Who Benefits From Social Health Insurance in Developing Countries?

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Abstract

A major policy issue in developing countries is the lack of formal insurance markets. A popular approach to this problem is compulsory social health insurance (SI). The movement towards SI has been motivated not only by the desire to expand insurance coverage, but also by fiscal pressure to shift the burden of delivering and financing health care from the public sector to the private. In this paper we show that SI fails to expand insurance coverage or shift the burden to the private sector because providers capture SI benefits as rent by raising price-cost margins to insured patients. As a result the out-of-pocket costs to the insured patient are the same as to the uninsured. Our empirical results from the Philippines indicate that hospitals extract 86 percent of SI benefits through price discrimination. We also show that expanding SI actually increased the burden on the public sector rather than relieving it.

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1. INTRODUCTION

A major policy issue in developing countries is the lack of formal insurance markets. A popular approach to this problem is mandated social health insurance (SI), which finances medical care through compulsory payroll taxes and allows beneficiaries to purchase medical care from both private and public providers.

The movement towards SI has been motivated not only out of the desire to expand insurance coverage, but also to reduce financial pressure on public budgets (Gertler, 1998). SI is seen as a way to shift a portion of the public burden of delivering and financing health care to the private sector. SI reduces the out-of-pocket price of higher quality private care relative to lower quality public care at the time of purchase, thereby providing an incentive to choose the private sector over the public.

In this paper, we show that serious flaws in the designs chosen by most SI plans significantly reduce their insurance value and fail to shift the burden from the public to the private sector. The typical SI design allows providers to capture the SI benefits as rent by raising price-cost margins to insured patients. As a result, out-of-pocket payments at the time of illness for the insured are the same as for the uninsured, implying that SI does not provide an incentive to choose the private sector over the public. Hence, SI fails to expand insurance coverage or shift the burden to the private sector. These results are important because a large number of countries have adopted this design, and there are strong political-economy reasons to believe that countries considering SI are likely to adopt this same design.

In this paper, we theoretically and empirically model the SI rent extraction through price discrimination. The identification of the rent extraction, however, is not straightforward. We use a two-part tariff model to derive optimal price discrimination strategies. We show that if hospitals have market power, they will not only extract all SI benefits through price discrimination, but also use health insurance status as information about patient type so as to exploit differences in insured and uninsured patients' price elasticities of demand to further price discriminate. However, the two-part tariff model has a natural hedonic price specification in which we can identify separately the two types of price discrimination.

We then use data from the Philippines to estimate the amount of rent extraction. The Philippines is an excellent setting for a case study for several reasons. First, the Filipino SI program has the typical design. Second, we can identify the price discrimination effect by using the fact that the Filipino SI program mandates coverage only to wage-sector employees and dependents. Third, since the program was introduced in 1972, there has been enough time for entry to dissipate rents if there is insufficient market power for price discrimination. If we observe price discrimination, then this suggests that there are long run entry barriers that allow providers an ongoing ability to capture SI benefits. Fourth, we exploit multiple observations on each provider to control for selection based on heterogeneity in provider quality. The results indicate that private hospitals extract 100 percent of SI benefits through increased price-cost margins and that public hospitals extract 70 percent.

Finally, we use the estimates from the price discrimination models to evaluate who benefits from SI. We consider three issues. First, what percent of SI benefits are captured by hospitals as rent through increased price-cost margins and what percent finances patient care. Second, we examine the claim that hospitals use the profits from charging higher prices to insured patients to cross-subsidize the care of financially indigent patients. Third, we examine the effect of expanding Medicare on public expenditures in the health sector to investigate the hypothesis that SI relieves the burden on the public sector.

The paper is organized as follows. In section 2 we describe the typical SI design, the motivation for countries to adopt SI, and the institutions that facilitate price discrimination. In section 3, we derive optimal price discrimination rules. In section 4, we specify the empirical model and describe our identification strategy. In section 5, report the estimation results for the Philippines. In section 6, we present the "who benefits analysis," which is followed by a brief conclusion in section 7.

2. PRICE DISCRIMINATION UNDER SI

In the post-colonial era, most low-income countries created large public health care delivery systems modeled after the British National Health Service (NHS). These NHS-like systems deliver medical care through publicly operated delivery systems financed through general tax revenues. They typically charge at most nominal user fees in order to insure that income is not a barrier to medical care (World Bank, 1987). However, rapid medical cost inflation combined with already bloated budgets caused many governments to rethink the policy of publicly financed and delivered health care (Gertler and van der gaag, 1990, Jimenez, 1994; World Bank, 1993).

A popular alternative to the NHS-like systems has been to introduce or expand compulsory SI (Gertler, 1998). SI plans typically finance medical care benefits for wage sector employees through mandatory earmarked income taxes, and the benefits are used to purchase medical care from either the public or the private sector.[1] SI is seen as a way to shift a good portion of the public burden of delivering and financing health care to the private sector. SI reduces the out-of-pocket prices of higher quality private care relative to lower quality public care at the time of purchase, thereby providing an incentive to choose the private sector over the public sector. In this way, SI shifts the delivery of care for wage sector families to the private sector, and finances their expenditures through additional off-budget earmarked income taxes, thereby relieving pressure from the general budget.

Gertler and Strum (1997) estimated that expanding SI would reduce the demand for public delivered care by 33 percent in Jamaica. These results, however, are based on the assumption that as SI expands, private sector prices did not increase—i.e., private sector supply is perfectly elastic. In this paper we explicitly take in to account provider response, and argue that SI actually produces the opposite of the desired effects.

[1] Administrative and compliance problems have typically limited expansion of SI to the informal sector and, as a result, coverage is less than universal in most countries.

2.1 Price Discrimination

There is a long tradition of price discrimination in health care in both developed and developing countries. Providers have often charged higher prices to the wealthy and lower prices to the poor justifying the practice based on charity motives. Governments viewed this practice as in the public interest as it improved the access of the poor to medical care. The U.S. literature on price discrimination in medical care markets dates back to Kessel's (1958) work on physician markets and most recently as part of the hospital cost-shifting debate (Dranove and White, 1994). SI facilitates price discrimination by providing information about whom to charge higher prices.

The typical SI design maximizes the amount of the insurance premium that providers can capture through raising prices to insured patients. The main features of the typical SI plan, described in Table 1, are first-dollar coverage up to a cap beyond which individuals are liable for the balance of the bill, insurance is limited to hospital inpatient care, providers are paid on a fee-for-service basis, and providers can charge market rates.

Table 1: Features of SI Programs in Selected Developing Countries

Country	Financing Sources	Benefits	Provider payment	Balance Billing
Costa Rica	Payroll tax & sales tax	1^{ST} dollar with capped benefits; Inpatient only	Fee-for-service	Yes
Egypt	Payroll tax & sin taxes	1^{ST} dollar with capped benefits; Inpatient only	Fee-for-service	Yes
Indonesia	Payroll tax & general tax revenues	1^{ST} dollar with capped benefits; Inpatient only	Fee-for-service	Yes
Morocco	Payroll taxes	1^{ST} dollar with capped benefits; Inpatient only	Fee-for-service	Yes
Korea	Payroll tax & general tax revenues	Co-pays	Fee-for-service	No
Philippines	Payroll tax & general tax revenues	1^{ST} dollar with capped benefits; Inpatient only	Fee-for-service	Yes
Thailand	Payroll tax & general tax revenues	1^{ST} dollar with capped benefits; Inpatient only	Fee-for-service	Yes
Taiwan	Payroll tax & general tax revenues	Co-pays	Fee-for-service	No
Vietnam	Payroll tax & general tax revenues	Co-pays; Inpatient only	Fee-for-service	Yes

Source: WHO Inter-regional Consultation on Health Insurance Reform, Seoul Korea, April 3-7, 1995

In plans with first-dollar capped-benefits, SI pays the provider from the first dollar of the bill up to the maximum benefit and patients must pay out of pocket any remaining difference between the price and the maximum benefits. The first-dollar capped benefit is a lump sum transfer or reverse deductible, which minimizes price distortions and the deadweight loss from moral hazard—i.e. the additional amount of health care demanded with insurance than without it. Since the benefit is basically a lump sum transfer, it does not distort prices at the margin, and only distorts demand when the cap is above the amount that patient would purchase without insurance. If the cap is small enough so that there is no demand distortion, then the whole benefit is available for rent capture. When there is moral hazard, some of the benefit must be used to pay for the increased production costs and deadweight loss, and therefore is unavailable for capture.

A necessary condition for price discrimination is that providers have sufficient market power so that potential new entrants and other competitors cannot profitably offer the services at a lower price. There are several reasons to believe that such market power may exist. First, most countries have licensure regulations that effectively limit physician and hospital entry. Second, hospitals have large fixed costs and exhibit economies of scale in variable costs.[2] Third, most low-income countries have poor transportation systems that facilitate local monopolies in hospitalization. While there are good reasons to believe that there is enough market power for hospitals to be able to price discriminate, the issue can only be resolved conclusively through empirical examination on a market-by-market basis. As Phlips (1983) argues …"the best evidence of market power is observing price discrimination." Therefore, we will directly examine whether there is price discrimination.

[2] Alba (1998) reports that fixed costs are over half of the costs of hospitals in the Philippines and that there are substantial economies of scale in variable costs until hospitals reach well over 100 beds in size. See Carey (1996) for economies of scale estimates in the US.

2.2. The Political-Economy of Health Care Reform

Low-income countries have limited abilities to tax, which imposes a tight budget constraint on SI benefits. SI plans face the trade-off between providing a large number of individuals with a small benefit or a small number of people with a large benefit. This means that a large deductible (or copay) is required to provide uncapped benefits for large financial risks—e.g. rare catastrophic illnesses such as cancer. The high deductible ensures that benefits are available for expensive catastrophic illnesses and are not used up on less expensive high-probability events (e.g. flu). Because of the budget constraint, lowering the deductible would require capping benefits. In the limit, a zero deductible implies the lowest possible benefit cap and the least effective insurance.

If capped first-dollar coverage provides minimal insurance, why then do we see it so widely adopted? In addition to providers, a number of powerful political interest groups, each for a different reason, see this design as in their self-interest. These same interest groups are active in countries considering SI, which suggests that it is a model to be even more widely adopted. The most obvious interest group is the collection of international donors and political interest groups worried about the poor (Besley and Gouveia, 1994). First dollar coverage alleviates the concern that small out-of-pocket costs may deter utilization (Cornea, Jolly and Stewart, 1987). Politicians also support first-dollar coverage. Since the median voter is poor in most of these countries, first-dollar coverage puts money into more voters' pockets.

Employers also have strong incentives to support capped-benefit first-dollar coverage. Typically, SI premiums are co-financed by employers. Employers historically have provided workers with health benefits as a means of reducing absenteeism (Gertler and Sturm, 1997). Quick treatment of minor illnesses reduces absenteeism more than the treatment of catastrophic illnesses. Employers cap benefits since it is cheaper to fire severely ill individuals who had little chance of returning to work and hire new works. For similar reasons, employers benefit more from the capped first-dollar coverage, which is more likely to reduce absenteeism, than from catastrophic coverage with high deductibles, which is less likely to affect workforce productivity.

3. OPTIMAL INSURANCE-BASED PRICE DISCRIMINATION

In this section, we develop a model of optimal pricing strategies when hospitals, assumed to have sufficient market power, exercise price discrimination based on observed patient insurance status. We show that hospitals are able to extract patients' insurance benefits by increasing price-cost margins, and use insurance status as a signal of unobserved differences in other characteristics that lead to differences in demand between insured and uninsured patients. The model developed here also has a natural hedonic pricing empirical specification and identifies the two sources of price discrimination. The empirical model is derived in Section 4.

3.1 Demand

Patients enter hospitals in order to treat an illness or injury. During treatment, they are provided with services such as medicines, lab tests, x-rays, and surgery. These services are not valued in and of themselves, but rather for their effect on health status. Since patients are heterogenious—i.e. have different health problems, incomes, education, tastes, etc.—there is substantial variation in patients' valuations of the benefits of medical care services.

For convenience we assume that there are K medical services and that patients have the following money-metric utility functions:

$$U = q^i H(M_1,...,M_K) - O = q^i H(\mathbf{M}) - O \quad , \tag{1}$$

where: H is the money value of the utility of health

$H(\cdot)$ is the health production function which is increasing and concave

M_k is the quantity of service k, $\mathbf{M} = (M_1,...,M_K)$,

O is the amount the patient pays out-of-pocket to the hospital, and

q^i is a preference intensity parameter.

We assume that there are two types of patients. *Type-l* patients have a lower valuation of the benefits of medical care than do *type-h* patients, $q^l < q^h$.

Hospitals price their services in the form of two-part tariffs where there is a fixed fee plus a price for every unit of each service consumed. A patient's bill is

$$B = F + \sum_{k=1}^{K} P_k M_k \qquad , \tag{2}$$

where F is the fixed fee and P_k is the unit price of M_k. Without insurance, the patient's out-of-pocket payment, O, is equal to B—i.e. the bill charged by the hospital.

Given this pricing rule, a utility-maximizing patient will enter the hospital if (1) is greater than the utility from the next best alternative, which we normalize to zero, and demand each service up to the point where marginal utility equals the unit price:

$$\theta^{i} \frac{\partial H\left(\mathbf{M}^{*}\right)}{\partial M_k} = P_k \ , \tag{3}$$

where $\mathbf{M}^{*} = \left(M_1^{*}, \ldots, M_K^{*}\right)$ solves (3).

When patients have insurance, the payment received by the provider diverges from the patient's out-of-pocket payment. Like most SI plans in low-income countries, the Philippine Medicare program provides first-dollar coverage up to a maximum amount payable to providers on a fee-for-service basis. Let R be the maximum insurance benefit. Then, assuming the hospital charges insured patients $\hat{F}$ and $\hat{P}$, the patient's out-of-pocket payment is:

$$O = \hat{F} + \sum_{k=1}^{K} \hat{P}_k M_k - R \qquad , \tag{4.1}$$

whereas the hospital's bill is:

$$\hat{B} = \hat{F} + \sum_{k=1}^{K} \hat{P}_k M_k \qquad . \tag{4.2}$$

The difference between the hospital's bill and the out-of-pocket payment is the insurance benefit.

Insurance, in this case, is like a reverse deductible. Patients receive a lump-sum transfer after which they are at risk for the balance of the bill. The lump-sum transfer does not distort relative prices and only distorts demand if the benefit is larger than what they would have purchased without the benefit. This means that an insured patient will enter the hospital if (1) is positive, and for each service, consume the greater of the demand implied by the maximum insurance benefit, $\overline{M}$, or M^*, the level implied by (3). Thus, if R is sufficiently low so that $M^* \geq \overline{M}$, then (3) holds for insured patients as well. In the case of the Philippines, the maximum Medicare benefit is approximately 15 percent of the average hospital bill and only a small fraction of the very expensive cases that severely skew the distribution of hospital expenditures to the right.

Total demand for hospital care and each of the services depends on the distribution of patients over insurance status and preferences. Suppose that there are Y uninsured patients, of which a are *type-h* patients and $(1-a)$ are *type-l* patients. Also let $\hat{Y}$ be the total number of insured patients, of which $\hat{a}$ are *type-h* patients and $(1-\hat{a})$ are *type-l* patients. The total number of potential patients, then, is $Y+\hat{Y}$.

Demands for hospitalization and hospital services are presented in Table 2. For a given level of prices, the utility of the *type-h* is always bigger than the utility of the *type-l*. Therefore, if the prices are such that the *type-l* have utility less than zero, then demand will be zero. If the prices are such that the *type-h* have positive utility but the *type-l* do not, then only the *type-h* will enter the hospital and the demand from services will be *type-h* demand. If the utility of the *type-l* is positive, then both types of patients will enter the hospital and the demand from services will be the sum of demand from the *type-l* and *type-h*.

Table 2. Demand for Hospital Care and Services

Patient Type	# of Patients in Hospital	Demand for Hospital Services	If …
Uninsured	0	0	$U^h < 0$
	aY	$a\mathbf{M}^{*h}Y$	$U^h \geq 0$ & $U^l < 0$
	Y	$\left(a\mathbf{M}^{*h} + (1-a)\mathbf{M}^{*l}\right)Y$	$U^l \geq 0$
Insured	0	0	$\hat{U}^l < 0$
	$\hat{a}\hat{Y}$	$\hat{a}\hat{\mathbf{M}}^{*h}\hat{Y}$	$\hat{U}^h \geq 0$ & $\hat{U}^l < 0$
	$\hat{Y}$	$\left(\hat{a}\hat{\mathbf{M}}^{*h} + (1-\hat{a})\hat{\mathbf{M}}^{*l}\right)\hat{Y}$	$\hat{U}^h \geq 0$

3.2 Hospital Behavior

We consider two cases. The first is where hospitals are able to distinguish patients by both insurance status and by intensity of preferences, and the second, the more realistic case, is where they are only able to observe insurance status.

We assume that hospitals are profit-maximizing organizations. However, in the Philippines, as in most countries, there are both private proprietary and government-operated facilities. While the profit maximization assumption is probably reasonable for proprietary hospitals, it may be less appropriate for public hospitals. While we will use the profit-maximizing framework to specify the empirical models, we will test for differences by estimating separate models. We will also test the hypothesis that hospitals charge higher prices to the insured to cross-subsidize the care of financially indigent patients.

3.2.1. Price Discrimination with Observed Patient Heterogeneity

In this case, the hospital can charge separate prices to patients based on both insurance status and preference intensity. The profit function can be expressed as

$$P = B^l a Y + B^h (1-a) Y + \hat{B}^l \hat{a} \hat{Y} + \hat{B}^h (1-\hat{a}) \hat{Y} - C(\mathbf{M}) \qquad (5)$$

where

$$\mathbf{M} = \left(\mathbf{M}^l a + \mathbf{M}^h (1-a)\right) Y + \left(\hat{\mathbf{M}}^l \hat{a} + \hat{\mathbf{M}}^h (1-\hat{a})\right) \hat{Y} \text{ ,}$$

and $C(\mathbf{M})$ is the cost of supplying services and is increasing and convex in $\mathbf{M}$.

Profits are maximized subject to the constraint that utility is non-negative for each patient type. Profit maximization implies the participation constraints are binding—i.e. utility is set equal to zero. Setting (1) equal to zero and solving using (2) and (4.2) implies that the profit maximizing fixed fee is equal to:

$$F^i = q^i H\left(\mathbf{M}^{*i}\right) - \sum_{k=1}^{K} P_k^i M_k^i \quad \textit{for } i = l \textit{ and } h \qquad (6.1)$$

$$\hat{F}^i = q^i H\left(\hat{\mathbf{M}}^{*i}\right) - \sum_{k=1}^{K} \hat{P}_k^i \hat{M}_k^i + R \quad \textit{for } i = l \textit{ and } h \qquad (6.2)$$

Notice that the fixed charge for uninsured patients is just to net consumer surplus, whereas for insured patients the fixed charge adds the insurance benefit.

Maximizing (5) subject to (6) derives the first order conditions for the service prices. Using (3) and rearranging the terms allows us to express the first-order condition as:

$$P_k^{*l} = P_k^{*h} = \hat{P}_k^{*l} = \hat{P}_k^{*h} = \frac{\P C}{\P M_k}. \tag{7}$$

This expression implies that hospitals set unit service prices equal to marginal costs. This rule is applied to all types of patients regardless of insurance status and preferences. Profits or rent are extracted only through the fixed charge, which vary by insurance status, and by patient preference intensity. This is a version of the standard two-part tariff result that firms set the variable prices equal to marginal cost to maximize net consumer surplus, and then extract all of net consumer surplus as profit through the fixed fee (Tirole, 1988).

Finally, we examine the difference in profits from patients with different insurance status. Substitution of (7) into (6) and both into (5), and rearranging terms yields:

$$P^{i} = q^{i} H\left(\mathbf{M}^{i*}\right) - C\left(\mathbf{M}^{i*}\right) \qquad \textit{for } i = l, h \tag{8.1}$$

$$\hat{P}^{i} = q^{i} H\left(\hat{\mathbf{M}}^{i*}\right) - C\left(\hat{\mathbf{M}}^{i*}\right) + R \qquad \textit{for } i = l, h \tag{8.2}$$

The hospital's profits are the total consumer surplus less costs plus the SI benefit from insured patients. Since the services prices are equal for insured and uninsured patients, $\mathbf{P}^{i*} = \hat{\mathbf{P}}^{i*}$, service demands must be equal, $\mathbf{M}^{i*} = \hat{\mathbf{M}}^{i*}$, and all of the difference in profit is captured through the fixed fee markup. Therefore, the difference in profits from insured and uninsured patients is just the SI benefit and $\hat{B}^{*i} - B^{i} = \hat{F}^{*i} - F^{*i} = R$.

3.2.2. <u>Price Discrimination with Unobserved Patient Heterogeneity</u>

While a patient's insurance status can easily be identified, hospitals cannot effectively discriminate on the basis of preference intensity. Therefore, while the hospital can set separate prices for insured and uninsured patients, it cannot do so for *type-l* and *type-h* patients. However, if the distribution of preference types within insured and uninsured patients is known, then insurance status provides a signal about the patient's type that can be used for further price discrimination. Therefore, differences in observed prices between insured and uninsured patients reflect not only the effort to extract the SI benefit, but also differences in demand due to underlying heterogeneity differences.

Assuming that the preference distribution parameters a and $\hat{a}$ are known, the hospital has two alternative pricing strategies. It could either charge prices that maximize profits from *type-l* patients or charge prices that maximize profits from *type-h* patients. If the hospital chooses the *type-l* strategy, then both patient types enter the hospital. In this case, the hospital extracts all rent from *type-l* and some rent from *type-h*. If the hospital sets prices above this point but below the prices that maximize profits form *type-h* patients, then the *type-l* do not enter and *type-h* do. Therefore, if the hospital is going to charge a price higher than the *type-l* strategy, then it will charge prices that maximize profits from the *type-h* patients.[3] The hospital will choose the strategy with the greater profits.

Consider first the *type-h* pricing strategy. In this case, the hospital knows that all of its patients are *type-h*. The pricing rule, then, is the same as the case when patient type is observed. It will set the prices of the services equal to marginal costs for both insured and uninsured patients and extract all consumer surplus through the fixed fees. The difference between the fixed fee charged to insured and uninsured patients is still equal to R—i.e. total SI benefits.

Now consider the *type-l* pricing strategy. This strategy implies that the fixed fees charged both types of patients are set to extract all of the consumer surplus *type-l* patients:

$$F^{l} = q^{l} H\left(\mathbf{M}^{*l}\right) - \mathbf{P}^{l}\mathbf{M}^{l} < q^{h} H\left(\mathbf{M}^{*h}\right) - \mathbf{P}^{l}\mathbf{M}^{h} \tag{9.1}$$

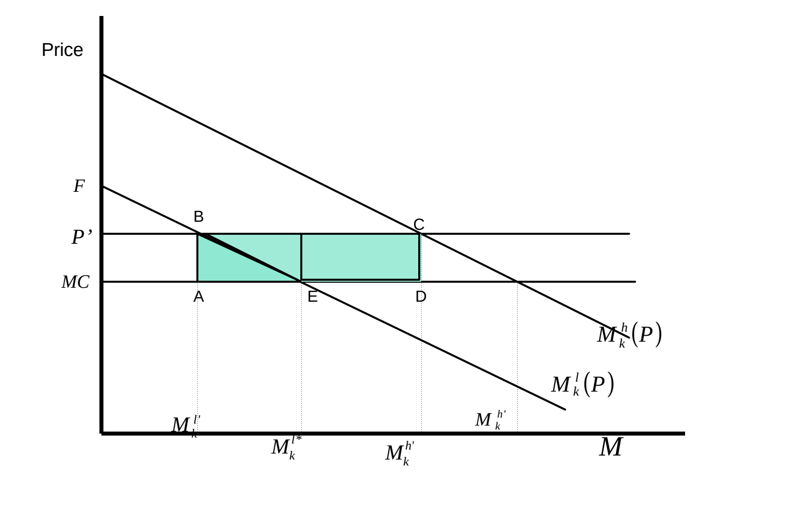
$$\hat{F}^{l} = q^{l} H\left(\hat{\mathbf{M}}^{*l}\right) - \hat{\mathbf{P}}^{l}\hat{\mathbf{M}}^{l} + R < q^{h} H\left(\hat{\mathbf{M}}^{*h}\right) - \hat{\mathbf{P}}^{l}\hat{\mathbf{M}}^{h} + R. \tag{9.2}$$

[3] A profit-maximizing hospital will always choose the *type-h* pricing strategy over any other set of prices strictly higher than the *type-l* strategy. Consider for example the average of the *type-l* and *type-h* strategies. Under both the *type-l* and the average bill pricing strategies, the number of patients entering the hospital will be equal to $aY + \hat{a}\hat{Y}$. This being the case, and since $\hat{a}\hat{B}^{h} + (1-\hat{a})\hat{B}^{l} < \hat{B}^{h}$ and $aB^{h} + (1-a)B^{l} < B^{h}$, profits under the *type-h* pricing strategy are higher.

At these prices, the hospital does not extract all of *type-h* surplus through the fixed charge.

However, the hospital can capture some of the remaining *type-h* surplus by raising the prices of services above marginal cost. Increasing prices captures more *type-h* surplus, but lowers surplus extracted from the *type-l* through the fixed fee. The point is illustrated in figure 1, where the lines $M_k^h(P)$ and $M_k^l(P)$ represent *type-h* and *type-l* demand for service k. If the hospital prices the service at marginal cost (*MC*), then the demands will be lines M_k^{h*} and M_k^{l*}, and profits will be 2 times the area *MCFE* which just the sum of the fixed fees for *type-h* and *type-l* patients. If the hospital raises the price to P', then demands fall to $M_k^{h'}$ and $M_k^{l'}$. The hospital gains profit represented by the slashed area *BECD* from *type-h* patients, but loses profits represented the checked area *ABE* from *type-l* patients. The hospital increases service prices above marginal cost as long as the marginal gain in surplus extracted from *type-h* patients is greater than the marginal cost of lost profits from *type-l* patients.

Figure 1



Formally, under the *type-l* pricing strategy, the provider profit function is

$$\Pi = \left(F^l + P^l\mathbf{M}^l\right)\left(aY + (1-a)Y\right) + \left(\hat{F}^l + \hat{P}^l\mathbf{M}^l\right)\left(\hat{a}\hat{Y} + (1-\hat{a})\hat{Y}\right) - C(\mathbf{M}). \qquad (10)$$

Maximizing (10) subject (9) and rearranging terms yields:

$$P_k^l = \frac{C_{M_k}}{\left[1 - \dfrac{a\left(M_k^h - M_k^l\right)}{aM_k^h e_k^h + (1-a)M_k^l \hat{e}_k^l}\right]} > 0 \qquad (11.1)$$

$$\hat{P}_k^l = \frac{C_{M_k}}{\left[1 - \dfrac{\hat{a}\left(\hat{M}_k^h - \hat{M}_k^l\right)}{\hat{a}\hat{M}_k^h \hat{e}_k^h + (1-\hat{a})\hat{M}_k^l \hat{e}_k^l}\right]} > 0 \qquad (11.2)$$

where $C_{M_{lk}}$ is the marginal cost of M_k and e_k^i is *type-i's* price elasticity of demand for M_k.

Conditions (11.1) and (11.2) show that the price-cost margin depends on the difference in demand for services between *type-h* and *type-l* patients, and a weighted average of their respective price elasticities where the weights are the total amount of the service demanded by that type. The bigger the differential between the amount demanded by *type-h* and *type-l* patients, the bigger the price-cost markup since there is more relatively surplus to capture from *type-h* patients. Similar to Ramsey pricing, the more elastic demand, the lower the price-cost markups since there is more to lose through reduced fixed fees.

Notice that the optimal prices of the services in (11.1) and (11.2) are not a function of R, but are a function of the heterogeneity parameters. On the other hand, the difference between the optimal fixed fees is just equal to R and plus the difference in consumer surplus of *type-l* patients which is a function of the services prices, and therefore a function of the heterogeneity parameters.

These results have three implications for the empirical work. First, the hospital will charge insured patients different fixed fees and different prices for the services if their are heterogeneity distributions are different. Only in the special case where the distributions are the same for insured and uninsured patients (i.e. $a = \hat{a}$) will $P^l = \hat{P}^l$. In this case, the difference in the fixed fees will be equal to the SI insurance benefit. Second, the hospital price discriminates against insured patients in two ways: (i) it extracts the SI benefit R, and (ii) its uses insurance status as a signal of the differences in the heterogeneity distributions of the two patient types. Therefore, a straightforward comparison of prices will not identify whether the hospital has captured the full SI benefit. Third, the differences in insured and uninsured service prices is solely due to using insurance status as a signal of unobserved heterogeneity, while the difference in the fixed fee is both the signal and extracting the SI benefit.

4. EMPIRICAL SPECIFICATION AND IDENTIFICATION

Our empirical objective is to investigate whether insured patients are charged higher prices than uninsured patients for the same services. The empirical specification is a combination of the total bill equations for uninsured and insured patients. Formally, combing (2) and (4.2) into a single equation yields the bill from hospital j who supplies services M_i to patient i:

$$B_{ij} = F + \left(\hat{F} - F\right) d_i + \sum_k P_k M_{ki} + \sum_k \left(\hat{P}_k - P\right)_k M_{ki} d_i + f_j + e_{ij} \tag{12}$$

where d_i equals one if the patient has insurance and zero otherwise, f_j is a hospital fixed effect and e_{ij} is a zero mean random disturbance that is uncorrelated with d_i, $f_{j,}$ and M_{ki}.

The specification in (12) is a hedonic pricing model (e.g. Rosen 1974) where the total bill is regressed against the M's—i.e. the characteristics of the good, a dummy variable indicating insurance status, and interactions between the dummy variable and the M's. The coefficients on the M's are interpreted as the implicit prices of the good's characteristics. In equilibrium these coefficients are equal to the markup in equation (11.1). The intercept is the fixed fee. The coefficient on the dummy variable is additional fixed fee charged insured patients, and the coefficients on the interactions are the additional service price charged insured patients. The addition charged insured patients is the difference between (11.2) and (11.1).

Ideally, we would let the fixed fee and service prices vary by hospital. Hospital prices might differ because demand varies across markets and because of heterogeneity in quality. Some hospitals are better at providing medical services because of more advance technology and more qualified staff, and are, therefore, able to charge higher prices. However, since we do not have enough observations to estimate separate models for each hospital, we fix the coefficients on the *M'*s across hospitals and interpret them as average prices. But we do allow the fixed fee to vary by hospital by including a hospital fixed effect. The f_j represents the addition to the patient's bill based on provider quality and differences in willingness to pay.

The fact that we are not able to estimate hospital-specific models implies that the error term is the sum of the deviation in the providers' prices from the means times the amount of services purchased by the patients—similar to a random coefficients specification. This introduces heteroskedasticity in the model and, as a result, we report White heteroskedastic-consistent standard errors.

A problem with the specification in (12), is that we cannot identify the extent to which prices are different due to SI rent extraction versus using insurance status as a signal of unobserved patient heterogeneity. Recall that the differences in the service prices reflect only the effect of using insurance status as a signal of the unobserved heterogeneity. Therefore, the identification problem is with the coefficient on the insurance dummy varible.

We solve the identification problem by substituting (9.1) and (9.2) evaluated at the optimal prices into (12):

$$B_{ij} = F + \left(\hat{S}^{l*} - S^{l*} + R_i\right)d_i + \sum_k P_k M_{ki} + \sum_k \left(\hat{P}_k - P\right)_k M_{ki} d_i + q_j + e_{ij} \qquad (13)$$

where $S^{l*} = q^l H\left(M^{l*}\right) - \sum_k P_k M_k^{l*}$ **and** $S^{l*} = \hat{q}^l H\left(\hat{M}^{l*}\right) - \sum_k \hat{P}_k \hat{M}_k^{l*}$, which is just consumer surplus for the *type-l* uninsured and insured patients. In a continuum of types, the first two terms of the coefficient on d_i are just the difference in consumer surpluses of the marginal insured and uninsured patients who are just indifferent between entering the hospital and the next best alternative. The third term is the maximum SI benefit. The benefit has an *i* subscript, because it varies by diagnosis, severity of illness, and type of hospital.

The specification in (13) imposes full SI benefit extraction. To allow for less than full rent extraction, we multiply R_i by a coefficient that must be between zero and one. This allows us to write (13) in regression format as:

$$B_{ij} = a_f + a_{\hat{f}-f} d_i + gR_i d_i + \sum_k b_k M_{ki} + \sum_k l_k M_{ki} d_i + q_j + e_{ij} \tag{14}$$

where the parameters are given by their analogues in (13).

The coefficient on R_i, *g*, equals one if the hospital extracts the full SI benefit, and equals zero if none of the benefit is extracted so that all of it is used to finance patient care. Any benefit not extracted through price discrimination pays for patient care by reducing the amount paid out of pocket at the time of care. Therefore, *1-g* measures the proportion of the benefit used to finance patient care. Price discrimination based on using insurance status as a signal of unobserved heterogeneity is captured by the coefficients on d_i and on the $M_{ki}d_i$. In addition, non-zero coefficients on R_i, d_i and or on the $M_{ki}d_i$ is evidence of market power (Phlips, 1974).

While non-zero coefficients on d_i and interactions with d_i are evidence that hospitals have market power and choose to price discriminate, it is not necessarily evidence that price discrimination is exercised for profit motives. Hospitals argue that they charge insured patients more to be able to cross-subsidize the care of charity patients. To rule out the possibility that charitable motives drive price discrimination, we must show that the bill charged charity is greater or equal to the cost of care. We will address this question in Section 6.

The specification in (14) assumes that the heterogeneity distributions are different for insured and uninsured patients. As shown above, if the distributions are the same, then insurance status carries no usable information about unobserved heterogeneity. In this case, the hospital charges the same price for services to insured and uninsured patients. The difference in the fixed fee is just the amount of SI benefit extracted. This implies that (14) reduces to:

$$B_{ij} = a_f + gR_i d_i + \sum_k b_k M_{ki} + q_j + e_{ij} \qquad . \tag{15}$$

If the coefficients on d_i and on $M_{ki}d_i$ are jointly zero, the heterogeneity distributions are the same.

An additional identification problem exists from possible sorting based on hospital quality. This arises from the possibility that insured patients choose the higher quality hospitals. In this case, the coefficients on insurance status also capture the effect of higher quality. Therefore, we estimate the model using hospital fixed-effects to directly control for the q_j as incidental parameters.

5. PRICE DISCRIMINATION IN FILIPINO HOSPITALS

In this section we use data from the Philippines to estimate the extent to which hospitals are able to extract Medicare insurance benefits as rent through price discrimination. The Philippines is an excellent setting for this analysis. We can identify the price discrimination by using the fact that the Filipino SI program mandates coverage only to wage sector employees and dependents. Since the program was introduced in 1972, there has been enough time for entry to dissipate rents if there is insufficient market power for price discrimination. We first describe the SI program, then discuss data and measurement of variables, and finally present the results.

5.1 Medicare

The Filipino SI program, Medicare, was established in 1972. It provides benefits for wage sector employees and their dependents financed through compulsory payroll taxes. Today, Medicare covers approximately one-third of the population including government workers, private sector employees and their dependents. The program is financed by a 2.5 percent earmarked payroll tax equally shared by workers and employers. In 1994, members contributed an average of 36 U.S. dollars annually to Medicare.

Medicare provides limited coverage for inpatient hospitalization but not for outpatient services. Its inpatient benefits are first-dollar coverage up to a cap, which varies with the type of care (surgical, general medicine, maternity, pediatrics, etc.), with severity of illness (ordinary, intensive and catastrophic), with the level of facility (primary, secondary and tertiary), and with physician certification (general vs. specialist). In 1994, the average program benefit spending per claim was $85, an amount that is roughly equal to a third of the average cost of hospitalization in the private sector and a trivial portion of the costs of treating more rare catastrophic illness.

5.2 Data and Measurement

The data come from survey of a random sample of patients from132 hospitals conducted by the Philippine Institute of Development Studies for the Philippine Department of Health (PIDS-DOH) in 1991[4]. Table 3 reports sample sizes and descriptive statistics.

The dependent variable is the total bill paid to the hospital. The key independent variables are insurance status (Medicare) and the maximum Medicare benefit for the patient (Medicare Payment). Note that most of the variance in the maximum Medicare benefit comes from individuals having Medicare or not. In the cases where they don't have Medicare, the maximum benefit is coded to zero. However, the variable is not quite a dummy because, as discussed above, there is variation in the maximum benefit based on a number of factors. In the regression, we also control for length of stay by room accommodation (charity ward, general ward, semi-private/private room) and medical services (lab tests, radiological exams, physician visits, surgeries, drugs and medical supplies).

We also test for the possibility that there is measurement error in the services provided patients or that some of the services received were omitted from the data collection. This creates a

[4] See Solon et al. (1997) for a detailed discussion of the sample and data collection methods.

potential omitted variables problem. Insured patients may demand more services and if those services are omitted from the regression, the estimated insurance effects will be confounded with differences in demand for the omitted services. We test for this by including individual characteristics that would lead to purchasing more services in the model. These variables are whether the individual is a college graduate, monthly household per capita income, and an indicator of severity of illness (i.e. days in bed before being admitted to the hospital). If these variables are significant predictors of the total bill, then there are omitted services from the model and the estimates are biased.

Table 3: Descriptive Statistics

Variable	Private Hospitals		Public Hospitals	
	Mean	Std. Dev.	Mean	Std. Dev.
Total Bill Paid to Hospital (Pesos*)	6,613	11,051	1,452	3,063
Payment Out-of- Pocket (Pesos)	5,968	10,793	1,008	2,680
Medicare Payment (Pesos)	578	1,235	444	1,347
Medicare (= 1)	0.32	0.47	0.25	0.50
Charity Ward (=1)	0.05	0.22	0.38	0.49
General Ward (=1)	0.57	0.50	0.05	0.22
Private/Semi Private Room (=1)	0.38	0.49	0.00	0.00
Inpatient Days	4.66	6.48	5.84	8.19
Lab Tests	1.52	1.39	1.75	1.44
Radiology Exams	0.33	0.62	0.21	0.49
Physician Visits	2.66	4.06	5.48	18.68
Surgeries	0.20	0.50	0.20	0.57
Drugs Prescriptions	3.78	2.35	2.66	2.37
Supply Orders	2.01	2.21	1.45	1.10
Age	26.36	20.30	28.10	22.49
Female(=1)	0.39	0.49	0.46	0.50
Monthly Family Per Capita Income	5,423	5,108	3,231	3,851
Income Missing (=1)	0.14	0.35	0.10	0.29
College (=1)	0.32	0.47	0.77	0.34
Days in Bed Before Admission	1.67	8.11	2.61	10.21
Sample Size: Patients	421		485	
Sample Size: Hospitals	70		62	

*Monetary values are reported in 1991 Pesos. At that time the exchange rate was 25 Pesos for one US Dollar.

Table 3 shows that average bill in private hospitals was about 4.5 times the average public hospital bill. Several reasons for this are immediately apparent. Private hospitals have close to twice as many insured patients. Their patients are better educated and have higher incomes. These wealthier insured patients consume substantially more hospital services. Fewer patients in private hospitals are in the charity wards and more are in private rooms. In addition, patients in private hospitals have more radiological exams and more medication. However, patients in public hospitals do have substantially longer lengths of stay and slightly more lab tests.

Table 4 reports the means by insurance status. In private hospitals, the average total bill paid hospitals is about 40 percent higher for insured patients than for the uninsured. However, the out-of-pocket payments are almost the same. Moreover, the quantity of each of the services is about the same for insured and uninsured patients. Thus, the descriptive statistics suggest that insured and uninsured patients are paying about the same out-of pocket for the same amount of services. This is consistent with price discrimination that completely extracts the SI benefit. Similarly for the public hospitals, the average total bill paid the hospital for insured patient care is about 2.5 times the amount paid for the uninsured. However, the payment out-of-pocket is similar for insured and uninsured. In the public case, there are more services provided to the insured than the uninsured patients. While these statistics are consistent with the price discrimination story, they are less clearcut than those for private hospitals.

The patients choosing public hospitals look very different from those choosing private hospitals. The key difference, as indicated in Table 3, is that insured, wealthier and better-educated patients tend to choose private hospitals. However, once they have made that choice, the insured patients in private hospitals look similar to the uninsured in private hospitals and demand similar amounts of services as uninsured patients. Table 4 also shows that, in private hospitals, insured and uninsured patients have the same income, education and severity of illness. These results suggest that the underlying heterogeneity distributions of insured and uninsured patients may be similar enough so that private hospitals charge the same service prices to insured and uninsured patients. This is not the case for public hospitals, where insured and uninsured patients look different and demand different levels of care.

Table 4: Means by Insurance Status

Variable	Private Hospitals		Public Hospitals	
	Insured	Uninsured	Insured	Uninsured
Total Bill Paid to Hospital (Pesos)	8,134	5,784	2,535	1,079
Medicare Payment (Pesos)	1,828	0	1,734	0
Out of Pocket Payment (Pesos)	6,306	5,784	808	1,079
Charity Ward (=1)	0	0.08	0	0.77
Pay Ward (=1)	0.60	0.55	0.92	0.20
Private/Semi Private Room (=1)	0.40	0.37	0.08	0.04
Length of Stay (days)	4.22	4.86	6.10	5.76
Lab Tests	1.65	1.46	2.37	1.54
Radiological Exams	0.26	0.36	0.34	0.16
Physician Visits	4.19	1.95	10.80	3.65
Surgeries	0.18	0.20	0.18	0.20
Drug Prescriptions	3.89	3.72	3.13	2.50
Supply Orders	2.06	1.98	1.44	1.46
Age	29.0	25.15	31.29	27.00
Male (=1)	0.40	0.39	0.54	0.44
Monthly Per Capita Household Income	5,282	5,489	4,753	2,708
Income Missing (=1)	0.09	0.16	0.12	0.09
College (=1)	0.35	0.31	0.22	0.05
Days in Bed Before Admitted	1.49	1.76	1.41	3.02
Sample Size	149	273	126	366

5.2 Estimation Results

The results are presented Tables 5 and 6 for private and public hospitals[5]. For each sample, we estimated four different models. All of the models include Medicare Payment and the service variables. Model 1 also includes the Medicare dummy, interactions between Medicare and the service variables, and patient characteristics. Model 2 adds only Medicare and interactions, and Model 3 adds only patient characteristics. Finally, Model 4 has no added variables.

The results of specification tests are reported at bottom of the Tables. Consider first tests of the hospital fixed effects. In all models, we conducted Hausman tests to see if we could use random effects instead of fixed effects. Random effects were rejected in all models. Moreover, Chow tests rejected the hypothesis that the fixed effects were jointly zero in all models.

We next tested for omitted services that could confound the insurance effect. Chow tests could not reject the hypothesis that the coefficients on the patient characteristics were jointly zero

[5] Chow tests reject poling profit and not-for-profit samples.

in the relevant models for both types of hospitals. Moreover, none of the individual coefficients on the patient characteristic variables were significantly different from zero. We conclude from this test that there are no omitted services that bias the estimate of the insurance effects.

Finally, we tested the hypothesis that insured and uninsured patient heterogeneity distributions were the same. Chow tests could not reject this hypothesis that the coefficient on the Medicare dummy and the interactions were jointly zero for private hospitals, but rejected it for public hospitals. These results are consistent with the descriptive pattern presented in Table 4. For private hospitals, this implies that insurance status provides no information about unobserved heterogeneity so that it is optimal to charge insured and uninsured patients the same prices for services and raise the fixed fee by the amount of the insurance benefit that can be extracted.

These specification tests imply that the data are most consistent with Model 4 in Table 5 for private hospitals and Model 2 in Table 6 for public hospitals. The coefficient on the Medicare Payment measures the extent to which hospitals are able to capture the Medicare benefit through price discrimination. In the private hospital Model 4, the estimated coefficient is 0.95, significantly different from zero, and not significantly different from one. This implies that private hospitals raise the fixed fee to insured patient by an amount almost equal to the insurance benefit. In this case, the hospital captures the full benefit and Medicare finances none of the patient's care. In the public hospital model 2, the estimated coefficient is 0.70, significantly different from zero, and significantly less than one at the 0.1 level. This implies that public hospitals extract only about 70 percent of the benefit through price discrimination, and about 30 percent of the benefits are used to reduce out-of-pocket payments.

The coefficients on the other variables are consistent with common sense. Private hospitals charge positive amounts for all services except for drug prescriptions. They charge the most for surgeries and radiological exams that are the most costly services to provide. They charge more for patients in private rooms than in general wards, and do not charge for accommodation in charity wards. Public hospitals do not seem to charge for accommodation in charity wards and for physician visits but do charge for the other services. Public hospitals raise the fixed fee for insured patients and charge them more than double for radiological exams and surgery. However, they give modest price discounts to insured patients for the other services.

Table 5: Private Hospital Hedonic Price Models ¾ Fixed-Effects Estimates

	Model 1		Model 2		Model 3		Model 4	
Independent Variables	*b*	***T-Stat*[+]**	*b*	***T-Stat*[+]**	*b*	***T-Stat*[+]**	*b*	***T-Stat*[+]**
Medicare Payment (Pesos)	1.25	2.60	1.18	2.54	0.99	2.01	0.95	1.97
Days in Charity Ward	-56.58	-0.41	-82.79	-0.61	-53.16	-0.39	-77.80	-0.58
Days in Pay Ward	447.11	3.86	426.67	3.74	435.73	3.92	414.47	3.80
Days in Private / Semi Private Room	554.83	2.75	518.37	2.63	571.60	3.23	545.43	3.16
Lab Tests	88.29	0.15	49.90	0.09	260.01	0.57	185.38	0.41
Radiological Exams	1743.98	1.45	1473.13	1.29	1627.46	1.61	1389.64	1.44
Physician Visits	722.35	3.58	720.63	3.60	668.98	4.26	680.96	4.37
Surgeries	2664.34	1.85	2712.69	1.93	2547.68	2.14	2530.29	2.18
Supply Orders	481.48	1.29	496.81	1.35	428.61	1.35	469.66	1.51
Drug Prescriptions	-357.71	-0.98	-315.74	-0.87	-28.33	-0.09	1.75	0.01
Medicare Dummy and Interactions								
Medicare (=1)	-2297.36	-0.82	-2562.05	-0.93				
Days Pay Ward × Medicare	-405.12	-0.73	-386.94	-0.71				
Days in Private Room × Medicare	-191.65	-0.34	-134.72	-0.25				
Lab Tests × Medicare	677.62	0.70	553.34	0.59				
Radiological Exams × Medicare	-1129.78	-0.51	-1131.25	-0.51				
Physician Visits × Medicare	-246.11	-0.78	-207.33	-0.67				
Surgeries × Medicare	-1015.80	-0.41	-1173.56	-0.48				
Supply Orders × Medicare	-399.21	-0.73	-331.21	-0.62				
Drug Prescriptions × Medicare	1006.60	0.88	986.34	0.86				
Patient Characteristics								
Age	-29.47	-0.96			-27.63	-0.91		
Male (=1)	-751.16	-0.65			-740.47	-0.65		
Per Capita Household Income	-0.07	-0.61			-0.06	-0.54		
Income Missing (=1)	-56.45	-0.03			18.02	0.01		
College (=1)	456.87	1.11			396.44	0.99		
Days in Bed Before Admitted	-5.01	-0.07			-13.38	-0.19		
Specification Tests	***Statistic***	***P Value***	***Statistic***	***P Value***	***Statistic***	***P Value***	***Statistic***	***P Value***
F-Statistic for Patient Characteristics	0.51	0.77			0.46	0.81		
F-Statistic for Medicare Interactions	1.09	0.37	1.05	0.40				
Hausman Test for Random Effects	39.89	0.03	119.05	0.00	527.93	0.00	584.39	0.00
F-Statistic for Hospital Fixed Effects	1.40	0.03	1.43	0.02	1.50	0.01	1.54	0.01
Overall R-Squared	0.21		0.21		0.20		0.20	
Sample Size: Patients	421		421		421		421	
Sample Size: Hospitals	70		70		70		70	

[+] T-Statistics are computed using White Heteroskedastic Robust Standard Errors

Table 6: Public Hospital Hedonic Price Models¾ Fixed Effects Estimates

	Model 1		Model 2		Model 3		Model 4	
Independent Variables	*b*	***T-Stat***[+]	*b*	***T-Stat***[+]	*b*	***T-Stat***[+]	*b*	***T-Stat***[+]
Medicare Payment (Pesos)	0.72	3.98	0.70	3.87	0.67	5.80	0.62	5.44
Days in Charity Ward	18.90	0.95	15.48	0.80	14.66	0.78	3.99	0.24
Days in Pay Ward	128.22	1.98	139.13	2.16	91.92	1.95	90.82	2.02
Days in Private / Semi Private Room	233.20	3.10	229.28	3.10	114.53	3.37	111.34	3.47
Lab Tests	413.61	3.39	403.15	3.35	335.09	3.15	350.45	3.73
Radiological Exams	-255.75	-0.66	-178.59	-0.49	5.01	0.02	417.19	1.56
Physician Visits	-5.99	-0.54	-5.72	-0.51	-7.90	-0.89	-6.47	-0.94
Surgeries	507.82	2.09	512.35	2.12	707.26	3.22	882.03	4.21
Supply Orders	213.66	2.93	217.32	3.00	169.56	2.56	127.30	2.29
Drug Prescriptions	112.49	0.92	116.16	0.95	150.28	1.33	136.15	1.29
Medicare Dummy and Interactions								
Medicare (=1)	224.61	0.28	254.31	0.32				
Days Pay Ward ×Medicare	-24.74	-0.26	-31.25	-0.34				
Days in Private Room × Medicare	-138.07	-1.62	-133.91	-1.59				
Lab Tests ×Medicare	-305.40	-1.48	-318.87	-1.55				
Radiological Exams × Medicare	766.03	1.40	840.23	1.57				
Physician Visits × Medicare	0.54	0.04	0.56	0.05				
Surgeries × Medicare	689.56	1.14	878.57	1.47				
Supply Orders × Medicare	-119.74	-0.96	-103.06	-0.83				
Drug Prescriptions × Medicare	-31.94	-0.10	-80.76	-0.26				
Patient Characteristics								
Age	6.95	1.23			7.11	1.27		
Male (=1)	-177.70	-0.74			-189.98	-0.80		
Per Capita Household Income	-0.01	-0.36			-0.02	-0.65		
Income Missing (=1)	431.63	1.01			432.48	1.02		
College (=1)	1.63	0.02			16.48	0.16		
Days in Bed Before Admitted	-7.59	-0.65			-8.57	-0.74		
Specification Tests	***Statistic***	***P Value***	***Statistic***	***P Value***	***Statistic***	***P Value***	***Statistic***	***P Value***
F-Statistic for Patient Characteristics	0.62	0.69			0.79	0.55		
F-Statistic for Medicare Interactions	4.65	0.00	4.75	0.00				
Hausman Test for Random Effects	98.58	0.00	651.35	0.00	24.78	0.07	23.04	0.01
F-Statistic for Hospital Fixed Effects	2.45	0.00	2.27	0.00	2.25	0.00	2.25	0.00
Overall R-Squared	0.36		0.36		0.36		0.35	
Sample Size: Patients	485		485		485		485	
Sample Size: Hospitals	62		62		62		62	

[+] T-Statistics are computed using White Heteroskedastic Robust Standard Errors

6. WHO BENEFITS FROM MEDICARE IN THE PHILIPPINES?

In this section, we use the estimated two-part tariff hedonic pricing models to evaluate who benefits from Medicare in the Philippines. We consider three issues. First, what percent of Medicare expenditures are captured by hospitals as rent through increased price-cost margins and what percent finances patient care. Second, we examine the claim that the profits from charging higher prices to insured patients are used to cross-subsidize the care of financially indigent patients. Finally, we examine the effect of expanding Medicare on public expenditures in the health sector.

6.1 Medicare Expenditures

In 1991, the year of the PIDS-DOH survey, Medicare spent about 1,829 million pesos reimbursing benefit claims submitted by about 1,600 accredited hospitals (Philippine Medicare Commission, 1992). Of that amount approximately 12 percent was spent on administrative overhead costs, leaving about 1,610 million Pesos in actual payments to providers.

Using the results from the two-part tariff hedonic price regressions, we estimate the percentage of total Medicare expenditures captured as rent by hospitals and the amount spent on patient benefits[6] —i.e. the amount that was actually used to finance patient care. Rent and benefit are calculated separately for private and public hospitals. The average Medicare payment comes from Table 4 and the coefficients on the maximum Medicare benefit come from Table 5 and Table 6. The number of visits is calculated as average inpatient hospitalization for Medicare beneficiaries times the number of Medicare beneficiaries. In 1991 there were approximately 26.14 million Medicare beneficiaries and annual inpatient admission rates were 0.019 for private hospitals and 0.015 for public hospitals.

[6] Rent is calculated as the average Medicare reimbursement times the estimated coefficient on the maximum Medicare payment times the number of visits. Benefits are calculated as the average Medicare reimbursement times one minus the estimated coefficient on the maximum Medicare payment times the number of visits

The results of these calculations are presented in Table 7 in which both the Peso estimates and percentages of total expenditures are presented. Our model predicts total Medicare expenditures extremely well. In total we estimate that 1,590 million Pesos were paid to hospitals in 1991 compared to 1,610 million in actual payments. The results indicate that 84 percent of Medicare payments were captured as rent and only 16 percent financed patient care. Over half the expenditures were captured as rent by private hospitals.

Table 7: Distribution of Medicare Expenditures

	Rent		Benefit		Total	
	Pesos	**Percentage**	**Pesos**	**Percentage**	**Pesos**	**Percentage**
Private Hospital	863.49	54%	45.45	3%	909.48	57%
Public Hospital	476.48	30%	204.20	13%	680.98	43%
Total	1339.97	84%	249.65	16%	1590.46	100%

6.2 Charity Motives

Consider the hypothesis that hospitals use the rent from charging Medicare patients higher prices to cross-subsidize the care of financially indigent or charity care patients. A necessary condition for this to be true is that the hospital charges charity patients less than the marginal cost of care.

In order to compare prices to the costs of care, we construct total bills for a common set of services. The first three rows of numbers in Table 8 report the predicted bills for patients holding constant the level of services at the grand mean except for the bed day charges. The bills are constructed assuming 5 days in a charity ward with no insurance, 5 days in a general ward without insurance, and 5 days in a general ward with insurance. The private hospital predictions use Model 4 from Table 5 and the public hospital predictions use Model 2 from Table 6.

The lower panel of Table 8 reports hospital cost estimates from Alba (1998). Using data from the same sample of Philippine hospitals, Alba estimated a Translog variable cost function for public and private hospitals using inpatient admissions and outpatient visits as measures of output. He did not have information on room accommodation or services to be able to construct more refined output measures. His estimates of marginal cost for an inpatient admission for an average hospital are reported in third from the last row. He also reports fixed costs by hospital type. Averages fixed costs are reported in the second to last row assuming that of it is allocated to inpatient care. The last row reports the sum of marginal variable and average fixed costs.

Table 8: Predicted Bills and Costs for a Standard Package of Services

	Private Hospital	Public Hospital	Difference
Predicted Price Charged to			
Charity Patient	4,590	838	3,752
Uninsured Patient	6,663	1,539	5,124
Insured Patient	8,359	2,777	5,582
Cost Per Patient			
Marginal Cost	2,909	2,611	
Average Fixed Cost	1,398	3,270	
Marginal + Average Fixed Cost	4,307	5,881	

The results indicate that private hospitals charge charity patients not only more than marginal cost, but an amount approximately equal to marginal costs plus overhead. Profit margins on uninsured patients are about 50 percent and about 100 percent on insured patients. Public hospitals charge insured patients' marginal cost, but subsidize the costs of uninsured patients and charity patients. Charity patients receive a 68 percent discount from marginal cost and an 86 percent discount from full costs. Uninsured patients receive a 74 percent discount and insured patients a 53 percent discount off of full costs.

These results imply that private hospitals do not use the profits from insured patients to cross-subsidize the care of charity patients. In public hospitals, however, all patients receive a subsidy. Therefore, increased charges to SI reduce public subsidies. Using the information from Table 7, we can now distribute the SI benefits in terms of rent, reductions in public subsidies and health benefits. Specifically, 54 percent of Medicare payments were captured as profits by private hospitals, 30 percent were used to reduce public subsidies to public hospitals, and the remainder, 16 percent, financed the care of Medicare beneficiaries.

6.3 The Public Burden

Finally, we consider the effect of expanding Medicare coverage on public expenditures. Recall that one of the motivations for expanding SI is to reduce the public sector's financial burden by shifting SI beneficiaries into the private sector. This is accomplished by lowering the out-of-pocket price of private hospital care relative to that of public hospital care at the time of purchase. The effect on demand for public care depends on how the relative prices change and the price elasticity of demand for hospital care.

We begin by calculating the relative prices. Recall that the predicted bills for a standardized set of services are reported in Table 8. The second and third rows of numbers report the bills for insured and uninsured patients. The last column reports the difference. The results indicate that the price differential actually widened, rather than narrowed. This implies that insured patients have a greater incentive to choose public care over private care, other things equal. This is because while private hospitals raised prices to extract almost all the Medicare benefit, public hospitals only raised price to extract 70 percent. Therefore, the Medicare insurance benefit lowered the out-of-pocket price of public care, but not that of private care.

The fact the price differential widened suggests that the public burden expands as the government mandates that more people be covered by Medicare. The exact amount depends on the price elasticity of demand. In a separate paper, we use data from a DOH-PIDS household survey conducted at the same time to estimate the price elasticities (Gertler, Solon and Tan, 1996). The estimated price elasticities are presented in Table 9. Overall, demand is inelastic with the demand for treatment in private hospitals more price elastic than for care in public hospitals. As expected, demand is more price-elastic among lower income individuals.

We use these price elasticities to predict how expanding Medicare coverage will affect utilization of public hospitals and the amount of public subsidies used to finance the sector. Table 10 reports public hospital utilization rates under the assumptions of no Medicare, current Medicare coverage, and universal coverage. Since the relative price of private to public care widens with Medicare, the expansion of Medicare increases the demand for public hospitals. However, because Medicare changes relative out-of-pocket prices by a small amount and demand is fairly inelastic, utilization does not change in a dramatic way. In fact, total utilization increases by about one percent moving from no Medicare to universal coverage. As a result, public subsidies to hospitals would have to increase by about one percent as well.

Table 9: Price Elasticities of the Demand for Hospitalization

Income Group	Private Hospital	Public Hospital
Lowest Quintile	-0.651	-0.103
Second Lowest Quintile	-0.334	-0.050
Top Three Quintiles	-0.035	-0.007
Overall	-0.207	-0.033

Table 10: Estimated Annual Probability of Being Admitted to a Hospital

Income Group	No Medicare	Current Coverage	Universal Coverage
Lowest Quintile	0.01895	0.01895	0.02013
Second Lowest Quintile	0.01296	0.01306	0.01331
Top Three Quintiles	0.01088	0.01900	0.01092
Overall	0.01312	0.01315	0.01348

7. CONCLUSIONS

The Filipino Medicare program is a classic example of a poorly designed social health insurance program. However, we find that for political economy reasons, that the Filipino model is being used throughout the developing world. We have shown that Medicare fails to finance health care because health care providers capture the benefits through insurance-based price discrimination. In fact, hospitals extracted 84 percent of Medicare expenditures in increased price-cost margins. As a consequence, expanding Medicare increased rather decreased the government's financial burden for health care. The main features of Medicare, which allow full rent extraction, are (i) first-dollar coverage with a low cap on benefits, (ii) paying providers on a fee-for-service basis, and (iii) allowing providers to balance bill.

The lesson for developing countries is to carefully consider the incentive effects of both the benefit design and payment mechanism of SI programs. The current system of first dollar coverage with a low cap provides limited insurance benefits. However, raising the cap will increase insurance only if providers cannot capture the benefit through increased prices. This could be done by not allowing balance billing, but there are serious questions regarding the ability to enforce a no-balance-billing provision. The persistence of "red envelope" payments as a form of tipping health care providers in countries with strict price controls, like Japan and Taiwan, suggest that the enforcement of a no-balance-billing provision is likely to be less effective in developing countries. Rent extraction of limited first-dollar benefits may be prevented if such benefits can be paid out through capitation. However, setting caps requires information on health care demand and costs that may not be available in a developing country setting.

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