Health Insurance in the Presence of Physician Price Discrimination

Rhema Vaithianathan
University of Auckland, r.vaithianathan@auckland.ac.nz

Health Insurance In The Presence Of Physician Price Discrimination[*]

Rhema Vaithianathan

Department of Economics

University of Auckland

November 1998

ABSTRACT

We model equilibrium in the health insurance market, when a monopolistic physician price discriminates on the basis of coinsurance rates. The physician extracts surplus created in the insurance market, leading to some consumers remaining uninsured. This 'hold-up' problem is solved if the physician and insurer integrate or enter a price agreement prior to writing the insurance contract. Both approaches improve insurer and physician profitability, and restore complete insurance market coverage. This paper therefore explains both partial insurance market coverage and the emergence of various contractual and ownership arrangements in the health insurance industry.

1 Introduction

Universal health insurance coverage has become an increasingly urgent issue on the health care agenda, with an estimated 15% of the United States population having no health insurance of any kind (see Cutler (1994)). As a rule, risk averse individuals would like to mitigate the risks associated with unpredictable shocks to their health states by purchasing health insurance. Therefore, *a priori*, partial insurance market coverage requires explanation. Two theoretical explanations have emerged in the economic literature for this phenomenon, namely, the presence of moral hazard and adverse selection in the health insurance market.

The problem of moral hazard was first discussed by Pauly (1968), and relates to the fact that insurers cannot freely observe the health state of the patient, and are therefore forced to make insurance payments contingent

on health care expenditure. This effectively subsidizes health expenditure, and creates an inefficiency resulting in the well known trade-off between risk reduction and moral hazard in health insurance. With insufficiently risk averse consumers, the gains from risk reduction may not offset the efficiency loss from moral hazard (see Jack and Sheiner (1996)).

The adverse selection problem occurs when consumers are better informed about their own expected costs of health care than the insurer. Although contracts may be written to separate out each risk type, under some conditions, separation is too costly and the insurer provides insurance for high cost types only (see Stiglitz (1977)).

More practical reasons for partial insurance market coverage have also been offered, relating to the close tie-up between employment and insurance, the rapid rates of job turnover, and the fact that many hospitals provide free emergency care to the medically indigent (see for example, Cutler (1994)).

Another phenomenon attracting attention in the health insurance industry is the emergence of various ownership and contractual arrangements between insurers and providers. Under the general rubric of managed care, these arrangements range from full integration to agreements on pricing of services. This trend is generally explained as attempts by insurers to restrain expenditure through supply-side incentives, such as cost sharing by providers (Ma and McGuire(1997)).

This paper offers a new explanation for both the existence of partial market coverage, and managed care arrangements. Traditional insurance contracts impose coinsurance on consumers. Because coinsurance reduces the elasticity of demand with respect to physician prices, a physician who

3

price discriminates on the basis of coinsurance rates, will increase prices to consumers facing low coinsurance rates. Such discriminatory pricing diminishes the value of insurance to both the consumer and insurer. I show that in equilibrium, this leads to low cost consumers remaining uninsured.

I then demonstrate how contractual and ownership arrangements may be used to overcome this problem. The insurer and physician may agree on a price prior to writing the insurance contract, or they may integrate. Both of these mechanisms lead to complete insurance market coverage. Moreover, the physician and insurer are better off and are therefore willing to enter into such arrangements. This suggests the emergence of managed care type organisations as a response to a kind of hold-up problem.

The advantage of the explanation offered here is its consistency with three empirically important features of the US health care market: the existence of partial insurance coverage, the trend towards contracts between insurers and physicians, and the practice of price discrimination by physicians on the basis of insurance coverage[1]. Therefore, the introduction of physician price discrimination into a standard model of insurance operates like Occam's razor. It allows a single, unified explanation for a number of important phenomena that have previously been treated as separate.

---

[1]For a review of the empirical literature on physician price discrimination, see Gaynor (1994).

4

2   The model

There is a heterogeneous consumer population who differ in their constant marginal cost of treatment, $c \in [0, \bar{c}]$. A consumer faces two possible states - healthy and ill - with a probability π of falling ill. If the consumer is healthy, utility is derived purely from the consumption of a composite good, C, and the consumer's preferences may be represented by the following von Neumann-Morgenstern (vNM) utility function

$$U^h(C) = C^a$$

where $0 < a < 1$.

If the consumer falls ill, he continues to derive utility from C, but also derives utility from purchasing health care, M. His preferences, when ill, are represented by the following vNM utility function

$$U^s(C, M) = (C - H(M))^a$$

where $H : \mathbb{R}_+ \to (0, W)$, $H' < 0$, $H'' > 0$, and W is the consumer's initial wealth. Note that utility in the ill state is strictly positive given that $H(0) < W$; i.e. the health shock is never large enough to leave the consumer with negative wealth. Furthermore, we shall assume $-H'(0) > \bar{c}$, which will ensure that consumers always purchase a non-zero quantity of health care (see equation (4) below).

A monopoly insurer exists. The insurance company is able to observe the cost type of the consumer, so insurance contracts are written under symmetric information. That is, we explicitly exclude adverse selection as a possible source of partial insurance market coverage. An insurance contract takes

5

the form of a premium $P \in [0, W]$, paid only in the healthy state[2], and a requirement that the consumer pays proportion $k \in [0, 1]$ of any medical bills when ill[3]. The assumption that no premium is paid when ill is made for modelling convenience only, and nothing of substance in the paper depends upon it. In particular, the results are driven by the effect that insurance has on the elasticity of demand for health care. It is natural to suppose that the dominant source of this elasticity effect is the coinsurance rate k. The additional wealth effect on demand associated with a premium would complicate the algebra, without adding any further insights.

If the consumer falls ill, she seeks treatment from a monopoly physician. The physician observes the consumer's marginal cost of care c, and her insurance contract (P, k), and then sets the profit maximizing price. Therefore, the physician is able to price discriminate on the basis of both consumer cost type and insurance policy.

Both the insurance company and the consumer rationally anticipate this price response of the physician. Therefore, when modelling equilibrium in the insurance market, we cannot treat the price of health care as exogenous. Rather, the outcomes in these two markets are jointly determined as a sub-game perfect equilibrium of a two-stage game.

For a given health insurance contract, (P, k), the consumer determines the amount of health care purchased when ill by solving

$$\max_{C, M} (C - H(M))^a$$

---

[2]Such a contract implies that the state is verifiable to the insurer.

[3]I assume a linear co-payment because it is commonly observed in practice, and is a standard modelling assumption in the health insurance literature, not because it is optimal.

subject to the budget constraint

$$W = C + kyM,$$

where y is the price of health care.

The first-order condition for this constrained maximization problem is

$$\frac{MU_M}{MU_C} = yk, \tag{1}$$

where MU_i is the marginal utility of good i to the consumer when he is ill. Therefore $MU_M = -aH'(M)(C - H(M))^{a-1}$ and $MU_C = a(C - H(M))^{a-1}$, so (1) becomes

$$-H'(M) = yk. \tag{2}$$

Hence the demand function may be expressed as

$$M(y; k) = (H')^{-1}(-yk) \tag{3}$$

and its associated inverse demand function is

$$y(M; k) = \frac{-H'(M)}{k} = \frac{y(M; 1)}{k}. \tag{4}$$

That is, the effect of the coinsurance is to "scale" inverse demand by a factor of $1/k$. Indeed, it is clear that this relationship would obtain regardless of the form of the consumer's utility function.

For a consumer of type c, the physician's problem may therefore be written as follows:

$$\max_M M\frac{y(M; 1)}{k} - Mc. \tag{5}$$

Let $M^e(k, c)$ be the solution to (5), and

$$y^e(k, c) = \frac{y(M^e(k, c); 1)}{k} \tag{6}$$

7

be the associated equilibrium price of health care. Define

$$q^e(k,c) = y^e(k,c) M^e(k,c)$$

to be the total equilibrium expenditure on health care.

Having established the equilibrium in the health care market, we can express a type c consumer's expected utility from a given insurance contract, (P, k), as

$$\Psi(P, k, c) = (1 - \pi)(W - P)^a + [\pi W - kq^e(k,c) - H(M^e(k,c))]^a. \quad (7)$$

The insurance company chooses (P, k) to maximize

$$\Pi(P, k, c) = (1 - \pi)P - \pi(1 - k)q^e(k,c) \quad (8)$$

subject to meeting the consumer's participation constraint

$$\Psi(0, 1, c) \leq \Psi(P, k, c). \quad (9)$$

3 Equilibrium insurance market coverage

In this section we consider equilibrium in the insurance and health care markets, and show that price discrimination induces low cost types to remain uninsured.

In order to prove this result, we first need to establish the following lemma.

Lemma 1 *For any given cost type, c, the insurance company's iso-profit curves are downward sloping. That is*

$$\left. \frac{dP}{dk} \right|_{\Pi = \bar{\Pi}} < 0.$$

8

Proof:

The iso-profit curve is given by

$$(1 - \pi) P = \pi (1 - k) q^e (k, c) + \overline{\Pi}.$$

It is therefore sufficient to show that $(1 - k) q^e (k, c)$ is strictly decreasing in k.

We first show that

$$\frac{\partial M^e (k, c)}{\partial k} \leq 0. \tag{10}$$

The first order condition for solving (5) is

$$r (M; 1) = ck$$

where

$$r (M; 1) = y' (M; 1) M + y (M; 1)$$

is the marginal revenue function associated with $y(M; 1)$. Therefore

$$\frac{\partial M^e (k, c)}{\partial k} = \frac{c}{r' (M^e (k, c) ; 1)}. \tag{11}$$

But the second order necessary condition for solving (5) implies

$$r' (M^e (k, c) ; 1) \leq 0$$

which implies (10).

From (5) it is obvious that maximized profits cannot increase when k increases. Since (10) implies that total costs are weakly decreasing in k it follows that total revenue must also weakly decrease in k.

Finally, $q^e (k, c) > 0$ from (4) and our assumption that $-H' (0) > \overline{c}$. Therefore, $(1 - k) q^e (k, c)$ is strictly decreasing in k. ∎

This proof shows that $\partial M^e / \partial k$ has an unambiguous sign. However, the sign of $\partial y^e / \partial k$ cannot be determined. To see this, one may use (4), (6) and (11) to show

$$\frac{\partial y^e(k,c)}{\partial k} = \frac{H'(M^e(k,c))}{k^2} - \frac{H''(M^e(k,c))}{k} \frac{c}{r'(M^e(k,c);1)}.$$

We have seen that $r'(M^e(k,c);1) \leq 0,$ so the sign of this expression is ambiguous. Given the empirical evidence that uninsured consumers obtain price discounts (Gaynor (1994)), it seems reasonable to make the following assumption.

Assumption 1 *For any c and any k,*

$$\frac{\partial y^e(k,c)}{\partial k} < 0.$$

Assumption 1 is only necessary for the proofs of Propositions 2 and 3.

From (11), we observe that for type $c = 0$, the physician's price response to changes in k is such that health care utilization is independent of the level of k. However, for consumers of type $c > 0$, health care utilization increases with lower levels of k. This accords with the empirical evidence on the difference in utilization patterns between insured and uninsured consumers.

It is intuitive from these observations that the physician price response destroys the value of insurance for type $c = 0$. However, because it is costly to insure this type, an insurance company would require a non-zero premium. It is therefore strictly unprofitable to serve the $c = 0$ type. Provided the incentives are appropriately continuous in c, we may expect that all types with sufficiently low c obtain no insurance. The following proposition confirms this intuition.

10

Proposition 1 *Under physician price discrimination, consumers whose marginal cost of health care falls below a critical value $c^* > 0$ will remain uninsured.*

Proof: Consider a person of cost type c. Figure 1 illustrates the insurer's iso-profit curve for zero profit

$$P = \frac{\pi}{1-\pi} (1-k) q^e (k,c). \tag{12}$$

At point A the consumer's participation constraint is met with equality. To prove Proposition 1, we identify a $c^* > 0$ such that, if $c < c^*$, the consumer's utility is strictly decreasing as we move up the iso-profit curve from point A. In other words, when $c < c^*$, $\frac{\partial \Psi}{\partial k}|_{\Pi=0} > 0$ for all $k \in [0,1]$. Therefore, for these types, there does not exist an insurance contract which at once meets the participation constraint and generates non-negative profits.

Let $b(c)$ be implicitly defined by the condition

$$W = \frac{\pi}{1-\pi} (1 - b(c)) q^e (b(c), c)$$

For a given cost type c, $b(c)$ is the coinsurance rate such that a premium equal to the consumer's total wealth will generate zero profit. Since $q^e(k,c) \to \infty$ as $k \to 0$, Lemma 1 and the Implicit Function Theorem imply that $b(c)$ is a well-defined, differentiable function with $b(c) > 0$ for all $c \in [0, \bar{c}]$.

Using the continuity of $b(c)$, let us now define $\underline{k} = \min_{c \in [0,\bar{c}]} b(c)$ and observe that $\underline{k} > 0$. We can interpret $\underline{k}$ as the minimal coinsurance rate that could be observed in equilibrium. For any cost type, a coinsurance rate of $k < \underline{k}$ would require a premium $P > W$ for the insurance company to break even.

11

Therefore, to complete the proof, it suffices to find a $c^* > 0$ such that $\frac{d\Psi}{dk}|_{\Pi=0} > 0$ for all $c < c^*$ and $k \in [\underline{k}, 1]$.

The type c consumer's utility along the zero iso-profit curve is obtained by substituting (12) into (7):

$$\Psi(P, k, c)|_{\Pi=0} =$$

$$(1 - \pi) \left(W - \frac{\pi}{1 - \pi}(1 - k) q^e(k, c) \right)^a + \pi (W - kq^e(k, c) - H(M^e(k, c)))^a.$$

Therefore

$$\frac{\partial \Psi}{\partial k}\Big|_{\Pi=0} = \frac{q^e - (1 - k)\frac{\partial q^e}{\partial k}}{\left[W - \frac{\pi}{1-\pi}(1-k) q^e \right]^{1-a}} - \frac{q^e + kM^e \frac{\partial y^e}{\partial k}}{\left[W - kq^e - H(M^e) \right]^{1-a}}.$$

Note that $q^e - (1 - k)\frac{\partial q^e}{\partial k} > 0$ by the proof of Lemma 1. Also, $[W - kq^e - H(M^e)]^a$ is the equilibrium utility obtained by the consumer when ill. Recall from §2 that this must be strictly positive, and hence

$$[W - kq^e - H(M^e)] > 0. \tag{13}$$

Therefore, defining

$$L(k, c) \equiv$$

$$\left[\frac{W - kq^e - H(M^e)}{W - \frac{\pi}{1-\pi}(1-k) q^e} \right]^{1-a} - \frac{q^e + kM^e \frac{\partial y^e}{\partial k}}{q^e - (1 - k)\frac{\partial q^e}{\partial k}} \tag{14}$$

we see that $L(k, c) > 0$ if and only if $\frac{d\Psi}{dk}|_{\Pi=0} > 0$.

Since $L(k, c)$ is continuous, it attains a minimum over $k \in [\underline{k}, 1]$ for each c. Define

$$\underline{L}(c) = \min_{k \in [\underline{k}, 1]} L(k, c).$$

To complete the proof, we need to show that there is a $c^* > 0$ such that $\underline{L}(c) > 0$ for all $c < c^*$.

12

Let us first show that,

$$q^e(k,0) + kM^e(k,0) \frac{\partial y^e(k,0)}{\partial k} = 0. \tag{15}$$

Observe, from (4) and (6) that

$$\frac{\partial y^e}{\partial k} = \frac{\partial y}{\partial M} \frac{\partial M^e}{\partial k} + \frac{\partial y}{\partial k}.$$

Using (11) and (4) we have

$$\frac{\partial y^e(k,0)}{\partial k} = \frac{\partial y(M^e(k,0);k)}{\partial k} = \frac{H'(M^e(k,0))}{k^2}.$$

Therefore, using (4) once more,

$$kM^e(k,0) \frac{\partial y^e(k;0)}{\partial k} = M^e(k,0) \frac{H'(M^e(k,0))}{k} = -q^e(k,0)$$

which proves (15).

We now have

$$L(k,0) = \left[\frac{W - kq^e(k,0) - H(M^e(k,0))}{W - \frac{\pi}{1-\pi}(1-k)q^e(k,0)} \right]^{1-a}$$

For $k \in [\underline{k}, 1]$, $W - \frac{\pi}{1-\pi}(1-k)q^e(k,0) \geq 0$ by definition of $\underline{k}$. Therefore, using (13), $L(k,0) > 0$ for all $k \in [\underline{k}, 1]$ and hence $\underline{L}(0) > 0$.

By the Theorem of the Maximum, $\underline{L}(c)$ is continuous. Therefore, there exists a $c^* > 0$ such that for all $c < c^*$, $\underline{L}(c) > 0$. ∎

According to Proposition 1, when a monopoly physician rationally price discriminates, this results in a spill-over effect on the insurance market. Because lower coinsurance rates induce higher physician fees, gains from trade in the insurance market are squeezed such that only high cost types are insured.

13

4 Integration

Some managed care organisations integrate insurance and health care provision, while others are essentially insurers who have contractual relationships with physicians and other health care providers. In this section, we consider the market coverage and profitability of both of these arrangements.

In order to prove our main results, we first establish the fact that if the physician could commit not to price discriminate on the basis of the coinsurance rate, then there would be complete insurance market coverage.

Lemma 2 *Consider a consumer of any type $c \in [0, \bar{c}]$. If the physician can commit to a price of health care $\tilde{y}$, where $\tilde{y}$ satisfies $\tilde{y} < |H'(0)|$ and is independent of the insurance contract chosen by the consumer, then a profitable insurance contract will be sold to the consumer.*

Proof: Let $c \in [0, \bar{c}]$ and $\tilde{y} < |H'(0)|$ be given. The consumer's utility from insurance is given by

$$\Psi(P, k) = (1 - \pi)(W - P)^a + \pi[W - k\tilde{y}M(\tilde{y}; k) - H(M(\tilde{y}; k))]^a.$$

Using (2), the slope of the consumer's indifference curve through the point $(k, P) = (1, 0)$, evaluated at $(k, P) = (1, 0)$, can be shown to be

$$\frac{dP}{dk}\Big|_{\Psi = \Psi(0,1)} = -\frac{\pi}{(1 - \pi)} \left(\frac{W}{W - \tilde{y}M(\tilde{y}; 1) - H(M(\tilde{y}; 1))} \right)^{1-a} \tilde{y}M(\tilde{y}; 1). \tag{16}$$

The insurance company's profit is

$$\Pi(P, k) = (1 - \pi)P - \pi(1 - k)M(\tilde{y}; k)\tilde{y} \tag{17}$$

14

and hence the slope of the zero profit locus evaluated at $(k, P) = (1, 0)$ is

$$\frac{dP}{dk}\big|_{\Pi=0} = -\frac{\pi}{(1 - \pi)} M(\widetilde{y}; 1) \widetilde{y}. \tag{18}$$

Note that $\widetilde{y} < |H'(0)|$ implies $M(\widetilde{y}; 1) > 0$ (see (2)). Therefore, recalling the discussion around (13), we may observe that both (16) and (18) are strictly negative. If $\frac{dP}{dk}\big|_{\Pi=0} > \frac{dP}{dk}\big|_{\Psi=\Psi(0,1)}$ at $(k, P) = (1, 0)$, then we can conclude that the optimal insurance contract must have $k < 1$.

Note that $\frac{dP}{dk}\big|_{\Pi=0} > \frac{dP}{dk}\big|_{\Psi=\Psi(0,1)}$ at $(k, P) = (1, 0)$ iff

$$\left(\frac{W}{W - \widetilde{y}M(\widetilde{y}; 1) - H(M(\widetilde{y}; 1))} \right)^{1-a} > 1 \tag{19}$$

Condition (19) clearly holds. ∎

Notice that, according to Lemma 2, a profitable insurance contract exists, regardless of the level at which price is fixed (so long as some M is consumed at that price). This is because it is not the physician mark-up which destroys gains from insurance, but rather the manner in which this mark-up responds to changes in the coinsurance rate. This suggests that physician price commitment, *per se*, is valuable to the insurer.

The next result demonstrates that such a price commitment can be facilitated by joint ownership.

Proposition 2 *Integration of health care provision and insurance results in universal insurance coverage and strictly larger profits for the integrated firm.*

Proof: Let c be a type of consumer who would remain uninsured in the non-integrated case, and let $\overline{y}$ be the physician's profit maximising price for serving an uninsured consumer of this type. Suppose the integrated

15

firm offers such a consumer a contract $\left(\overline{P}, \overline{k}, \overline{y}\right)$, where $\left(\overline{P}, \overline{k}\right)$ is the optimal insurance contract for this type given a fixed price $\overline{y}$ for health care. From Lemma 2, we know that $\overline{k} < 1$. That is, a strictly profitable insurance contract will be sold to this consumer type.

Let $\overline{M} = M\left(\overline{y}; \overline{k}\right)$ and $\widehat{M} = M\left(\overline{y}; 1\right)$. Observe that $\overline{M} > \widehat{M}$. Under separate ownership, the sum of expected profits accruing to the insurer and the physician from the uninsured consumer of type c is given by

$$\pi\left(\overline{y}\widehat{M} - c\widehat{M}\right).$$

An integrated firm offering the contract $\left(\overline{P}, \overline{k}, \overline{y}\right)$ obtains an expected profit of

$$
\begin{aligned}
(1 - \pi)\overline{P} + \pi\left(\overline{k}\,\overline{y}\overline{M} - c\overline{M}\right) \quad &> \quad \pi\left(\overline{y}\overline{M} - c\overline{M}\right) \\
&> \quad \pi\left(\overline{y}\widehat{M} - c\widehat{M}\right),
\end{aligned}
$$

where the first inequality uses the fact that the insurance contract is strictly profitable (hence $(1 - \pi)\overline{P} > \pi(1 - \overline{k})\overline{y}\overline{M}$), and the second uses $\overline{M} > \widehat{M}$. Therefore, aggregate expected profits have increased relative to the non-integrated case.

We now need to verify that $\overline{y}$ is renegotiation-proof so that $\left(\overline{P}, \overline{k}, \overline{y}\right)$ is a credible contract. Note that once the consumer has purchased $\left(\overline{P}, \overline{k}, \overline{y}\right)$, he will never renegotiate $\overline{y}$ upwards, therefore, we need to check that $\overline{y}$ will not be renegotiated downwards. In other words, that $\overline{y} \leq y'$, where

$$
\begin{aligned}
y' &= \arg\max_{y}\left[\overline{k}y M\left(y; \overline{k}\right) - cM\left(y; \overline{k}\right)\right] \quad &(20) \\
&= \arg\max_{y}\left\{\overline{k}y\left[(H')^{-1}\left(-\overline{k}y\right)\right] - c\left[(H')^{-1}\left(-\overline{k}y\right)\right]\right\}. \quad &(21)
\end{aligned}
$$

16

The right-hand side of (20) is the *ex post* profit of the integrated firm from its sale of M, and (21) expands this expression using (3).

Recall that $\bar{y}$ is the optimal price to charge an uninsured consumer of c type; i.e. $\bar{y} = y'$ for $k = 1$. It is clear from (21) that

$$y' = \frac{\bar{y}}{k}.$$

Therefore the *ex post* optimal price of health care is strictly greater than $\bar{y}$, given $\bar{k} < 1$. This implies that $\bar{y}$ will not be renegotiated downwards.

Hence, the contract $(\bar{P}, \bar{k}, \bar{y})$ convinces the previously uninsured individual to purchase insurance, while increasing the combined expected profit earned by the insurer and physician. ∎

We now show that joint ownership is not necessary for facilitating the necessary price commitment.

Proposition 3 *If the insurer and physician agree on the price prior to writing the insurance contract, this results in universal insurance coverage and increased profits for the physician and insurer.*

Proof: The proof follows similar lines to the proof of Proposition 2. The insurer contracts with the physician to provide care at $\bar{y}$ to consumers of type c and offers such a consumer a contract $(\bar{P}, \bar{k}, \bar{y})$. As in the previous proof, we need only check that $\bar{y}$ will not be renegotiated downwards.

Recall that $\bar{y}$ is the optimal price to charge an uninsured consumer of c type. Assumption 1 implies that the *ex post* optimal price of health care is strictly greater than $\bar{y}$, given $\bar{k} < 1$. Therefore the physician will never negotiate $\bar{y}$ downwards.

17

The physician's profit increases because of the increased quantity demanded by the previously uninsured consumer i.e. the physician sells $M\left(\bar{y};\bar{k}\right)$ rather than $M\left(\bar{y};1\right)$. Hence, the physician is willing to enter into this price commitment with the insurer. The insurer passes this commitment on to the consumer, to ensure that $\bar{y}$ is renegotiation proof. ■

In the proof of Proposition 3, ensuring that $\bar{y}$ would not be renegotiated upwards required consumers to be party to that price commitment. However, the contract between the insurer and physician alone is sufficient to make $\bar{y}$ credible, if the insurer is unwilling to renegotiate $\bar{y}$ upwards.

Recall that the insurer is liable for $\left(1-\bar{k}\right)\left[yM\left(\bar{k},y\right)\right]$ where the expression in square brackets is the consumer's total expenditure on medical care. Therefore, a sufficient condition for the insurer not to renegotiate $\bar{y}$ upwards is that demand, given by $M\left(\bar{k},y\right)$, is price inelastic for all y greater than $\bar{y}$. In this case, total expenditure will be higher for any y greater than $\bar{y}$, and the insurer will face a higher pay-out.

Assumption 1 implies that the physician will not renegotiate $\bar{y}$ downwards. Therefore, if the elasticity condition is met, the insurer need not pass on the price commitment to the consumer, in order to make $\bar{y}$ credible.

5 Concluding Remarks

The objectives of this paper are two-fold. The first is to propose a new theoretical explanation for partial insurance market coverage. We argue that physician price discrimination destroys the gains from trade in the insurance market for low cost types, and leads to partial market coverage. This result

18

is analogous to a hold-up problem in the sense that *ex post* opportunism by the physician leads to *ex ante* inefficiency, which is detrimental to both insurer and physician.

The second objective of this paper is to offer some insight into the emergence of managed care plans. Having demonstrated that the insurer is subject to a form of hold-up by the physician, we argue that managed care plans solve this problem. The notion that unified governance structures may serve as mechanisms for minimising opportunism is certainly not new[4]. Grossman and Hart (1986) show how vertical integration can solve a general hold-up problem generated by relationship specific investments. This article is the first to offer such an explanation for institutional arrangements observed in the health insurance industry. The particular type of hold-up discussed in this paper is also novel.

It is important to note that, while the results in this paper may appear similar to the double marginalisation argument for vertical integration[5], the present situation is in fact quite different. In the double marginalisation case, the purpose of vertical integration is to avoid the loss in profit that occurs when each firm in the chain adds its own mark-up. Therefore, price coordination, rather than commitment, is the key to avoiding this loss. In contrast, the lost profit in the present case stems from the physician's inability to commit to a price. Even commitment to a very high price is valuable.

While this paper assumes that the insurer is a monopolist, this is not strictly necessary for the results. In proving Proposition 1, we showed that

---

[4]See Williamson (1979) for a discussion.

[5]See Tirole (1998) for a discussion.

19

a profitable insurance contract does not exist for types $c < c^*$, implying that even a competitive insurance market will not insure this type. Moreover, if physicians are required to offer the same price commitment of $\bar{y}$ to all insurers, so that they are prevented from foreclosing the insurance market, then Proposition 2 and 3 would continue to hold.

6 References

1. CUTLER, DAVID. "A Guide to Health Care Reform" *JEP;* 8 (3) 1994 pp3-11

2. GAYNOR, MARTIN. "Issues in the Industrial Organization of the Market for Physician Services" *Journal of Economics & Management Strategy,* 1994 (3) pp211-55.

3. GROSSMAN, SANFORD AND HART, OLIVER (1986) "The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration." *Journal of Political Economy,* August, 94 (4) pp. 691-719.

4. JACK, WILLIAM AND SHEINER, LOUISE "Welfare-Improving Health Expenditure Subsidies" *American Economic Review* 1997 (87) pp206-221

5. MA, CHING-TO ALBERT; MCGUIRE, THOMAS G (1997). "Optimal Health Insurance and Provider Payment". *American Economic Review.* Vol. 87 (4). p 685-704.

6. PAULY,V MARK (1968) "The Economics of Moral Hazard" *American Economic Review* (53) pp531-37

7. STIGLITZ, JOSEPH E.(1977)"Monopoly, Non-linear Pricing and Imperfect Information: The Insurance Market" *Review-of-Economic-Studies*;44(3) pp 407-30

8. TIROLE, JEAN (1998) *The Theory of Industrial Organization*: MIT Press, Cambridge MA.

9. WILLIAMSON, OLIVER E. (1979) "Transaction Cost Economics: the Governance of Contractual Relations" *Journal of Law and Economics* pp. 233-261.