

Reputation and Disenrollment: Role of Consumer Information in Health Insurance Markets

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* The authors thank the seminar participants at the University of California at Irvine and the University of Southern California for their comments.

평판과 탈퇴 : 의료보험시장에서의 소비자정보의 역할

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〈Abstract〉

We model that separation is a rational decision to resolve the inherent uncertainty about quality from the matching process. In health insurance markets, quality of services is revealed to consumers only after enrollment. Discrepancies between the expected and

realized quality lead utility-maximizing enrollees to disenroll if they find a better alternative. Accordingly, factors that reduce this discrepancy will decrease disenrollment. The firm-level empirical analysis shows that disenrollment is relatively small in markets where the reputation effect works efficiently because consumers can predict the expected quality accurately.

〈국문초록〉

구매(혹은 가입이나 취업)에 관한 의사결정과정에서는 그 대상이 되는 재화나 서비스의 질을 미리 경험하지 못하고 선택을 하므로 필연적으로 불확실성과 불완전 정보에 의한 문제가 발생한다. 본 논문에서는 탈퇴(혹은 이직)와 같은 결별(separation)을 재화나 서비스의 질에 대한 불확실성에서 연유하는 문제를 사후적으로 해결하기 위한 합리적 행동으로 모형화하여 분석한다. 본 논문의 주된 분석대상인 미국의 의료보험에서 소비자가 보험을 구매할 때 기대했던 서비스의 질과 구매후 경험한 실제 서비스의 차이가 클수록 소비자는 기존의 보험으로부터 탈퇴할 유인이 커진다. 따라서 소비자가 구매 의사결정과정에서 서비스 질에 관한 기대치를 더 정확하게 형성할수록 서비스질 기대치와 실제치의 차이가 줄어들어 소비자의 탈퇴는 감소하는데, 평판(reputation)이 잘 작동하는 시장일수록 소비자가 기대되는 서비스 질을 미리 예측하기 쉬워진다. 본 연구는 개별 소비자를 분석단위로 했던 종전의 연구와는 달리 개별 기업을 분석단위로 하여 시장수준에서 평판이 불완전정보하의 소비자행동에 미친 영향을 분석한 데 의의가 크다.

I. Introduction

Quality of services, especially health services, is hard to observe and measure. Uncertainty and information asymmetry about the quality of services between providers and consumers complicates consumers' decisions about purchasing services. Despite the constraint of incomplete information about quality, rational consumers appear to choose among providers based on price and expected quality. When consumers purchase health

insurance, for example, health maintenance organizations (HMOs), they gather available *information*, estimate the expected quality of specific insurers, and choose one, trying to maximize quality for a given premium.¹

If *reputation* works effectively in the market, providers' incentive to cheat consumers should be reduced because short-run gains from reducing quality and "milking" reputation will be offset by decreased demand in the long-run.² The more effective the reputation of providers in the market, the more accurately consumers perceive providers' cheating, and hence the smaller the firms' gain from cheating because consumers switch to other providers. Reputation therefore mitigates problems associated with information asymmetry by affecting the behavior of sellers concerned about the future demand for their services (Holmstrom 1985).

This paper explores and tests empirically the role of reputation in consumer decision making in health care markets --how does reputation affect consumer estimation of expected quality and choice of insurance? We test the effect of reputation on consumer behavior by analyzing consumer decisions to *stop buying* --their decisions to disenroll from the HMO. Since the market share of HMOs is increasing and managed care is expected to play an important role in cost containment efforts, the analysis of the factors affecting the disenrollment from HMOs will provide us with the insight on the dynamic aspects in this large health insurance market.

With respect to risk selection, some believe that people with greater needs for health care are more likely to quit HMOs because of the limited choice of providers and more constrained practice styles³ (e.g., Leibowitz et. al. 1992). This argument makes sense if consumers are assigned to HMOs by a *compulsory* policy (i.e., involuntary enrollment). But, if the choice of the HMO is voluntary and rational, why do enrollees want to leave the plan that they once chose? Perhaps enrollees cannot foresee their future health status because of its stochastic nature. Thus, if their health status gets worse after enrollment, they might want to disenroll from their current plan and choose traditional insurance (risk-selection argument). However, people disenrolled from current HMOs in this study

are expected to choose either traditional insurance or other HMOs in the market, although we cannot differentiate between those two different types of disenrollments. Furthermore, if we assume constant enrollee health status (in a *static* sense), what can explain disenrollment in HMOs?

Consumers are concerned primarily about two properties of HMOs --premium and quality. Premium (i.e., price) is accessible to consumers by search whereas all aspects of quality are not. Uncertainty about experience characteristics of which a person cannot be aware even after search leads to rational separation decisions (e.g., divorce in Becker 1977; worker quit in Wilde 1979). Therefore, uncertainty about HMO quality prior to enrollment causes rational disenrollment, when experiences fall short of expectations. Rational consumers collect information about the premium and quality of HMOs, and choose HMOs based on these characteristics. However, only enrollment in the HMO enables consumers to use medical services and experience actual quality. Our major hypothesis is that the greater the *discrepancy* between expected quality and actual quality, the more likely the enrollee will want to leave the current plan and search for a better match. The discrepancy results either from consumers' inaccurate beliefs (expectations) about quality or from the variations (changes) in the actual quality during their enrollment.

Previous analyses of disenrollment have been based on the disenrollment of *individual* enrollees from a sample of one or several HMOs (e.g., Long et. al. 1988). In contrast, the firm-level model and cross-sectional empirical analysis used in this paper focus effects on disenrollment of *plan-specific* characteristics --associated with the production of actual quality-- and *market* conditions including reputation and consumer information --related to the accuracy of the consumers' expectation of HMO quality.

II. Model: Reputation and Disenrollment in HMOs

Assume that people have different degrees of willingness to pay for quality of medical services, and hence have different preferences for quality-cost mix in the market for managed care plans. A consumer collects information about the quality of services (or its distribution) to estimate expected HMO quality prior to enrollment. A rational consumer enrolls in the HMO that provides the maximum expected quality, taking the premium into consideration. After enrollment, a consumer experiences actual quality, leaving the current plan if switching to another plan increases utility. In other words, disenrollment is a utility-maximizing behavior. If the discrepancy between expected quality and actual quality is too great, rational enrollees will want to leave the plan and choose an alternative plan that is expected to provide greater utility than the current one, based on the revised expectation --i.e., posterior beliefs about quality.

The discrepancy is caused either by enrollees' inaccurate expectation of quality or by the dynamic aspect in the production of actual quality of medical services, i.e., deterioration of quality over time. Accurate estimates of quality before enrollment should cause enrollees to remain in the plan because their expectations regarding service quality are fulfilled. Even if quality of services in a specific HMO is poor, a rational enrollee should not quit if he or she correctly anticipated this level of quality and chose that HMO because its premium-adjusted quality yielded the desired utility (due to low premium, for example). In contrast, even if actual quality is high, some enrollees may want to leave an HMO if they expected even higher quality. Therefore, factors facilitating consumers' *accurate* estimation of expected quality should decrease disenrollment. Disenrollment should increase when "noise" increases in the process that determines reputation for quality in the market.

Even when enrollees make an accurate estimation of expected quality, they may decide to disenroll from an HMO if the quality of services deteriorates after enrollment. Time-varying quality of services hinges upon the HMO's *willingness and ability* to

maintain its level of quality or to manage consumer satisfaction efficiently. If the HMO "milks" its reputation, quality may deteriorate over time, and rational enrollees, perceiving this quality change, should want to leave. Sometimes, even if an HMO wants to preserve its reputation, difficulty in the efficient monitoring and management of quality and consumer satisfaction may limit its ability to keep quality from deteriorating. Therefore, health care market structure and plan-specific characteristics that are related to producing quality will influence disenrollment.

Consumers' estimation of the quality of medical services may be modelled by viewing medical care as a *reputation good*.⁴ The search for a reputation good is similar to a "word-of-mouth" search in which each consumer searches randomly among other consumers who recommend providers based on their experience (Butters, 1977). For that purpose, one needs to specify two types of procedures : (a) how experienced consumers evaluate the quality of services (*quality observation or perception*), and (b) how this information is transmitted to potential enrollees (*communication*).

Suppose that an experienced consumer i observes service quality q with errors so that

$$q_i = q + e_i, \quad \text{where } e_i \sim N(0, \sigma^2)$$

with q denoting the true quality of services. The error term e is assumed to be normally distributed with mean zero and variance σ^2 . This error-ridden process of quality valuation reflects the inherent information asymmetry in health care markets --the fact that consumers cannot accurately observe or evaluate the quality of medical services.

Because medical services are not purchased or experienced frequently, receiving information from experienced people is critical for consumers' estimation of expected quality; the communication process must be modelled among experienced consumers and prospective enrollees. Avoiding the details of information reservation (e.g., consumer's loss of memory over time) and dissemination, we propose the following simple and static process of information gathering. To inquire about quality, a prospective HMO enrollee

picks a random sample of individuals of size M from the market. Searching for all experienced consumers in the community to obtain recommendations is too costly. Let m denote the number of consumers who have experience with a given HMO in the sample ($m \leq M$). A prospective enrollee then gets the estimate of the expected quality (sample mean),

$$\bar{q} = \sum_{i=1}^m q_i/m = q + \bar{e}, \quad \text{where } \bar{e} = \sum_{i=1}^m e_i/m$$

From this process of quality valuation and information dissemination, the prospective enrollee gets the *unbiased* estimate of the true quality q with variance σ^2/m . In other words,

$$E(\bar{q}) = q \quad \text{and} \quad \text{Var}(\bar{q}) = \sigma^2/m.$$

In this process of reputation formation, the accuracy of expected quality is determined by the number of experienced consumers m in the sample of size M . This number depends on several factors associated with HMO-specific variables and characteristics of population and market. Among HMO characteristics, HMO size (the number of enrollees in the HMO) and HMO age play critical roles in reducing the variance of the expected quality. The larger the number of HMO enrollees and the older the HMO, the larger the number of experienced consumers in the overall sample (i.e., larger m), and the smaller the variance (σ^2/m). Consequently, the consumer can predict the quality of services more accurately for a larger, older HMO than a smaller, newer one.

Population mobility should affect disenrollment. Increasing mobility reduces the percentage of experienced consumers in the market, leading to a smaller number of experienced consumers in the sample drawn in the search process (therefore larger variance σ^2/m) and inaccurate estimation of expected quality. Population mobility will, therefore, increase disenrollment by decreasing the efficiency of the reputation effect

Larger *numbers of* HMOs in the market decrease the amount or quality of information that average consumers have on each HMO⁵ --i.e., the more HMOs in the market, the less accurate the estimation of expected quality for each HMO. On the other hand, if there is *quality competition* among HMOs in the market (stimulated by large *numbers of* HMOs), HMOs have more incentives to improve quality of services and to maintain their reputation. Therefore the final effect on disenrollment of the *number of* HMOs cannot be determined, a priori.

As is usually assumed in the search theory, we accept that consumers will not initiate a search for a new HMO once the actual quality of the HMO in which they are currently enrolled is equal to or higher than the expected level, due to the cost of collecting information, i.e., we exclude the case of continuous search for higher quality once the expectation of quality is fulfilled. In fact, we assume a *threshold*, wherein an enrollee will conduct a search for an alternative HMO only when the difference between expected and realized quality is greater than a certain level.

III. Empirical Analysis

III.1. Data Source

A nationwide survey of all HMOs taken by Alan Hillman in 1987 was used in the empirical analysis. This survey of 337 HMOs contains information about HMO-specific characteristics and financial incentive schemes, including the three basic compensation methods --salary, capitation, and fee-for-service-- and ancillary financial incentives. Larger HMOs are overrepresented in the sample (the sample accounts for roughly 66 percent of Interstudy's estimate of total 1986 HMO enrollment).⁶ 290 HMOs for which information about disenrollment is available are used in the empirical analysis. The data set was merged with the Area Resource File to incorporate the characteristics of the population and providers in the market area surrounding each HMO. Since information on

HMO enrollee location was not available in our data, the market area for an HMO is defined by the observation unit of the area resource file (i.e., the county where each HMO operates).

III.2. Empirical Model

The main implication from the model is that factors facilitating consumers' accurate estimation of expected quality should decrease disenrollment, while factors increasing the noise in the process by which reputation for quality is formed in the market should increase disenrollment. Disenrollment will be lower in markets in which reputation effects work well. Put differently, efficiency in the consumer search process will decrease disenrollment because the possibility of *mismatch* between HMOs and consumers is lower. Another factor affecting disenrollment is the change over time in the actual quality of services. This hinges on the HMO's willingness and ability to maintain service quality.

The theoretical model suggests that HMO age and size enhances the efficiency of the process by which consumers estimate expected quality. Larger numbers of HMOs in the market should reduce the efficiency of consumer search, thus increasing disenrollment unless HMOs compete based on quality. Since population mobility decreases the pool of experienced consumers in the market, it should reduce the efficiency of communication among consumers, and hence increase disenrollment.

In addition, several other variables associated with population characteristics and HMO descriptors are included in the empirical model. Population characteristics, especially the level of education, are expected to reflect efficiency of information processing and to test how well reputation works in the market. The level of education should be positively related to the efficiency of consumer search.

HMO descriptors such as ownership type, financial status (break-even), and organizational structures are included to control for HMO-specific characteristics which

may affect service quality. Including the basic payment methods for primary care physicians could control for the effect of financial incentives on physician behavior and the quality of medical services.⁷ To control for the potential scale effect, the variable of squared HMO enrollment is added in the empirical model

Increases in HMO market share in the 1980s were due to growth of IPAs (independent practitioner associations). IPA-type HMOs were able to expand market share rapidly because they are more flexible in contracting with physicians; for example, consumers often don't have to change physicians after enrollment in IPA-model HMOs. If the long-run relationship between physicians and patients is important and reflects greater satisfaction for consumers, disenrollment in IPA-type HMOs is expected to be relatively small. Since an increased number of primary care physicians means more freedom for enrollees to choose providers, consumer satisfaction is likely to be higher in HMOs which contract with a larger number of physicians.

The following empirical model is finally estimated,

$$\begin{aligned} \text{TURNOVER} = f (& \text{POPULATION CHANGE, AGE, INCOME, EDUCATION,} \\ & \text{WHITE POPULATION, URBAN POPULATION, NUMBER OF HMOS,} \\ & \text{FOR-PROFIT, GROUP, IPA, MULTI-PLAN, QUALIFIED,} \\ & \text{BREAK-EVEN, NUMBER OF PHYSICIANS,} \\ & \text{SALARY, CAPITATION, HMO SIZE, HMO SIZE SQUARED,} \\ & \text{HMO AGE })^8 \end{aligned}$$

Definition of variables is presented in [Table 1](#). To better fit the regression equation, the natural logarithm of the odds of disenrollment rate instead of disenrollment itself is used as a dependent variable. If disenrollment is interpreted as the probability of leaving an HMO multiplied by 100, then the dependent variable represents the logit of disenrollment. Results of White test (1980) show that we cannot reject the null hypothesis of homoskedasticity.

III.3. Empirical Results

Results of the empirical testing are presented in Table 2.⁹ As predicted from the model, high *population mobility* is associated with disenrollment, due to reduced efficiency of communication among consumers ($p=.0502$). In contrast, also as predicted, the *age of HMO* is significantly and negatively associated with disenrollment, because there are more experienced consumers from whom prospective enrollees can get more accurate information about quality.

Table 2 Regression Result for HMO Disenrollment

Independent Variables	Coefficient Estimate	t Value
Intercept	-6.611065	-3.622 ***
Population change	7.177114	1.967 *
Age	0.028092	1.840 *
Income	0.000003394	0.164
Education	-0.133575	-0.838
White population	-0.001128	-0.251
Urban population	0.002546	0.702
Number of HMOs	-0.006732	-0.574
For-profit +	-0.040745	-0.373
Group +	-0.045177	-0.409
IPA +	-0.531616	-2.537 **
Multi-plan +	0.092352	0.922
Qualified +	0.148276	1.390
Break-even +	0.084573	0.755
Number of physicians	-0.000159	-0.981
Salary +	0.131727	0.644
Capitation +	0.095799	0.899
HMO size	0.000006179	2.082 **
HMO size squared	-1.4939E-11	-1.692 *
HMO age	-0.035229	-2.223 **
	R ²	0.2399
	F value	4.485 ***

* (**) [***] Significant at $\alpha=.10$ (.05) [.01] in two-tailed test

+ Dummy variables

HMO size is positively associated with disenrollment, while squared *HMO size* is negatively associated with it. Thus, *HMO size* has a negative effect on disenrollment, as predicted in the model, if *HMO size* is greater than a certain level. It reflects that there exists a scale effect in the process in which *HMO size* increases the accuracy of consumers' quality estimation such that large enrollment enhances search efficiency for relatively large HMOs. For relatively small HMOs, enrollment size must not be of substantial benefit to accurate quality expectation. An alternative interpretation is also possible. If enrollment hampers the HMO's ability to monitor and enforce quality, the *HMO size* might correlate with variation in quality and inefficiency in the management of consumer satisfaction. When HMOs are relatively small, the effect of *HMO size* in impeding quality or consumer satisfaction could dominate its positive effect on consumers' search efficiency, thus the greater the *HMO size* the greater the disenrollment. If HMOs are relatively large, however, the positive effect of *HMO enrollment* on the efficiency of consumer search might be greater than its negative effect on consumer satisfaction, thus the larger the *HMO* the smaller the disenrollment.

Since older people are more likely to experience declines in health status, a greater proportion of elderly in the market could reflect a potential demand shift in the market, increasing the probability of market-wide disenrollment. (However, the variable used in this model represents the median age of the market area population and information about the age of enrollees is not available.) Lower disenrollment in IPA-type HMOs may reflect consumers' freedom of provider choice as well as long-term relationships between physicians and patients in this type of HMO ($p=0.117$). When enrollees are not satisfied with the quality of services, they can choose to change providers rather than leaving the HMO.

We hypothesized that more educated consumers can more efficiently collect information, and more accurately estimate expected quality. The education level of the market area was negatively associated with disenrollment, although at a statistically insignificant level. The number of HMOs in the market does not have a statistically

significant effect on disenrollment perhaps because the number of HMOs in markets is typically small enough that consumers do not have difficulty obtaining information on them. The number of HMOs will usually be less than ten, while there will be more than 10 HMOs in cities.

IV. Discussion

Analysis of disenrollment in HMO markets provides an unique opportunity to explore the role of reputation in consumers' decision making when there is information asymmetry about the quality of services. We hypothesize that separation (disenrollment) is a rational decision to resolve disappointment about quality --caused by the inherent uncertainty about quality from the matching process (enrollment). Quality of services is revealed to consumers only after enrollment. Therefore, (ex post) discrepancies between the expected and realized quality lead utility-maximizing enrollees to search for a better alternative. Accordingly, factors that reduce this discrepancy will decrease disenrollment. The analysis shows that disenrollment is relatively small in markets where the reputation effect works efficiently --i.e., consumers can predict the expected quality accurately. By the same token, the analysis also suggests that consumers make enrollment decisions based on expected levels of quality, although the estimation of quality is imperfect.

This model is unique because it explains disenrollment by a firm-level cross-sectional analysis and shows how HMO characteristics and market conditions influence disenrollment. The limitation of this analysis of separation (disenrollment), as with all such analyses, is that it does not fully capture the dynamic aspects of demand (e.g., change in health status) and supply (e.g., entry of new HMO), because data are not available. Future analyses should include these dynamic processes of disenrollment.

Notes

1. Quality in this study is non-price attributes of health services including technical (clinical) effectiveness and consumer satisfaction. Our study focuses on how consumers perceive quality and make decisions based on that, and does not attempt to capture or analyze true technical quality (i.e., the process and outcomes of medical care). Since the choice of physicians in HMOs is restricted to member physicians, the quality of HMO services is determined by the quality of services its member providers provide.
2. As in Shapiro (1982, 1983), reputation is defined in this paper as consumers' expectation of quality. Therefore, effective reputation means that consumers have accurate expectations regarding service quality
3. Some studies have shown favorable risk selection in HMOs since enrollees were healthier prior to enrollment than those staying in conventional insurance (e.g., Buchanan and Cretin 1986). When people do not anticipate the need to use inpatient or tertiary care, they may be attracted by the generous wellness and ambulatory care benefits in HMOs, but when they get sick, they may switch from HMO to indemnity insurance, which has fewer restrictions on the use of providers and the types of procedures. There are other studies, however, that refute the existence of risk selection in HMO markets (e.g., Manning, et al. 1987). It is also possible that sicker HMO patients will stay with the HMO because of the comprehensive nature of its benefits structure --i.e., less out-of-pocket payments for sicker patients than in traditional insurance.
4. According to Pauly and Satterthwaite (1981), "A reputation good, ... , is a product or service for which (a) sellers' products are differentiated, and (b) consumers' search among sellers is conducted primarily by asking relatives, friends, and associates for recommendations."
5. For details on the relationship between the number of sellers and the efficiency of

- search, see Satterthwaite (1979).
6. See Hillman (1987) for details.
 7. For theoretical and empirical analyses of the effect of financial incentives on provider behavior, see Kwon (1996, 1997).
 8. Since HMO enrollment can be through employers, disenrollment may be related to job mobility. But the variable of labor market mobility was not available.
 9. We have also tried an alternative specification adding or substituting the variable of the number of HMOs per capita for the variable of the number of HMOs. The empirical results were not changed.

References

- Becker G, Landes E, Michael R. An economic analysis of marital instability. *Journal of Political Economy* 1977; 85: 1141-1187.
- Buchanan J, Cretin S. Fee-for-service health care expenditures: evidence of selection effects among subscribers who choose HMOs. *Medical Care* 1986; 24: 39-51.
- Butters G. Equilibrium distribution of sales and advertising prices. *Review of Economic Studies* 1977; 44: 465-491.
- Hillman A. Financial incentives for physicians in HMOs: Is there a conflict of interest?. *New England Journal of Medicine* 1987; 317: 1743-1748.
- Holmstrom H. The provision of services in a market economy. In *Managing the Service Economy: Prospects and Problems*. Edited by R. Inman : Cambridge University Press, 1985.
- Kwon S. Structure of financial incentive systems for providers in managed care plans. *Medical Care Research and Review* 1996; 53(2): 149-161.
- Kwon S. Payment systems for providers in health insurance markets. *Journal of Risk and Insurance* 1997; 64(1): 155-173.
- Leibowitz A, Buchanan J, Mann J. A randomized trial to evaluate the effectiveness of a

- medicaid HMO. *Journal of Health Economics* 1992; 11: 235-257.
- Long S, Settle R, Wrightson C jr. Employee premiums, availability of alternative plans, and HMO disenrollment. *Medical Care* 1988; 26 : 927-938.
- Manning W, Newhouse J, Duan N. et al. Health insurance and the demand for medical care: evidence from a randomized experiment. *American Economic Review* 1987; 77: 251-177.
- Pauly M, Satterthwaite M. The pricing of primary care physicians' services: A test of the role of consumer information. *Bell Journal of Economics* 1981; 12: 488-506.
- Satterthwaite M. Consumer information, equilibrium industry price, and the number of sellers. *Bell Journal of Economics* 1979; 10: 483-502.
- Shapiro C. Consumer information, product quality, and seller reputation. *Bell Journal of Economics* 1982; 13: 20-35.
- Shapiro C. Premiums for high quality products as returns to reputations. *Quarterly Journal of Economics* 1983; 98: 659-679.
- White H. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica* 1980; 48: 817-838.
- Wilde L. An information-theoretic approach to job quits. In *Studies in the Economics of Search*. Edited by S. Lippman and J. McCall: North-Holland, 1979.