14	0.01
no Medicare experience	9.70	
Medigap product		
with Medigap product	11.59	0.30
no Medigap product	9.43	
Federal qualification		
federally qualified	14.65	9.74 ***
not federally qualified	5.79	
National firm affiliation		
1. BCBS affiliated	9.86	0.001
all others	9.76	
2. non-BCBS national firm affiliated	10.28	0.12
all others	9.29	
Noncontiguous service area		
contiguous service area	14.04	1.23
noncontiguous service area	9.14	

* $p < 0.10$. *** $p < 0.01$.

Resource Availability

The only significant difference in resource availability was observed in the percentage of foreign-born population. New risk plans operated in the service areas which the foreign-born population counted for a higher percentage of total population.

The significant differences in income level, the proportion of large employers, and physician per 1,000 population were no longer found for the panel sample.

Market Price

New risk plans had significantly higher AAPCC rates, either Part A or Part B, or the combined sum of Part A and Part B. The significant differences persisted for Part B and the combined sum of Part A and Part B AAPCC rates after being adjusted for wages.

Organizational Attributes: Continuous Variables

The differences in enrollment size, physician pool, and physicians per 1,000 enrollees were statistically significant. For example, new risk plans contracted fewer physicians per 1,000 enrollees, compared with those that did not have a risk contract (63 vs. 212).

Organizational Attributes: Discrete Variables

As Table 11 indicates, the significant association between having a Medicare risk contract and discrete variables only held for federal qualification for the panel sample. About 15% of HMOs that were federally qualified as of January 1, 1994 signed on Medicare risk contract as of January 1, 1995, compared to 6% of HMOs that were not federally qualified. Since HMOs cannot participate in risk contracting without federal qualification, these 6% HMOs might be applying for federal qualification and risk contracting at the same time.

Comparison in Organizational Attributes by Sample: RISK94=1 vs. RISK95=1

The results from comparing the organizational attributes for HMOs with risk contracts in the cross-sectional sample and panel sample are presented in Table 12. The differences in two variables, percentage of Medicare enrollment and any Medicare experience, are subject to endogeneity as explained in the previous section. The only significant differences were found in the natural logarithm of age and HMO model type. On average, HMOs that had risk contracts before January 1994 (RISK94=1) were in business longer than new risk plans (RISK95=1). The predominant model type was the open-panel type for new risk plans, compared with an almost equal share of open-panel and mixed-model types for older risk plans.

Model Building

Before presenting the results of the multivariate logistic regression, multicollinearity problems are discussed. Afterwards, results of the modeling are presented.

Detection of Multicollinearity

The results from the factor analysis and regression analysis are reported to examine multicollinearity problems among subsets of continuous independent variables. Discrete independent variables are reflective of organizational attributes which are included in model building mainly as control variables. Thus, multicollinearity among these discrete variables is not a major concern in this analysis. Simple correlation tests

were also used to supplement relevant information. Based on these diagnostic tests, modified approaches for model building were employed.

Table 12

Bivariate Analysis of Organizational Attributes by Sample: RISK94=1 vs. RISK95=1

	Percentage of Observing a Given Discrete Variable=1		
Continuous Variables	RISK94=1 (n=95)	RISK95=1 (n=43)	T Statistic
Log (age)	2.59 (0.57)	2.36 (0.70)	1.99 **
Log (size)	11.79 (1.20)	11.56 (1.33)	0.99
Physician pool	3766 (4889)	2935 (3127)	1.20
Physicians per 1,000 enrollees	36.07 (66.08)	62.78 (160.06)	1.05
% Medicare enrollment	16.20 (25.27)	1.17 (3.46)	5.57 ***
Discrete Variables	RISK94=1 (n=95)	RISK95=1 (n=43)	Likelihood Ratio X^2
Model type:			7.51 **
closed-panel	14.74%	13.95	
open-panel	42.11%	65.12%	
mixed	43.16%	20.93%	
Tax-exempt status	68.42%	74.42%	0.52
Medicare experience	96.84%	16.28%	99.49 ***
Medigap product	16.84%	18.60%	0.06
Federal qualification	77.89%	67.44%	1.66
Affiliation:			3.61
independent	24.21%	32.56%	
BCBS	8.42%	16.28%	
other national firms	67.37%	51.16%	
Noncontiguous service area	14.74%	18.60%	0.32

Note. Standard deviation in parentheses.
* $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.

Factor Analysis

The results from the initial factor analysis for continuous independent variables that measure market and resource characteristics indicate four groupings among these

variables. For less ambiguous results, a 6-factor solution with Varimax-rotation was applied. As Table 13.1 indicates, three variables, the number of risk plans (N_RISK94), the percentage of foreign-born population (FOREIGN), and physicians per 1,000 population (MD_POP), especially the last two, had high loadings on Factor 1. Factor 1 might represent the availability of primary care physicians in the service area and was then labeled as F_AVAIL because of high loadings of FOREIGN and MD_POP on Factor 1, though N_RISK94 had a moderate loading. As expected, both the proportion of elderly population (OLD) and the proportion of female elderly population (OLD_F) loaded highly on Factor 2 which reflected the aging of the population in the service area. Thus, Factor 2 was labeled as F_OLD. The market dominance index (MDI) and market share (SHARE) converged on Factor 3, which could be explained as market control of a given HMO, and thus is labeled as F_CONTROL. Both adjusted income level (A_INCOME) and the proportion of large employers (EMPLOY) had high loadings on Factor 4, labeled as F_PROSP, which could be reflective of the prosperity of the service area. The weighted number of competitors (N) loaded highly on Factor 5 (labeled as F_COMPETE), and HMO penetration (PENE) loaded on Factor 6 (labeled as F_PENE). Other variables also had moderate loadings on these two factors, reflecting moderate correlation with N and PENE, which were examined in the subsequent regression analysis. About 88% of total variance in the 11 independent variables in this model was explained by the 6-factor solution, on which basis factor scores were used to determine

subsequent logistic regression modeling. The use of factor scores in model building can help avoid multicollinearity which leads to inefficient, unstable estimates of coefficients.

Table 13.1

Factor Analysis for Continuous Independent Variables: Market and Resource Characteristics

	Factor Loading *						Communality
Variables	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	h_j^2
N	0.169	0.017	-0.272	0.163	0.848 |	0.192	0.885
N_RISK94	0.584 |	0.020	-0.205	-0.306	0.455	0.306	0.779
FOREIGN	0.868 |	-0.010	-0.199	-0.036	0.232	0.191	0.885
MD_POP	0.919 |	0.145	0.090	-0.080	-0.047	-0.018	0.884
OLD	0.085	0.988 |	0.094	-0.042	0.034	0.031	0.995
OLD_F	0.048	0.992 |	0.055	0.022	0.014	0.047	0.992
MDI	0.045	0.095	0.863 |	-0.008	-0.311	-0.057	0.855
SHARE	-0.171	0.071	0.883 |	-0.111	-0.033	-0.189	0.863
A_INCOME	-0.058	0.059	0.015	0.893 |	0.197	-0.137	0.862
EMPLOY	-0.148	-0.107	-0.189	0.770 |	-0.115	0.359	0.805
PENE	0.200	0.095	-0.199	0.074	0.229	0.869 |	0.901
Label	F_AVAIL	F_OLD	F_CONTROL	F_PROSP	F_COMPETE	F_PENE	
Eigenvalue	3.244	2.380	1.772	1.031	0.649	0.631	
Variance Explained	29.5%	21.6%	16.1%	9.4%	5.9%	5.7%	
Cumulative variance	29.4%	51.1%	67.2%	76.6%	82.5%	88.3%	

* Vertical lines indicate large loadings.

Table 13.2 presents the results of factor analysis of the continuous independent variables on HMO characteristics. Both the natural logarithm of HMO age (LN_AGE) and enrollment size (LN_SIZE) grouped together on Factor 1, labeled as F_SIZE. Physicians per 1,000 enrollees (DOC_EN) and the percentage of Medicare enrollment (MCR_P) had unambiguously high loadings on Factor 2 (labeled as F_%DOC) and

Factor 3 (labeled as F_%MCR), respectively. About 90% of variance in these four variables were explained by this 3-factor solution.

Table 13.2

Factor Analysis for Continuous Independent Variables: HMO Characteristics

	Factor Loading *			Communality
Variables	Factor 1	Factor 2	Factor 3	h_j^2
MCR_P	0.071	-0.023	0.991	0.988
LN_AGE	0.886	-0.063	0.174	0.820
LN_SIZE	0.837	-0.278	-0.063	0.783
DOC_EN	-0.203	0.973	-0.027	0.988
Label	F_SIZE	F_%DOC	F_%MCR	
Eigenvalue	1.866	0.994	0.720	
Variance explained	46.6%	24.9%	17.9%	
Cumulative variance	46.6%	71.5%	89.5%	

* Vertical lines indicate high loadings.

Multiple Regression

A set of multiple regression models was constructed to examine potential multicollinearity problems among variables: HMO penetration (PENE), market dominance index (MDI), the weighted number of competitors (N), and market share of the individual HMO (SHARE). As Table 14.1 indicates, both N and SHARE significantly predicted PENE and MDI. Similarly, both PENE and MDI were significant predictors for N and SHARE. It appears that multicollinearity existed among these variables, which raises concern for subsequent logistic regression analysis. That is, inclusion of these four variables in one logistic regression model should be avoided. Alternatively, factor scores can be used as previously described.

Table 14.1

Results of Multiple Regression for Four Independent Variables: Market Characteristics

	Dependent Variable			
Predictors	PENE	MDI	N	SHARE
PENE		0.035	15.04 *	-0.295 *
MDI	0.047		-14.60 *	0.778 *
N	0.007 *	-0.005 *		-0.001
SHARE	-0.210 *	0.416 *	-1.895	
R-square	0.25	0.47	0.30	0.47

* $p < 0.0001$.

Table 14.2 reports the results of the regression analysis for HMO attributes: age (LN_AGE), enrollment size (LN_SIZE), Medicare enrollment as percentage of total enrollment (MCR_P), and contracted physicians per 1,000 enrollees. The regression results confirm the existence of multicollinearity among these continuous variables. The alternate approach using factor scores in the logistic regression suggested above also applies to HMO attributes.

Logistic Regression

Two approaches were used for model building. The first approach was to select one variable among those that are multicollinear for model building. The second approach was to use factor scores for correlated variables. The dependent variable was a discrete variable reflective of an HMO's market entry into a Medicare risk contract during 1994. It was coded as 1 for Medicare market entry and 0 for others.

Table 14.2

Results of Multiple Regression for Four Independent Variables: HMO Characteristics

Dependent Variable

Predictors	LN_AGE	LN_SIZE	MCR_P	DOC_EN
LN_AGE		1.365 **	1.456 **	-114.134 *
LN_SIZE	0.182 **		-0.180	-123.273 **
MCR_P	0.026 **	-0.024		-2.204
DOC_EN	-0.0008 *	-0.0007 **	-0.00009	
R-square	0.34	0.36	0.04	0.16

* $p < 0.05$. ** $p < 0.0001$.

First Approach: Using Original Variables

In the first approach, three groups of correlated variables were identified: (1) PENE, MDI, SHARE, and N; (2) N_RISK94 and FOREIGN; and (3) LN_SIZE, LN_AGE, DOC_EN, and MCR_P. Two other correlated sets of variables, OLD-OLD_F and A_INCOME-EMPLOY, were not used in combination for model building, since previous studies on either HMO development or Medicare risk contracting found them redundant or lacking in empirical specification (see Tables 1 and 2 in Chapter 2). Instead, the solitary variables , OLD and A_INCOME, were included for model building. Additionally, MD_POP was correlated with N_RISK94/FOREIGN and was not used for model building based on the empirical results from prior studies (Adamache & Rossiter, 1986; Porell & Wallack, 1990).

A total of 32 ($4 \times 2 \times 4$) logistic models were constructed. That is, if sorted by variables of market attribute PENE, MDI, SHARE, and N, there were 8 models which differed from one another by the combination of N_RISK94/FOREIGN and

LN_SIZE/LN_AGE/DOC_EN/MCR_P. Among those 8 models, only the results from the model with "best fit" are presented. Model fit was assessed by the -2LogL statistic, often referred to as the likelihood ratio χ^2 statistic, of a model that includes the intercept and the covariates. The lower the value, the more satisfactory model fit. In a similar manner, a χ^2 difference test offers information how covariates improve model fit, or reduce the χ^2 statistics, relative to the model only containing the intercept.

Table 15 shows the results from the four models that fit best. Each differs from one another slightly by the variables included. Consistency of statistical significance was found in four variables across the four models. The positive coefficients of AAPCC, LN_SIZE, and FEDQUAL were statistically significant at least at the p value of 0.05, and GROW was moderately and negatively significant ($p < 0.1$). In general, the correct classification rate for each of the four models was almost 70%. It merits notice that the sample used for model building was the same sample used to validate the model built. Thus, all the correct classification rates reported in this study were inevitably upwardly biased.

Three variables that did not appear in the best-fit models were LN_AGE, DOC_EN, and MCR_P. In other models, LN_AGE had a positive coefficient and the other two had negative coefficients. None of these three variables ever reached statistical significance at the p level of 0.1 in any of 24 models in which these variables were included.

Table 15

Four Models with the Best Fit to Predict HMO Risk Contracting for the Panel Sample: Inclusion of Original Variables

Variables	Model 1		Model 2		Model 3		Model 4	
Competitive Market Structure: Non-elder Market								
GROW	-5.676	*	-5.788	*	-5.862	*	-5.694	*
PENE	0.326	†						
MDI			-0.515	†				
SHARE					-1.773			
N							0.032	†
Competitive Market Structure: Medicare Market								
G_MCR	0.013		0.015		0.013		0.014	
N_RISK94	0.048	†			0.010	†	0.021	†
Resource Availability								
OLD	0.090		0.094		0.110		0.094	
FOREIGN			0.031					
MOVER	-0.012	†	-0.013	†	-0.015	†	-0.015	†
A_INCOME	-0.001	†	-0.000		-0.005	†	-0.001	†
A_INCOM2	0.000	†	0.000		0.000	†	0.000	†
Market Price								
AAPCC	0.009	**	0.007	*	0.008	**	0.008	**
Organizational Attributes								
OPEN	-0.340	†	-0.371	†	-0.540	†	-0.499	†
MIX	-0.410	†	-0.394	†	-0.536	†	-0.504	†
LN_SIZE	0.732	***	0.755	***	0.873	***	0.688	***
TAXSTAT	0.758		0.801		0.804	*	0.782	*
ROLLCARE	-0.513	†	-0.530		-0.576		-0.572	
MEDIGAP	-0.168	†	-0.180	†	-0.254	†	-0.165	†
FEDQUAL	1.073	***	1.130	***	1.067	***	1.108	***
AFFIL1	-0.101	†	-0.075	†	-0.169	†	-0.202	†
AFFIL2	-0.604		-0.612		-0.713		-0.653	
MARKET_C	0.302	†	0.394	†	0.381	†	0.216	†
-2LogL (df=19)	227.54		226.41		226.03		226.70	
χ^2 difference test	54.12	***	55.25	***	55.62	***	54.95	***
Classification rate	69.8%		69.1%		69.1%		69.8%	

† standard error greater than parameter estimate.

* $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.

The magnitude of the coefficients for several variables such as PENE, MDI, N, and N_RISK94 was smaller than that of their standard errors. This indicates residual multicollinearity not detected in the factor analysis. A simple correlation test (the last two rows in Table 16) indicates that N_RISK94 and LN_SIZE were significantly correlated with variables of market attribute.

Table 16

Correlation Matrix of Selected Variables Involved in Multicollinearity

	PENE	MDI	SHARE	N	N_RISK94	LN_SIZE
PENE	1.000					
	(0.0)					
MDI	-0.299	1.000				
	(0.0001)	(0.0)				
SHARE	-0.398	0.651	1.000			
	(0.0001)	(0.0001)	(0.0)			
N	0.437	-0.450	-0.391	1.000		
	(0.0001)	(0.0001)	(0.0001)	(0.0)		
N_RISK94	0.439	-0.304	-0.299	0.448	1.000	
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0)	
LN_SIZE	0.121	-0.143	0.273	0.225	0.098	1.000
	(0.011)	(0.0026)	(0.0001)	(0.0001)	(0.040)	(0.0)

Note. p-value in parentheses.

To further correct this problem and obtain more stable coefficient estimates, stepwise logistic regression was employed to obtain a more parsimonious model, forcing only one of four market attributes (PENE, MDI, SHARE, and N) to be included in separate models. Thus, another 32 models were constructed, and only the four best-fit models are reported in Table 17.

Table 17

Four Models with the Best Fit Using a Stepwise Logistic Procedure to Predict HMO Risk Contracting for the Panel Sample: Inclusion of Original Variables

Variables	Model 1		Model 2		Model 3		Model 4	
Competitive Market Structure: Non-elder Market								
GROW	-4.832		-5.264	*	-5.444	*	-4.796	
PENE	1.339	†						
MDI			-1.279	†				
SHARE					-1.559			
N							0.033	
Resource Availability								
OLD			0.095		0.093			
A_INCOME	-0.0002	*	-0.0002	*	-0.0002	*	-0.0002	*
Market Price								
AAPCC	0.010	***	0.009	***	0.009	***	0.009	***
Organizational Attributes								
LN_SIZE	0.716	***	0.747	***	0.841	***	0.662	***
TAXSTAT	0.779	*	0.810	*	0.807	*	0.778	*
FEDQUAL	0.942	***	0.964	***	0.980	***	1.007	***
AFFIL2	-0.534		-0.552		-0.604		-0.565	
-2LogL	231.78		230.83		229.51		231.29	
χ^2 difference test	49.88	***	50.819	***	52.14	***	50.36	***
Degrees of freedom	8		9		9		8	
Classification rate	69.3%		70.0%		69.8%		69.8%	

† standard error greater than parameter estimate.
* $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.

Compared with the initial four full models reported in Table 15, four reduced models in Table 17 generate similar results in terms of sign and statistical significance of estimated coefficients. Though the full models fit the data better, which was reflected by smaller χ^2 statistics and larger results of the χ^2 difference test, there was no significant gain in classification rate. From the results of the other models not reported in Table 17,

if neither N nor LN_SIZE was included in a specific model, N_RISK94 carried positive coefficients in 9 models, 6 of which were statistically significant at the p level of 0.05.

Based on the above discussion, two revised best-fit models were constructed, each of which included either LN_SIZE (Model 1) or N (Model 2) as seen in Table 18. The largest standardized coefficient in Model 1 was found in LN_SIZE (0.933), followed by AAPCC (0.282) and FEDQUAL (0.269). The odds ratio for FEDQUAL was 2.664. Having federal qualification is a necessary condition for HMOs to participate in a Medicare risk program. The odds ratio of GROW reflects that given a one percent increase in overall HMO enrollment in the service area, it was 5% less likely that an HMO would enter into a Medicare risk market. The odds ratio of AAPCC indicates that a $10 increase in the AAPCC would result in 9% higher likelihood of an HMO entering into a Medicare risk contract. Opposite to what is observed in the bivariate analysis (Table 10), the coefficient of SHARE was negative, though not statistically significant.

If N, instead of LN_SIZE, was included in the model (Model 2 in Table 18), FEDQUAL had the largest standardized coefficient (0.346), followed by N (0.279) and AAPCC (0.266). In addition, the coefficient of SHARE became positive and significant ($p < 0.05$). If the Part A (or Part B) AAPCC rate was substituted for the combined sum of AAPCC rates, it was found statistically significant at the p value of 0.05 in both Models 1 and 2. Comparatively, Model 1 in Table 18 had a correct classification rate better than Model 2, and performs almost as well as the four best-fit models in Table 17.

Table 18

Revised Models with the Best Fit to Predict HMO Risk Contracting for the Panel Sample:

Inclusion of Original Variables

Variables	Model 1 Beta		Model 1 Standardized Estimate	Model 1 Odds Ratio	Model 2 Beta		Model 2 Standardized Estimate	Model 2 Odds Ratio
Competitive Market Structure: Non-elder Market								
GROW	-5.446	*	-0.257	0.947 [a] [0.89, 1.01]	-5.478	*	-0.258	0.947 [a] [0.89, 1.01]
PENE	0.082		0.006	1.001 [a] [0.97, 1.03]	2.065		0.153	1.02 [a] [0.99, 1.05]
SHARE	-1.522		-0.159	0.99 [a] [0.96, 1.01]	2.262	**	0.236	1.023 [a] [1.00, 1.04]
N					0.080	***	0.279	1.083 [1.03, 1.14]
Resource Availability								
OLD	0.092		0.119	1.001 [a] [0.999, 1.002]	0.029	†	0.038	1.000 [a] [0.999, 1.002]
A_INCOME	-0.0002	*	-0.182	0.861 [c] [0.73, 1.02]	-0.000	**	-0.206	0.844 [c] [0.72, 0.99]
Market Price								
AAPCC	0.0090	***	0.282	1.094 [b] [1.03, 1.17]	0.008	***	0.266	1.09 [b] [1.02, 1.16]
Organizational Attributes								
LN_SIZE	0.837	***	0.933	2.309 [1.57, 3.39]				
TAXSTAT	0.806	*	0.204	2.240 [0.91, 5.49]	0.492		0.124	1.635 [0.70, 3.83]
FEDQUAL	0.980	***	0.269	2.664 [1.30, 5.45]	1.259	***	0.346	3.525 [1.71, 7.25]
AFFIL2	-0.602		-0.166	0.548 [0.25, 1.21]	-0.213	†	-0.059	0.808 [0.38, 1.70]
-2LogL			229.51				244.55	
χ^2 difference test (df)			52.14 (10)				37.10 (10)	
Classification rate			69.3%				67.5%	

Note. 95% confidence limits are in parentheses.

[a] denotes odds ratio based on one percent change in the predictor.

[b] denotes odds ratio based on ten units change in the predictor.

[c] denotes odds ratio based on 1000 units change in the predictor.

† standard error greater than parameter estimate.

* $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.

If two revised models in Table 18 were applied to the 1994 cross-sectional sample, some interesting results were observed. In Model 1 that included LN_SIZE, PENE became at least moderately significant. The importance of the combined sum of AAPCC rates was no longer found. If the Part B AAPCC rate was in place of the combined sum of AAPCC rates, it was significant at the p level of 0.05. LN_SIZE still had the largest standardized coefficient. Similar results were also found in Model 2 that excluded LN_SIZE but included N. Appendix D presents the detailed results from the models including the Part B AAPCC rate instead of the combined sum of AAPCC rates.

Second Approach: Using Original Variables and Factors

The second approach was to include both the original variables and factor scores for model building. Table 19 presents the results from three full models.

Model 1 was identical to Model 2 except that ROLLCARE was used in place of F_%MCR in Model 2. ROLLCARE was a dummy variable indicating that an HMO had any Medicare enrollment. This replacement led to a three percent increase in correct classification rate. Thus, the third model included ROLLCARE rather than F_%MCR and excluded F_SIZE, since moderate correlation ($r = 0.3$, $p < 0.0001$) between F_SIZE and F_COMPETE was found in a simple correlation test. Model 3 was one percent less accurate in prediction than Model 2.

Table 19

Models Predicting HMO Risk Contracting for the Panel Sample: Inclusion of Original Variables and Factors

Variables/Factors	Model 1		Model 2		Model 3	
Competitive Market Structure: Non-elder Market						
GROW	-5.587		-5.331		-5.485	*
F_PENE	0.199	†	0.202	†	0.310	
F_CONTROL	-0.056	†	-0.095	†	0.050	†
F_COMPETE	0.403	**	0.432	**	0.578	***
Competitive Market Structure: Non-elder Market						
G_MCR	0.011	†	0.011	†	0.008	†
Resource Availability						
F_OLD	0.431	†	0.177		0.153	†
F_AVAIL	0.034	†	0.050	†	-0.012	†
MOVER	-0.021	†	-0.220	†	-0.024	†
F_PROSP	0.135	†	0.059	†	0.161	†
A_INCOM2	-5.02E-9	†	-3.89E-9	†	-5.19E-9	†
Market Price						
AAPCC	0.009	**	0.008	**	0.010	**
Organizational Attributes						
OPEN	-0.206	†	-0.336	†	-0.562	
MIX	-0.414	†	-0.484	†	-0.504	†
F_SIZE	0.945	**	0.983	**		
F_%DOC	-2.296	*	-2.314	*	-0.949	
F_%MCR	-11.524	†				
ROLLCARE			-0.501	†	-0.372	†
TAXSTAT	0.779		0.742		0.519	
MEDIGAP	0.083		-0.020	†	0.174	†
FEDQUAL	1.088	***	1.108	***	1.390	***
AFFIL1	-0.049	†	-0.092	†	0.086	†
AFFIL2	-0.363	†	-0.381	†	-0.177	†
MARKET_C	0.313	†	0.297	†	0.438	†
-2LogL	231.69		231.01		237.33	
χ^2 difference test	49.96		50.64		44.33	
Degrees of freedom	22		22		21	
Classification rate	65.2%		68%		67%	

† standard error greater than parameter estimate.

* $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.

Across the three models, some consistency is observed. F_COMPETE, AAPCC, F_SIZE, and FEDQUAL were positive, significant predictors. In addition, higher standard errors for several predictors were found, reflective of the multicollinearity among predictors. Thus, a stepwise procedure was employed again to obtain more parsimonious models.

The models using the stepwise logistic procedure did not demonstrate much difference from the full models in Table 19, and are presented in Appendix E. The only differences in terms of statistical significance occurred in the squared term of income level (A_INCOM2) and F_PENE. A_INCOM2 became moderately significant ($p < 0.1$). F_PENE was significant at the p level of 0.1 if F_SIZE was not included in the model. Compared with the full models in Table 19, the reduced models did not lose much in the correct classification rate.

Summary

The empirical results of this study were presented in this chapter. Analyses of the sample data were performed using univariate descriptive statistics, bivariate comparison (t statistics and Likelihood ratio χ^2 statistics), exploratory factor analysis, multiple regression, and multivariate logistic regression.

Univariate Analysis

Based on the results of univariate analyses for the 1994-1995 panel sample (Tables 6 and 7), the measures for HMO age and size were transformed by taking the

natural logarithm of each due to the extremely skewed distribution of these two variables. Open-panel HMOs were the predominant HMO model type among the panel sample. For-profit HMOs accounted for a majority of the study sample.

Bivariate Analysis

The results from the bivariate comparison for the panel sample (Table10) indicate that HMOs with a risk contract were significantly distinct from those that did not have a risk contract in regard to competitive market structure and market price. HMOs with a new risk contract were in the service areas with higher HMO penetration, a lower market dominance index, more competitors, more HMOs that already had a risk contract, and higher AAPCC rates. Risk plans also tended to be older, larger in enrollment size, and have less physician contracts. Most of variables measuring resource availability did not demonstrate statistical importance in distinguishing between the two groups of HMOs in the panel sample. The major difference between results from the 1994 cross-section sample (Tables 8) and those from the 1994-1995 panel sample lies in the significance of variables measuring resource availability and certain AAPCC rates. These differences might be attributable to endogeneity inherent in a cross-sectional sample. When cross-comparing the results from Tables 9 and 11, the significant differences in model type and national firm affiliation disappeared in the panel sample. Based on the bivariate comparison of these two samples, it appears that market factors contributing to previous market entry did not differ much from those contributing to new market entry.

A comparison between the previous market entrants (RISK94=1) and new market entrants (RISK95=1) indicates no obvious differences in organizational attributes except for HMO age and model type (Table 12). That is, the new market entrants were similar to the previous market entrants. Furthermore, 40 HMOs that were excluded from this study because they started their operation after January 1, 1994 did not significantly differ from the 1994-1995 panel sample in organizational attributes. This finding implies that the results from this study may be generalized to HMO samples in the future.

Model Building

Due to multicollinearity among several independent variables, two approaches were used for model building. The first approach used the original variables for model building, and the second approach combined the original variables and factor scores. As shown in Tables 18 and 20, HMO size was the most influential variable, in a relative sense, to predict a market entry decision. Other significant measures included the AAPCC rates and federal qualification status of the HMO. If the measure for HMO size was excluded, the importance of several measures for competitive structure, such as market share and weighted number of competitors was unveiled, which was probably due to correlation of HMO enrollment size and these market attributes. Models combining the original variables and factor scores (second approach) did not lose nor gain much in the classification rate, though the models using original variables had a slightly better model fit and classification rate, especially when the measure for HMO enrollment size was included.

Chapter 6 first summarizes the results of hypothesis testing. Implications from this study are then explored. Finally, limitations of this study and directions for future study are discussed.

CHAPTER 6

DISCUSSION

The purpose of this study is to examine the determinants of the new entry of an HMO into a Medicare risk contract by using a resource dependence-diversification framework. The previous empirical study of this topic is very limited and is conducted before 1990. Organizational theory has not been adopted by previous studies to investigate a market entry of an HMO into a Medicare risk contract. In addition, prior research reflects several methodological weaknesses.

Thus, this study employs a panel design and analyzes recent data with a focus of identifying factors associated with the new entry of HMOs into a Medicare market. The assumption based on resource dependence theory is that an HMO's decision to diversify depends on the stability and availability of environmental resources.

This chapter first summarizes the results of hypothesis testing and discusses responses to research questions. Implications from this study are then explored. Finally, limitations of this study and directions for future study are addressed.

Results of Hypothesis Testing

This study tests twelve hypotheses. Hypotheses 1-4 address the competitive structure in an HMO's commercial market. Hypotheses 5 and 6 are concerned with the competitive structure in an HMO's Medicare market. The importance of resource

availability is tested through the analyses of Hypotheses 7-11. Hypothesis 12 is proposed to test how market price affects a market entry decision. Organizational attributes are included in logistic models mainly as control variables based on prior evaluation (see Table 2). Due to multicollinearity among independent variables, some hypotheses are tested by an alternate approach using factor scores for model building. Results of hypothesis testing based on the revised models with the best fit using two approaches are summarized in Table 20.

H_1: Holding other variables constant, in a service area with low growth rate of HMO enrollment, an HMO is more likely to enter into a Medicare risk contract.

H_1 is moderately supported ($p < 0.1$) across the parsimonious models that include original variables (first approach presented in Table 20). The negative coefficients indicate that a high growth rate of HMO enrollment in a service area discourages HMOs from signing Medicare risk contracts. Favorable conditions such as positive enrollment growth at the industry level in the existing commercial markets allow HMOs to remain self-sufficient and undiversified, rather than seeking other environmental niches such as diversification into a Medicare market in which restrictions are imposed by the HCFA on the size of Medicare enrollment, premiums charged, retainable profit, and marketing activities. Perhaps there is a reticence of HMOs to increase the size of elderly enrollment when they are still trying to enroll the nonelderly and assimilate them to managed care.

Table 20

Entry of HMOs into Medicare Risk Contracts: Results of Hypothesis Testing Using Two Approaches

Variables/Factors		Expected sign	1st Approach Sign	1st Approach P value	2nd Approach Sign	2nd Approach P value
Competitive Market Structure: Non-elder Market						
H_1	Growth in HMO enrollment	–	–	$p < 0.1$	–	NS
					[–	$p < 0.1$]
H_2	HMO penetration †	+	+	NS	+	NS
					[+	$p < 0.1$]
H_3	Market dominance index †	–	----	----	----	----
	Weighted number of competitors †	+	[+	$p < 0.01$]	+	$p < 0.05$
					[+	$p < 0.01$]
H_4	Market share †	?	–	NS	----	----
			[+	$p < 0.05$]		
Competitive Market Structure: Elder Market						
H_5	Growth in Medicare enrollment	+	----	----	----	----
H_6	Number of risk plans †	?	----	----	----	----
Resource Availability						
H_7	% of elderly population †	+	+	NS	----	----
H_8	% of foreign population †	+	----	----	----	----
H_9	(adjusted per capita income)^2	–	----	----	–	$p < 0.1$
H_{10}	Large employers †	+	----	----	----	----
H_{11}	Physician per 1,000 population †	+	----	----	----	----
H_{12}	Adjusted AAPCC rate	+	+	$p < 0.01$	+	$p < 0.01$

Note. Revised models with the best fit in the first approach include original variables (summarized from Table 18) and revised models with the best fit in the second approach include a combined set of both original variables and factor scores (summarized from Appendix D). Results in parentheses are from models which do not include the measure of HMO enrollment size.

† indicates that the factor score instead of the original variable is used for the specific hypothesis testing in the second approach.

---- denotes that variables/factors are not selected into models during the process of model building.

NS denotes that variables/factors are selected into models and their coefficients are not significant at least at the p value of 0.1.

H_2: Holding other variables constant, in a service area with higher HMO penetration, an HMO is more likely to enter into a Medicare risk contract.

H_2 is not statistically supported, though the expected positive sign of the coefficient is observed. If the measure for HMO size is excluded from the model, the factor reflective of HMO penetration (F_PENE) is moderately significant (second approach in Table 20). HMO penetration can be interpreted as either community receptivity or competition. That is, with a higher level of community receptivity of the HMO concept, or a higher level of competition among HMOs in a service area, an HMO is more likely to participate the Medicare risk program.

H_3: Holding other variables constant, in a service area where enrollment concentration is high, an HMO is less likely to enter into a Medicare risk contract.

H_4: Holding other variables constant, an HMO's entry into a Medicare risk contract is associated with its market share.

H_3 and H_4 are proposed to test the importance of an HMO's control over enrollment in its service area. If competitive concentration is reflected by the market dominance index (MDI) which is derived from the concept of the Herfindahl Index, H_3 is not supported, since the MDI is not included in the revised models with the best fit. Alternatively, if the concept of competitive structure is operationalized as the weighted number of competitors (N), H_3 is statistically confirmed ($p < 0.05$). Consistent with the results from the first approach, the results from the second approach indicate that a large

weighted number of competitors in the service area encourages market entry of an HMO into risk contracting. The significance of an HMO's market share proposed in H4 is supported only by the model that does not include a measure of HMO enrollment size.

H_5: Holding other variables constant, in a service area where the growth rate of HMO Medicare enrollment is higher, an HMO is more likely to enter into a Medicare risk contract.

H_6: Holding other variables constant, the number of Medicare risk plans in a service area is associated with an HMO's entry into a Medicare risk contract.

These two hypotheses regarding how the competitive structure of an HMO's Medicare market influences a new market entry decision do not receive empirical support. The corresponding variables (G_MCR and N_RISK94) are not included in models using original variables (first approach) or in models combining original variables and factor scores (second approach).

H_7: Holding other variables constant, in a service area where the size of elderly population is large, an HMO is more likely to enter into a Medicare risk contract.

H_8: Holding other variables constant, in a service area where immigration activity is higher, an HMO is more likely to enter into Medicare risk contract.

H_9: Holding other variables constant, the income level in a service area is non-linearly related to the entry of HMOs into a Medicare risk contract.

The above three hypotheses are concerned with the availability and access of buyers, that is, Medicare beneficiaries. H7 is not statistically supported, though the sign of the estimated coefficient is positive as expected (first approach). Neither is H8 empirically supported.

H9 is moderately confirmed by the second approach, since the coefficient of income level (A_INCOM2) is negative at the p value of 0.1. This result offers moderate evidence that there is a non-linear relationship between the income level in the service area and the new entry of an HMO into a Medicare risk contract. For the dually eligible (Medicare and Medicaid), the option may not exist to permit coverage of the elderly Medicaid population in HMO risk contracting arrangements, though Medicaid managed care enrollment is accelerating (Gold, Sparer, & Chu, 1996) and becoming more available for the elderly. Welch (1996) finds that the dually eligible are less likely to be enrolled in HMOs than other Medicare beneficiaries, and low enrollment of this population could be attributed to administrative difficulties. On the other hand, the elderly with higher incomes have possibly been under fee-for-service their entire life and can afford Medicare supplemental insurance, or may not be aware of the choice to enroll in HMOs. These two segments of the Medicare population are less likely to join HMOs. Consequently, HMOs are less likely to enter the service areas with a larger proportion of low- and high-income population.

H_{10}: Holding other variables constant, an HMO's entry into a Medicare risk contract is positively associated with the existence of large employers in the service area.

H_{11}: Holding other variables constant, an HMO's entry into the Medicare risk contract is positively associated with primary care physicians per 1,000 population in the service area.

The above two hypotheses are proposed to test the importance of availability of payers (large employers) and suppliers (primary care physicians). Neither is empirically supported in this analysis. Perhaps the existence of large employers has little impact on the choice of a health plan by retirees, and consequently no effect on an HMO's entry into a Medicare risk contract. If retirees move out of local areas where their prior employers were located, there may be no association with a local HMO and the HMO's market entry decision. Information from a survey study indicates that large firms are more likely to offer retirement benefits, but managed care plans are less available to retirees (Morrisey, et al., 1990). There is evidence that Medicare beneficiaries with health insurance subsidized by employers are less likely to enroll in HMOs (Dowd, et al., 1994). It seems the existence of large employers inhibits retirees joining HMOs. It is also possible that the new FAS 106 that requires the accounting of future retirement benefits as liabilities does not impact large employers' behavior of purchasing health care benefits for their retirees, or does not show an effect during the time frame of this analysis. Also, it seems

that an adequate supply of primary care physicians does not impact an HMO's decision to risk contract.

H_{12}: Holding other variables constant, an HMO in a service area with higher AAPCC rates is more likely to enter into a Medicare risk contract.

This hypothesis is statistically confirmed across different models in two approaches. The results indicate that higher AAPCC rates encourage a new market entry into a Medicare risk contract, consistent with the findings from prior studies. Thus, it appears that price that is based on the fee-for-service market is an important factor for HMOs. As the managed care environment continues to lower the amount reimbursed for care in the commercial market, the rate determined by the HCFA may be favorable in light of other payers.

Summary of Hypothesis Testing

The results of hypothesis testing indicate that HMOs that enter into a Medicare risk contract were more responsive to the competitive market structure and market price than to resource availability in the service areas. The importance of competitive structure in the HMO commercial market (H_1-H_4) receives at least moderate support. The significance of market price in the service area is strongly supported (H_{12}). However, the competitive structure in a Medicare market (H_5 and H_6) and resource availability (H_7-H_{11}) have little effect on a diversification decision by HMOs.

Not hypothesized, HMO enrollment size is found to be a predominant, positive factor in predicting a new market entry of an HMO into a Medicare risk contract. This

finding is consistent with the assertion of resource dependence theory that the need for environmental linkage increases as firm size increases. In addition, the positive effect of an HMO's enrollment size on risk contract participation supports the argument made by Porell and Wallack (1990) that large HMOs could capitalize on economies of scale if they enter into a Medicare risk contract.

Responses to Research Questions

This study addresses three research questions. The first two research questions inquire how market structure and munificence of environmental resources affect the participation of HMOs into a Medicare risk contract. Results from hypothesis testing suggest that competition encourage new market entry. However, munificence of resources perceived as the size of the elderly population, a mobile population, large employers, and more physicians is not found to have statistical significance in this analysis and thus seems to have relatively little impact on the decision of an HMO to enter a risk contract. Alternatively, it seems only when other resources such as HMO enrollment in the commercial market were in less abundance that HMOs turned to Medicare risk contracting. The number of HMOs has tripled (see Figure 1) and HMO enrollment has increased tenfold (see Figure 4) since the late 1970s. Managed care is no longer an alternative health delivery system. Given the profound changes in the health care system, it is not surprising to observe that factors important for a market entry

decision in the 1990s differ from those in the 1980s. New factors not operationalized in this analysis may contribute to market entry.

The third research question addresses the impact of AAPCC rates on market entry. As odds ratios in Table 18 indicate, given a $10 increase in AAPCC rates, the probability of a new market entry rises by almost 10%. It is reported that an HMO's income per member per month for the elderly may be four times that of the under-65 population (Bell, 1987). Therefore, as higher capitation rates for caring for the elderly under Medicare are available, particularly as other reimbursement rates are being lowered through efforts of managing costs, HMOs increase entry into risk contracting, probably to subsidize commercial products with Medicare products.

Implications

Based on the results of this study, implications can be drawn from different perspectives: methodological, theoretical, and health policy.

Methodological Implications

This study methodologically differs from prior studies of Medicare risk contracting in three aspects: study design, study sample, and market definition.

This study employs a panel design to better verify cause-effect relationships in a way such that the measurement of independent variables precedes the occurrence of dependent variable. Comparatively, the cross-sectional design which is used in prior

studies (Adamache & Rossiter, 1986; Porell & Wallack, 1990) can at best demonstrate an association.

Furthermore, the study sample includes only HMOs that do not have a Medicare risk contract at the first point of time of this analysis (January 1994). The separation of renewing HMOs and all others results in a more homogeneous sample which enhances the internal validity of study results. In contrast, prior studies include both renewing HMOs and all others in cross-sectional samples. Endogeneity bias is inevitable. That is, an HMO's market entry may itself contribute to differences in market structure and market price (Medicare fee-for-service expenditure in the service area).

These methodological differences may explain why some variables are found statistically important in previous studies but not in this study. This discrepancy demonstrates the importance of using an appropriate study design and sample specific to an investigation. A panel design should be employed instead of a cross-sectional design in order to indicate causality. A dissimilar sample should be avoided unless adequate statistical control is ensured. It is also hard to compare this analysis with prior studies, given the fact that the health care system has undergone tremendous transformation.

The third methodological difference exists in the definition of market area for an HMO. This study defines an HMO's market as all counties the HMO claims to serve, instead of the single county where the HMO office is based or an MSA. The use of service area as an HMO's market has recently been adopted in HMO research (for example, Feldman, et al., 1996; Wholey, et al., 1995). This market definition implies that

an HMO has control over the configuration of its market. An HMO is sensitive to the change in market structure and can affect its market dominance, or market share, and its exposure to competition by expanding or condensing its self-declared service area. The definition of an HMO's geographic configuration remains to be a pragmatic issue and methodological challenge, given data limitations. Policy consideration is needed in the way that a geographic unit is used to determine AAPCC rates, and this study shows the applicability of using designated service areas as an HMO's market.

As Table 16 indicates, HMO enrollment size is significantly correlated with variables measuring the market structure such as HMO penetration, market dominance, market share, the weighted number of competitors, and the number of risk plans. It appears that rather than a mere measure of HMO size, HMO enrollment may represent constructs reflective of market structure or market competition when an HMO's market is defined as the entire area it purports to serve.

Theoretical Implications

Prior studies of the entry of HMOs into a Medicare risk contract have not been conducted from a perspective of organizational theory. This investigation is a unique empirical study adopting a resource dependence-diversification framework to explain an HMO's decision to diversify into Medicare risk contracting. A classification rate of about 70% from the results of model building demonstrates the utility of a resource dependence-diversification model in HMO research.

The resource dependence theory posits that diversification is encouraged by a dependency situation that is related to resource availability and concentration. Modified from the diversification literature, this study measures the competition of HMO market structure by several variables, such as HMO enrollment growth rate, HMO penetration, market share of the individual HMO, and the weighted number of competitors. These variables are found to be at least moderately significant in predicting market entry. Thus, the relation of market competition to diversification is empirically supported. However, the importance of resource availability receives little empirical support. This may be in part due to the way resource availability is measured and operationalized, which will be discussed in the section concerning study limitations.

Health Policy Implications

With concern about the budget deficit, the federal government appeals to the success of the private sector that has been moving toward an integrated, capitated care system. The HCFA is aggressively promoting Medicare managed care through risk contracting. A positive response has been elicited from the HMO industry that in the 1990s is still in transition out of its infancy. Correspondingly, the adequacy of current AAPCC rates an HMO with a risk contract receives for providing services to Medicare beneficiaries has received much political attention and methodological criticism.

Previous studies suggest that the AAPCC rate is the most important determinant of HMO market entry in the early years of TEFRA implementation (Adamache & Rossiter, 1986; Porell & Wallack, 1990) and in a rural area (Serrato, Brown, & Bergeron,

1995). From a different perspective, however, Welch (1996) observes that at the MSA level, general HMO penetration rather than the AAPCC rate is the most important predictor of HMO share of the Medicare market. This study finds that HMO enrollment size is a more predominant predictor of HMO market entry, and the AAPCC rate is the second most important factor in the 1990s. With the growth of HMO enrollment, which may be interpreted as a construct of structural competition as discussed previously, an HMO is motivated to seek external linkages, asserted by a resource dependence perspective, though HMOs are still sensitive to the level of AAPCC rates. This finding may relieve some of the worry of policy makers who are concerned about favorable selection experienced by risk plans and are consequently in favor of adjusting or lowering AAPCC rates without discouraging HMO's participation in the Medicare program to a large extent.

As Table 12 indicates, the new market entrants are similar to previous market entrants. A further comparison between the 1994-1995 panel sample and new HMOs that became operational after January 1, 1994 reveals no significant difference in organizational attributes. This observation enhances the generalizability of this analysis to a future sample. That is, the results from this study convey a positive signal to policy makers that as long as an individual HMO, or the entire HMO industry continues to evolve and compete intensively, the entry into a Medicare risk contract seems to be a strategic step that HMOs would take as they strive to survive.

Limitations of the Study

This section discusses the limitations of this study due to study design, data availability, and variable measurement.

This study employs a panel design with only a one year time lag. In formulation of the study, staff in the HCFA and certain HMOs were consulted as to the length and appropriateness of the lag time needed to arrange a risk contract. A one year time lag might still be arbitrary, recognizing that the entire application-approval legal process varies by HMO as well as by geographic area in which an HMO is located. In addition to the legal process, it takes time to develop network. In order to accommodate the needs of Medicare beneficiaries different from the non-elderly population, HMOs need to expand their provider network, rather than using the existing network, to be successful in the Medicare business. Thus, a longer lag time might be appropriate given the importance of enrollment size, legal process, and network development.

Another issue consequent to the use of one year as the time lag for this study, and also in part due to the nature of risk contracting, is the small number of events, that is, new market entrants in this study. One restrictive rule proposed by Daley and Shwartz (1994) states that in order to obtain reliable coefficients, the number of predictors in a logistic regression model should not be more than 10% of the number of events. In this study, there are 43 new market entrants during the 1994-1995 time period, and thus no more than 5 predictors should be included in the logistic regression model, if the above rule is followed, which is not always necessarily the case. As a matter of fact, 10

predictors are included in the final revised models (Table 18). The low incidence of new market entry of HMOs during the 1994-1995 time period might explain in part why the correct classification rate is moderately high around 70%. These limitations could be overcome to a certain extent by adopting a wider time span and utilizing a survival technique which is able to account for censored cases.

The sample used for model building is the same sample used for validating the model built in this analysis. Thus, the correct classification rate is upwardly biased. A hold-up sample is not employed for validating the derived model in this study with a concern of declined statistical power due to a reduction of an effective sample size.

It could be argued that strategic adaptation by HMOs is possible in response to environmental changes and organizational performance. However, this study addresses only one of several strategic responses, diversification into a Medicare risk market. It would be desirable to include other organizational changes as dependent variables using multinomial logistic regressions to assess various responses to the environmental changes.

The level of Medigap premiums has long been descriptively suggested to have an impact on HMO's market entry into a Medicare market. However, the lack of consistently available information on Medigap premiums prevents Medicare supplemental insurance from being empirically tested in this study.

One major category of independent variables omitted from this study is the financial performance of HMOs. Financial data could provide better indicators reflective

of organizational slack or internal resources that either afford an HMO the ability to diversify or buffer it from getting involved in any organizational change. Though commercially available from Health Care Investment Analysts of Baltimore, Maryland, HMO financial data are not affordable for this study. Without inclusion it is not known if those variables would have been accurate and would have matched the sample in this analysis. Omission of important variables such as HMO financial indicators in this analysis may lead to inefficient estimates of the included variables (Kmenta, 1986). That is, it is less likely to find significant coefficients for the variables included.

Another data limitation is associated with the content of secondary surveys used in this study. Neither InterStudy nor GHAA/AAHP in its annual or semi-annual census asks managed care plans about their organizational goals and strategic orientation. As Evan and Klemm (1980) suggest, an organizational goal is critical in determining whether an organization will respond to environmental opportunities given certain internal resources or slack.

Omitting the variables discussed above, in addition to the low incidence rate of new market entry during the one year period of time studied, may offer some explanation why the correct classification rate is not as high as it might have been.

As discussed in the previous section, there is little support for the hypotheses proposed to investigate the importance of resource availability in the service area. It is possible that measurement of some variables is not without problems but limited due to data availability. For example, a foreign-born population does not necessarily represent

immigrants who are less likely to have a regular physician. A physician-patient relationship for an immigrant is also contingent upon how long ago one immigrates into the U.S. and to the degree to which one is acculturated. In addition, it may be far from ideal to operationalize in-migration activity, or geographic mobility of local residents by the percentage of population aged 5 or over who reside in different states within the past five years. However, these measures are the ones publicly available from the County and City Data Book.

Another concern regarding the construct validity of the foreign-born population is that this variable may not operationalize a physician-patient relationship. Among all HMOs in the panel sample, those in California and Florida have the highest percentage of foreign-born population in their service areas. Thus, it appears that the measure of the foreign-born population represents a regional effect. Furthermore, when examining the regional distribution of new market entrants, 6 out of 43 new risk plans are in California, and 4 in Florida and Pennsylvania, respectively. Among the 48 states that HMOs in the panel sample are identified with, new risk contracting does not take place in 30 states. The regional effect on market entry is possible but not hypothesized nor tested in this study.

Suggestions for Future Study

Future study could be conducted based on the findings and limitations of this study. Several different directions are considered.

Study Design

The lagged panel design used in this study can better reveal cause-effect relationships between predictors and an HMO's diversification decision. As discussed above, however, expanding the time window to more than one year is preferred in order to capture a more realistic, long-term situation and increase the number of events. Alternatively, a longitudinal design covering more than a one year cross-section sample with a concomitant survival analytic technique might better explore the issue.

HMO development in general, or Medicare risk contracting in particular, in the rural areas has received little empirical attention. HMO research has focused primarily on metropolitan areas. This may be due to the fact that HMOs have historically concentrated in certain urban areas, but that does not obviate the necessity of studying the pattern of service provision by HMOs in the rural areas. If feasible in terms of statistical power (that is, a reasonable sample size), it would be desirable to conduct a separate investigation for HMOs that primarily serve rural areas, or geographically expand into rural areas. Similarly, analysis of subset samples by the level of HMO penetration in the service areas may provide a more homogeneous sample and subsequently enhance the internal validity of the study. To improve the classification rate or predictive accuracy, the use of a hold-up sample to validate the model derived is preferred in order to obtain unbiased estimates of classification rates.

Measurement Issues

Resource concentration is an important construct predicting organizational change as proposed by the resource dependence theory. However, operationalization of resource concentration, or structural competition, varies among prior health service-related studies in general, or HMO studies in particular. Variation in measurement results from differences in the research focus, unit of analysis, the definition of market (or service area), and data availability. Thus, these inconsistencies may lead to different interpretation of results as well as different implications which could be drawn from the studies.

The Herfindahl Index has often been used as a measure of resource concentration. The utility of Herfindahl Index in HMO research has been questioned and criticized (for example, Feldman, et al., 1996; Wholey, et al., 1995). Instead, the number of HMOs in an HMO's operating area has been used to measure the competitive structure in the HMO industry (Feldman, et al., 1996; Wholey, et al., 1995). To measure competitive concentration confronted by an HMO, this study uses both the weighted number of HMOs in an HMO's service area and a modified Herfindahl Index which is interpreted as a market dominance index. The results reflect that the weighted number of HMOs in the service areas is a better predictor of a new market entry than the market dominance index. This finding lends some support to the critics that the Herfindahl Index is not an appropriate measure of competition in the HMO industry. Based on empirical evidence, future HMO studies may use a weighted number of HMOs to measure competitive

concentration. Moreover, the validity of these two measures should be subject to further exploration, varying the unit of analysis and the market definition. The quantitative comparison of market structure measurement among different market definitions, such as headquarter county, a single MSA, multiple MSAs, state of operation, and the service area, is also desirable.

Conclusions

This study is guided by a resource dependence-diversification framework to explain why HMOs entered into a Medicare risk contract. About 10% of HMOs in the 1994-1995 panel sample diversify into a Medicare risk market after January 1994. The results of this study demonstrate the appropriateness of a panel design to verify a cause-effect relationship and the applicability of the service area as the definition of an HMO's market in health services research. This study also contributes to the theoretical understanding of HMO's market entry and illustrates the utility of organizational theory in describing HMO behavior. The status of federal qualification is a necessary condition for market entry as required by law. HMOs are sensitive to the level of AAPCC rates in making a market entry decision. As HMO enrollment size grows, the need for environmental linkages increases, motivating HMOs to diversify, as indicated by resource dependence theory.

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APPENDICES

Appendix A

Comparison of the Different Market Definitions for HMOs

There are multiple ways that one can define the market area of an organization. As part of the measurement analysis for this investigation, a number of variations are examined to represent the market an HMO serves. An HMO's market has been empirically defined as headquarter county (Adamache & Rossiter, 1986), MSA(s) (Christianson, et al., 1991; Cromley & Shannon, 1983; McLaughlin, 1987; McNeil & Schlenker, 1975; Morrisey & Ashby, 1982; Porell & Wallack 1990; Schlesinger, et al., 1986; Welch, 1984; Wholey, et al., 1990; Wholey, et al., 1992), state (Ginsberg & Buchholtz, 1990), or service area (Feldman, et al., 1993; Feldman, et al., 1995; Wholey, et al., 1995).

In this study, only 33, or 6% of the 535 HMOs in the 1994 cross-sectional sample serve only one county. The phenomenon that the state where an HMO is headquartered is not the state(s) the HMO claims to serve is observed for 12 HMOs. By defining the headquarter county as the market that an HMO serves understates the operating locations for most of the HMOs. Headquarter county also misrepresents the service location for some HMOs.

Of all the HMOs in the 1995 InterStudy census, 22% of the HMOs report that they serve rural counties only. Thus, the use of an MSA definition is biased against rural

HMOs or those primarily serving a rural area. The MSA definition also does not accurately reflect the market configuration for HMOs serving urban-rural mixed areas.

The remainder of this appendix presents a graphic comparison between MSA(s) and service area as an HMO's market definition using county representations. For simple demonstration, Arizona and 5 HMOs in Arizona are selected for the following discussion. According to the U.S. General Accounting Office (1996), Arizona is the third largest state with regard to the number of Medicare beneficiaries enrolled in risk-contract HMOs as of August 1995, following California and Florida. In the 1994 cross-sectional sample, 10 out of 535 HMOs (2%) are in Arizona. Of 95 HMOs with Medicare risk contracts, 5 HMOs (5%) operate in Arizona. That is, the participation rate in Medicare risk contracting is 50% in Arizona, second to Oregon and New Mexico (67% for each state).

Figure A1 pictorially illustrates the 4 MSAs in Arizona, which comprise 5 counties in Arizona. The Las Vegas metropolitan area also covers two counties in Nevada. The shaded areas in Figures A2-A6 reflect the self-declared service areas of 5 HMOs that serve Arizona. HMO_1 (see Figure A2) serves two counties which constitute the Phoenix-Mesa MSA. For this HMO, the market definition of a single MSA is the same as that of the reported service area. The service area of HMO_2 (see Figure A3) covers 5 counties, only one of which constitutes entire the Tucson MSA. In the case of HMO_2, the use of a single MSA understates the market configuration. Figure A4 shows that HMO_3's service area includes two counties which compose the entire Tucson MSA and part of the Phoenix-Mesa MSA. Neither a single MSA nor two MSAs are accurate to

reflect HMO_3's service area. The self-declared service area by HMO_4 (see Figure A5) spans 3 urban counties (two MSAs, Phoenix-Mesa and Tucson) and 6 other rural counties. HMO_5 covers the entire state of Arizona, that is, 4 MSAs and all other rural counties (see Figure A6). For these two HMOs (HMO4 and HMO5), even multiple MSAs underdefine their service areas.

Through this very simple representative analysis it becomes clear that among several possible definitions for an HMO's market, such as a headquarter county, a single MSA, multiple MSAs, state of operation, and the service area, only the service area definition can better approximate the true operating area of an HMO. As a matter of fact, the market definition of self-declared service area implies that HMOs interact with the environment and have control over the configuration of their market. HMOs can not only modify their exposure to environmental opportunities and threats, but also affect market competition by expanding or shrinking their service areas. Thus, the service area is a more logical and pragmatic definition for an HMO's market than other market definitions.

Figure A1. All Urban Counties in Arizona.

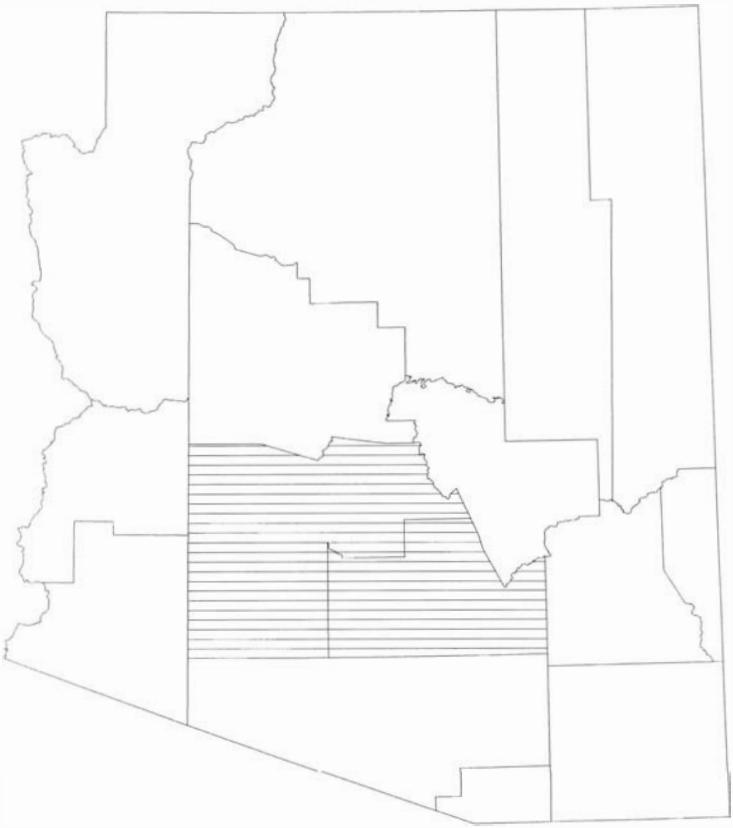

Figure A2. Reported Service Area of HMO_1.

Figure A3. Reported Service Area of HMO_2.

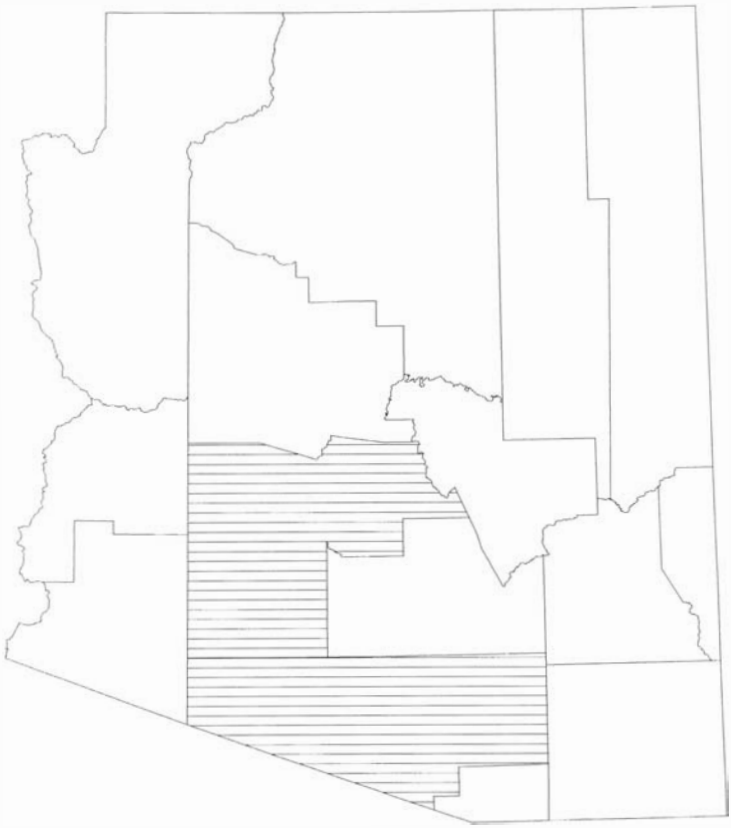

Figure A4. Reported Service Area of HMO_3.

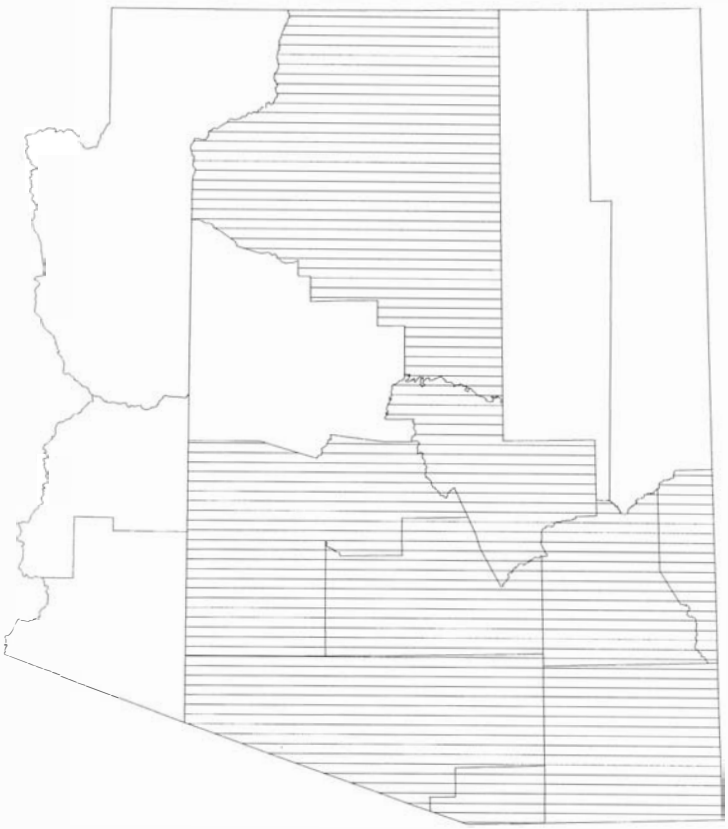

Figure A5. Reported Service Area of HMO_4.

Figure A6. Reported Service Area of HMO_5.

Appendix B

Methods of Data Aggregation:

Independent Variables Measuring Market Structure and Resource Availability

Components of the variable	Aggregation
Competitive Market Structure: Non-Elderly Market	
Growth in enrollment	
HMO enrollment for a given year	sum of HMO enrollment across counties in the service area for a given year
HMO penetration across the market	
total HMO enrollment	sum of HMO enrollment across counties in the service area
market population	sum of total population across counties in the service area
Market share of the individual HMO	
individual HMO enrollment	the enrollment of the individual HMO reported to InterStudy survey
total HMO enrollment	(see above)
Competitive concentration	
market share of the HMO	(see above and Appendix C)
Competitive Market Structure: Medicare Market	
Growth in Medicare enrollment	
Medicare enrollment for a given year	sum of Medicare enrollment under risk contracts across counties in the service area for a given year
Resource Availability	
Population aged 65 or over	
elderly population	sum of population aged 65 or over across counties in the service area
Migration activity	
foreign-born population	sum of foreign-born population across counties in the service area
Female elderly	
female aged 65 or over	sum of female population aged 65 or over across counties in the service area

Appendix B (continued)

Income	sum of per capita income across counties in the service area, weighted by county population and adjusted for wage index
Large employers	
number of large employer	sum of employers with 250 or more employees across counties in the service area
total establishment	sum of establishments across counties in the service area
Physicians per 1000 population	
number of physicians	sum of primary care physicians across counties in the service area
Market Price	
AAPCC	
Part A (or B) aged AAPCC	sum of Part A (or B) aged AAPCCs across counties in the service area, weighted by the number of Medicare beneficiaries in the county, adjusted for wage index

Appendix C

Process of Prorating an HMO's Enrollment over Counties in its Service Area and Measurement of HMO Enrollment-Based Variables

Prorating Process

The prorating process in this study follows the approach adopted by Christianson, Sanchez, et al. (1991). The first step is to use InterStudy census and GHAA directories to define an HMO's enrollment. The second step is to use county population as weights to allocate enrollment over all counties in the HMO's service area. For example, an HMO with total 1000 enrollees operates in County A and County B. The population size for County A and County B is 10,000 and 30,000, respectively. One quarter of the HMO enrollment, or 250 enrollees are allocated to County A, and three quarters (750 enrollees) are allocated to County B.

The Appropriateness of Using County Population as the Prorating Weight

Wholey et al. (1995) argued that the method used by Christianson, Sanchez, et al. *(1991)* might cause measurement errors if HMO enrollment does not distribute in the same proportion as county population. Instead, they used the information from the 1994 InterStudy survey to allocate HMO enrollment to MSAs served. They used county population as the weight only to allocate enrollment to counties within a MSA. This method is still not without measurement errors.

First, it should be noted that InterStudy asked HMOs to list MSAs served and to estimate the proportion of their enrollment from each MSA. This estimation would introduce errors in allocating enrollment to MSAs. Second, HMOs may not operate in all counties constituting a MSA. Using MSAs as the unit of market area and then allocating enrollment to MSAs would bias against HMOs that operate in an urban-rural mixed area, or primarily in rural counties. Moreover, prorating enrollment over counties in a MSA causes the same possible errors as Christianson, Sanchez, et al. (1991) do, as critiqued by Wholey et al. (1995).

Without any validation effort, one cannot be sure that the method developed by Wholey et al. (1995) is superior to that used by Christianson, Sanchez, et al (1991). In fact, Wholey's method involves more steps in calculation and probably may be exposed to more sources of measurement error. In this study, an effort is made to try to validate Christianson's approach, rather than to prove the superiority of either method.

Since county-level HMO enrollment data are not available, there is no direct way to demonstrate that HMO enrollment distributes in the same proportion as county population. Instead, there is evidence that states with higher total HMO enrollment have higher Medicare enrollment in HMOs (U.S. General Accounting Office, 1996), though the association at the county level is neither clear nor testable. In addition, Welch (1996) reports that on the MSA level general HMO market penetration is a significantly positive variable in predicting HMO penetration in the Medicare market.

In the first step of validation, thus, county-level Medicare enrollment in HMOs is used as the weight to prorate an HMO's enrollment over all counties in its service area. (Data on county-level Medicare enrollment in HMOs are available from the HCFA and are assumed to be accurate, since this data set is linked to the HCFA's financing function.) The resulting county-level HMO enrollment is denoted as $ENROLL_1$, and the county-level HMO enrollment calculated by using the method of Christianson, Sanchez, et al. (1991) is denoted as $ENROLL_2$. The second step is to correlate $ENROLL_1$ with $ENROLL_2$. The high correlation between $ENROLL_1$ and $ENROLL_2$ ($r = 0.96$) sheds light on the appropriateness of using county population as the weight.

Measurement of HMO Enrollment-Based Variables

1. Total HMO enrollment. Total HMO enrollment in Service $Area_i$ which is unique to HMO_i is calculated by adding the enrollment of all HMOs (including HMO_i and others) in Service $Area_i$.

2. HMO penetration. HMO penetration in Service $Area_i$ is calculated by total HMO enrollment in Service $Area_i$ divided by total population in Service $Area_i$.

3. Market share. The market share of HMO_i in Service $Area_i$ is HMO_i's enrollment divided by total HMO enrollment is Service $Area_i$. The market share of HMO_j in Service $Area_i$ is the enrollment contributed by HMO_j to Service $Area_i$ divided by total HMO enrollment in Service $Area_i$.

4. Market dominance index (MDI). The MDI for Service Area$_i$ or HMO$_i$ is the sum of squared market share for each HMO in Service Area$_i$. HMOs with smaller market shares in HMO$_i$'s service area contribute relatively less to HMO$_i$'s MDI.

5. Weighted number of competitor. HMO$_j$ is considered to be a competitor to HMO$_i$ if HMO$_j$'s service area overlaps that of HMO$_i$ by at least one county, with HMO$_j$'s enrollment proportion in service area$_i$ as the weight. For example, there are three HMOs (HMO$_1$, HMO$_2$, and HMO$_3$) in Service Area$_1$. HMO$_2$ and HMO$_3$ have 60% and 30% of their enrollment in Service Area$_1$, respectively. Thus, the number of competitors in Service Area$_1$ is 1 (HMO$_1$) plus 0.9 (0.6 + 0.3).

Appendix D

1994 Cross-Sectional Model of HMO Risk Contracting Activity

Variables	Model 1			Model 2		
	Beta		Standardized Estimate	Beta		Standardized Estimate
Competitive Market Structure: Non-elder Market						
GROW	-0.591	†	-0.026	-0.806	†	-0.036
PENE	1.829	*	0.151	2.740	***	0.226
SHARE	-0.105	†	-0.011	2.490	***	0.255
N				0.076	***	0.300
Resource Availability						
OLD	0.008	†	0.010	-0.023	†	-0.030
A_INCOME	-0.0002	***	-0.276	-0.0002	***	-0.286
Market Price						
Part B AAPCC	0.010	**	0.157	0.009	**	0.139
Organizational Attributes						
LN_SIZE	0.625	***	0.681			
TAXSTAT	0.045	†	0.011	-0.105	†	-0.027
FEDQUAL	1.137	***	0.314	1.401	***	0.386
AFFIL2	0.595	*	0.164	0.777	**	0.214
-2LogL	385.05			396.36		
χ^2 difference test	115.38	***		104.07	***	
Degrees of freedom	10			10		
Classification rate	71.8%			70.3%		

Note. If the combined sum of AAPCC rates instead of the Part B AAPCC rate was included in the models, it was not statistically significant.

† standard error greater than parameter estimate.

* $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.

Appendix E

Models Using Stepwise Procedure to Predict HMO Risk Contracting: Inclusion of Original Variables and Factors

	Model 1			Model 2		
Variables/ Factors	Beta	Standardized Estimate	Odds Ratio	Beta	Standardized Estimate	Odds Ratio
Competitive Market Structure: Non-elder Market						
GROW	-4.923	-0.232	0.952 [a] [0.90, 1.01]	-5.045*	-0.238	0.951 [a] [0.90, 1.01]
F_PENE	0.267	0.147	1.306 [0.90, 1.90]	0.352*	0.194	1.422 [0.99, 2.04]
F_COMPETE	0.392**	0.216	1.480 [1.07, 2.04]	0.547***	0.302	1.728 [1.29, 2.32]
Resource Availability						
A_INCOM2	-3.5E-9*	-0.178	1.000 [c] [1.00, 1.00]	-3.5E-9*	-0.181	1.000 [c] [1.00, 1.00]
Market Price						
AAPCC	0.010***	0.315	1.105 [b] [1.04, 1.18]	0.010***	0.321	1.107 [b] [1.04, 1.18]
Organizational Attributes						
F_SIZE	0.837**	0.461	2.310 [1.07, 4.97]			
F_%DOC	-2.200*	-1.213	0.111 [0.01, 1.21]	-1.002	-0.552	0.367 [0.10, 1.31]
TAXSTAT	0.541	0.136	1.717 [0.75, 3.92]	0.288	0.073	1.334 [0.61, 2.94]
FEDQUAL	0.990**	0.272	2.692 [1.25, 5.78]	1.263***	0.347	3.538 [1.71, 7.34]
-2LogL		235.27			241.21	
χ^2 difference test (df)		46.39 (9)			40.34 (8)	
Classification rate		67.5%			66.4%	

Note. Model 2 differed from Model 1 only in one aspect that F_SIZE was not included; 95% confidence limits are in parentheses; [a] denotes odds ratio based on one percent change in the predictor; [b] denotes odds ratio based on ten units change in the predictor; [c] denotes odds ratio based on 1000 units change in the predictor; since the magnitude of the coefficient for A_INCOM2 was very small, the odds ratio approached zero.

* $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.

Vita