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Physician Dual Practice: Access Enhancement or Demand Inducement?

Anupa Bir and Karen Eggleston*

Abstract

In many developing countries, the majority of physicians employed in government clinics also have a private practice. We develop a simple model to show that allowing dual practice helps low-income governments retain skilled physicians to assure patient access. If dual-practice providers differentially refer higher-income patients to private practice, public funding becomes more effectively targeted on the poor. Yet dual practice physicians may also skimp on effort, pilfer supplies, and induce demand. Patterns of care-seeking in Indonesia, especially disproportionate use of private providers by the urban poor, are consistent with exacerbated incentive for physician self-referral to private practice in urban areas.

JEL Classification: I1, J3, O1

Keywords: dual job holding; physician compensation; public-private competition; induced demand; Indonesian health care

1 Introduction

In many developing countries, the majority of physicians employed in government clinics also have a private practice. In the 1993 Indonesian Family Life Survey, 80 percent of public-sector physicians reported having a private practice. In other developing countries as disparate as India, Egypt, and Vietnam, the prevalence of dual job holding for physicians is also quite high (Chawla 1996).

*Anupa Bir is a health economist with RTI International, Inc., 411 Waverly Oaks Road, Waltham MA 02452, 781-788-8100, abir@rti.org. Karen Eggleston is an assistant professor of economics at Tufts University, karen.eggleston@tufts.edu. Send correspondence to Karen Eggleston, Braker Hall, Tufts University Economics Department, Medford, MA 02155. We thank Jerry Cromwell and anonymous referees for useful comments; all remaining errors are our own.

Multiple job holding is at odds with basic labor supply theories that predict individuals would prefer to work more hours at their highest-paying job rather than holding multiple jobs (Lang 1994). It is also contrary to theories of incentive design that predict that employers will want to constrain employee temptation to divert time and attention from hard-to-monitor tasks (Holmstrom and Milgrom 1991; as Holmstrom 1999 notes, "it is standard praxis that ordinary employees cannot work for two firms at the same time" [p.94]). Potential for severe conflicts of interest, and damage to public sector quality, might seem to suggest that any government should proscribe dual practice, if it were capable of enforcing such a ban. The prevalence of dual practice in developing countries thus presents a puzzle. It suggests that both physicians and governments–implicitly if not explicitly–acknowledge complementarities between jobs, and that there might be some advantages to allowing dual practice, particularly for developing countries.

Understanding the incentives of dual practice can also be constructive for analyzing under-the-table, "gratuity" or "informal" payments to public sector providers, which are widespread in developing and transitional economies (Lewis 2000; Kornai and Eggleston 2001; McKee, Healy, and Falkingham 2002). Indeed, when the physician's "private practice" consists of using public facilities to treat private-pay patients, dual practice is synonymous with under-the-table payments.

To understand the possible advantages of allowing dual practice, consider a developing country that seeks to guarantee its citizens universal access to primary health care. Without government financing, some high-income consumers would buy primary care services from available providers, but many low-income consumers might not. To achieve universal access, public intervention is needed for the latter group. Public financing targeted to the poor would be ideal. In practice, many countries adopt a system of implicit coverage through delivery of care at government hospitals and clinics. Thus access to basic health care, particularly for the poor, depends upon government ability to attract and retain competent physicians in public clinics and hospitals.

We argue that a useful way to understand government policies regarding dual practice and informal payments is to think of a government employer offering a total compensation package to physicians that includes both salary and the non-wage "benefit" of private practice revenue. Allowing dual practice enables the government to recruit quality providers at a modest budgetary expense.[1] It is in this sense that

[1] In Tajikistan, for example, official physician salaries in 1998 were only US$2.80-3.50 per month, compared to the workforce average of US$11 (McKee, Healy and Falkingham 2002: 136). Even in more advanced transitional economies such as Hun-

dual practice may enhance access. The availability of private practice represents an unofficial but often widely expected perk of government employment. In most countries where the public and private sectors do not share physicians, higher private sector wages are expected to attract higher quality physicians, leaving lower quality physicians in the public sector (Chawla 1996). Disallowing dual practice would thus put the public sector at a competitive disadvantage for attracting capable doctors, necessitating either a significant increase of official salaries (to compensate doctors for the opportunity cost of foregone private-practice income) or acceptance that higher-skill, higher-compensated doctors will disproportionately move to the private sector, compromising access for those unable or unwilling to pay private-sector prices. Since skilled clinicians expect to be able to generate significant income from private practice, allowing dual practice may be one of the most effective policies that a cash-strapped low-income government can use to retain skilled physicians in public clinics and hospitals.

This application of compensating differentials and total compensation theory (e.g., Pauly 1997, Miller 2003) to dual practice, formalized below, finds considerable support in the policy literature. For example, Gruen et al. (2002) argue that dual practice is viewed as legitimate in sub-Saharan African primarily to supplement extremely low official salaries, and that in Asia, "most governments have a permissive attitude to joint public/private practice, because they see it as a way to mobilize further resources and to retain qualified staff in the public health sector" (p.268). As Paxon and Sicherman (1996) argue, public practice may also enable physicians to balance fluctuations in their income streams from private practice.

Moreover, since public health services are typically available to all patients "free" or heavily subsidized, they are utilized even by those who would otherwise have purchased care from private providers. This "crowds out" private financing and creates a deadweight loss to society from additional tax distortions to finance the public facilities. If dual-practice providers differentially refer higher-income consumers to private practice, as would be consistent with income maximization as well as with altruistic concern for patient welfare, public funding of government health facilities becomes more effectively targeted on poor consumers. Dual practice could therefore serve as an informal means test for efficient sorting of consumers between sectors, while simultaneously allowing physicians to supplement income through price discrimination.

gary and Poland, physicians earned only 27-33% more than the average employee; by contrast, physicians in Germany and the United States earn more than 400% more than the average German or American employee (Kornai and Eggleston 2001: 167).

These potential benefits of dual practice do not come without a cost, however. Dual practice providers may skimp on work hours in the public sector to spend time in private practice. Since monitoring of provider time and effort is costly, often only minimal presence in a public practice is required to access the non-pecuniary benefits of public employment (e.g., official salary and civil servant fringe benefits such as public housing). This skimping may adversely affect access and quality of care for patients seeking treatment at government facilities.

Dual practice providers may also use government supplies and equipment in treatment of private sector patients. Such "free riding" on public financing to generate personal profit clearly undermines the efficiency of public delivery and typically constitutes regressive income redistribution. Furthermore, such opportunities give dual practice physicians a cost advantage over physicians solely in private practice. Free riding on public facilities can therefore constitute a break on the healthy development of a private sector delivery system (Kornai and Eggleston 2001), and may contribute to higher overall healthcare costs.[2]

Furthermore, dual practice providers have incentives to induce demand for private practice services. The propensity of health care providers to over-refer to facilities in which they have a financial interest is widely recognized (e.g., by laws prohibiting physician ownership of pharmacies in the US). Such self-referral, of which dual practice self-referral constitutes an important case, exemplifies the controversial phenomenon of physician-induced demand.[3] Since consumers with low educational levels and in poor health may be especially vulnerable to such inducement, the perverse incentives of dual practice are a particular concern for policymakers aiming to protect vulnerable populations.

This paper first develops a simple model of these dual practice incentives. In deciding on the degree of permissiveness for dual practice and informal payments, the government recognizes the negative effects of allowing dual practice. Indeed, in our simple model the government explicitly seeks to maintain a given quality of care while minimizing the total cost of salaries plus the social costs of dual practice.

We next use data from the 1993 Indonesian Family Life Survey to ex-

[2] The argument is parallel to one made by critics of physician ownership of ancillary treatment facilities in the US: opportunities for self-referral may inhibit competition from facilities that do not benefit from such self-referral, and thus raise overall costs (Mitchell and Sass 1995: 264).

[3] "Adding up the evidence, on obstetricians doing more C-sections, surgeons doing more bypass operations, *physicians referring more frequently to their own labs*, and other studies, makes a convincing case that doctors can influence quantity and sometimes do so for their own purposes" (McGuire 2000: 517, italics added, referring to Mitchell and Sass 1995).

amine whether measurable quality and price can explain patient choice of provider, or whether there is evidence of induced demand, particularly among the most vulnerable. Because we can compare public and private providers on structural, procedural, and amenity aspects of quality and price, we directly address whether the poor are choosing private providers because their quality is higher. Dual practice will entail social costs only to the extent that patterns of choice are driven more by provider incentives than the best interest of the patient. Unfortunately data limitations and lack of exogenous variation in dual practice conditions preclude a direct test of inducement behavior or the other potential costs and benefits of dual practice. Instead we focus whether the propensity of lower-income patients to use expensive private providers differs across areas where providers face different competition for patients, such as in urban versus rural areas.

The detailed analysis of consumer behavior undertaken here offers four main advantages over previous work. First, many studies cannot measure public and private sector quality accurately because physicians who practice in the public sector differ from those who practice in the private sector along important dimensions not observed by the analyst. This confounding from unobservable physician characteristics is far less of a concern in Indonesia because of the prevalence of dual practice. Second, information on individual facility characteristics allows for quality measures and ownership type to affect consumer choice of provider independently. Thus we can separate "ownership effects" from "quality effects" to see whether "publicness" or "privateness" influence consumer choice after controlling for measured dimensions of price and quality. Third, we use a number of dimensions of quality and price to examine the potential determinants of consumer choice. Finally, in addition to the standard multinomial logit model used in the literature, we estimate a nested multinomial logit and a heteroscedastic extreme value model, while allowing up to eight of the actual providers available in a market area, each with their specific characteristics, to comprise the choice set facing a consumer. Thus, the empirical part of the study adds to the literature on determinants of consumer behavior in developing countries by delving into consumer responsiveness to multiple aspects of quality of care and ownership in addition to price.[4]

[4]Leonard (forthcoming) also examines patient choice of provider in low-income countries, but focuses on how the choice of traditional healers can be traced to their ability to use outcome-contingent contracts. Unfortunately we are unable to include traditional healers (or other providers such as nurses and pharmacists) in the present study of patient choice because the data on quality is not directly comparable to that available about physicians.

In the next section, we develop a simple model to analyze the incentives of governments and providers regarding dual practice. We then overview the Indonesian context of primary health care delivery and dual provision. The final sections present empirical work estimating Indonesian consumer responsiveness to various dimensions of quality and price, and discuss the implications of our results for policy.

2 Advantages and Disadvantages of Dual Practice

A simple model of compensation package design and compensating differentials can well illuminate most of the critical incentive trade-offs and associated policy controversies about dual practice. Consider a government seeking to staff a public clinic or hospital. The government chooses a salary level for public sector physicians, S, and a permissiveness of dual practice, D. Even if the government chooses to make dual practice illegal ($D = 0$), physicians may still expect $D > 0$ if there is lax enforcement of the rules and/or widespread acceptance of informal patient payments above the official public fee (which we assume, for simplicity, to be zero). In a dynamic model, D could represent the discounted expected value of ability to earn private practice earnings, including the ability to build a private practice clientele and eventually retire from public service.

Let $b(D)$ represent the money metric of physician benefits from private practice revenue when dual practice is allowed. These benefits are increasing and concave in the government's permissiveness toward dual practice: $b' > 0, b'' < 0$, partly due to the trade-off between income from work and leisure. Some evidence suggests that physician benefits from private practice are substantial.[5] Physicians derive utility from salary and benefits, $U(S, b(D))$, and must receive a reservation utility of $\overline{U}$ to work in the public sector.[6]

Allowing private practice entails certain social costs, $c(D) \geq 0$. Examples include using public resources to treat private patients and di-

[5] Gruen et al. (2002) surveyed 100 government-employed doctors in Bangladesh who also had private practices. A majority reported at least to double their government income by engaging in private practice. Lerberghe et al. (2002: 583) argue that "in the average low-income country, salaries would have to be multiplied by at least a factor of five to bring them to the level of incomes from small private practices." This magnitude receives independent corroboration from a study of health service contracting in Cambodia, where official salary increases of 500-800% did not fully compensate some public health workers for the loss of income from the ban of private practice (Soeters and Griffiths 2003).

[6] In a more general model developed below, physicians derive utility from income Y, leisure L, and perhaps experience disutility from inducement I: $U(Y, L, I)$. Government permissiveness of dual practice impacts all three arguments in the utility function. For simplicity we first posit that $U(Y(S, D), L(D), I(D))$ takes the form $U(S, b(D))$.

verting even low-income patients from subsidized public care to expensive private treatment. Assume these social costs are increasing in D, at an increasing rate: $c(0) = 0$, $c' > 0$, $c'' > 0$.

Assume the government wishes to maximize the net benefit of patient access to primary care. Benefit includes quality, proxied by the average physician skill level θ, and access, proxied by the number of physicians who accept public employment, N, and the average time physicians devote to public practice, T. Each of these measures of quality is itself a function of dual practice permissiveness: D affects recruitment, $N(D)$, the skill level of physicians attracted to public employment, $\theta(D)$, and the time devoted to public practice, $T(D)$.

We will discuss physician heterogeneity and dual practice as a policy to attract high-θ physicians in the next section. We will also allow physicians to skimp on public practice duties by choosing T. For now, however, we simplify by assuming the government achieves a minimum acceptable level of quality if it can recruit a representative physician. The goal of maximizing quality less cost thus becomes the objective of minimizing the costs of providing basic access to care with publicly employed physicians, subject to the participation constraint of a representative physician:

$$\begin{aligned} &\underset{<S,D>}{Min}\ [S + c(D)] \\ &s.t. U(S, b(D)) \geq \overline{U}. \end{aligned} \tag{1}$$

The first-order conditions for constrained minimization imply that the government sets the salary S^* to meet the physician participation constraint $\overline{U}$, given D^*, which the government chooses according to the following first-order condition:

$$\frac{U_b}{U_S}\frac{db}{dD} = c'(D). \tag{2}$$

The left hand side of (2) represents the (negative of the) physicians' marginal rate of substitution between non-wage perks and salary, multiplied by the marginal benefit to doctors of dual practice 'perks.' The right hand side is the marginal social cost, $c' > 0$, of dual-practice privileges. The government balances the benefit of relaxing the physician participation constraint (and thus allowing the government to employ many physicians despite low salary S) against the social costs of dual practice.

Accordingly, governments would optimally allow dual practice when the opportunity costs of raising government physician salaries are high

compared to the social costs of allowing dual practice. The government can remove the social costs by prohibiting–and strictly enforcing prohibition–of dual practice, as in many advanced market economies. Attracting physicians into public practice would then require offering public-sector salaries (and other benefits) sufficient to compensate for the foregone private practice revenue.

We turn next to the question, what specifically are the social costs of allowing dual practice, $c(D)$? They arise predominantly from the rational responses or "coping strategies" of physicians with low incomes. Such physician "coping" strategies are not confined to low-income countries. Nicholson and Souleles (2002) find that US physicians who experienced negative income shocks (earning less than they expected) respond by increasing hours worked and allocating more time to patient care rather than teaching or research. Yet high-income countries often proscribe arrangements like dual practice. Our theory can account for this fact. The opportunity costs of raising public sector salaries arguably decrease as an economy develops, until the social costs of dual practice outweigh the costs of paying more competitive salaries in the public sector. Higher-income countries have institutional capacity to implement relatively well-targeted (means-tested) direct transfers to the poor, and insurance programs or other purchaser-provider splits that largely remove the need to assure access through public sector physicians. Nevertheless, even in high-income countries, public providers often continue to form the core of the safety net,[7] and dual practice continues for some countries and services (e.g., Italian physicians and UK dentistry).

2.0.1 Physician Sorting, Quality and Access

The oft-heard argument that allowing dual practice decreases the quality of public sector provision ignores the counterfactual of what physician sorting by skill level would take place in the absence of dual practice. Clearly, dual practice gives doctors incentive to reduce hours and divert attention and resources to their private practice. (We model this formally below). While this reduces quality compared to full attention by those same physicians to their public sector duties, this is frequently not the correct counterfactual. Indeed, if the government cannot offer salaries high enough to attract competent physicians without dual practice perks, then access depends on allowing dual practice.

Consider physicians who differ in their skill level, θ. When salaries

[7] In the US, for example, Zuckerman and co-authors (2001) report that of the 107 hospitals nationwide with the highest market share of uncompensated care and highest burden (measured as percentage of expenses that are uncompensated), 69.2% were public and none was for-profit.

cannot explicitly vary by skill level (because θ is noncontractible, even if partially observable), then satisfying the participation constraint of higher-skill physicians requires either raising all salaries to high levels or offering a non-wage benefit that higher-skill physicians differentially value, such as dual practice. A physician's expected benefits from dual practice are likely to be higher for those who are confident they can attract a lucrative private practice clientele. It is therefore natural to assume that benefits $b(D;\theta)$ are such that the marginal benefit of private practice,$\frac{db}{dD}$, is increasing in θ. Thus the marginal benefit of D–the left hand side of (2)–increases in θ. (Physician reservation utility would presumably be increasing in skill level as well.) Perhaps ironically, *allowing private practice differentially attracts providers of greater skill who anticipate higher dual practice earnings*, thus offsetting the otherwise prevalent skill-based sorting that leaves low-wage public sector facilities starved of human capital.

Some evidence supports the assumption that $\frac{db}{dD}$ is increasing in θ. For example, Gruen et al. (2002), in a survey of dual-practice physicians in Bangladesh, found that primary-care doctors were willing to give up private practice if paid higher salaries, but that doctors in secondary and tertiary care were far more reluctant to do so. Hicks and Adams (2001) report that in Nepal, an initiative to promote teaching and research by paying physicians a "non-practicing allowance" seemed successful for basic sciences, but that "in clinical departments, many physicians resigned their teaching positions" (p.10). Both examples are consistent with increasing benefits of private practice for higher-skilled clinicians.

Thus, low D–in the extreme, banning dual practice and strictly enforcing rules against gratuities–reduces the attractiveness of public service, especially for the higher-skilled physicians.

Proposition 1 *The impact of dual practice on public provider quality is theoretically ambiguous. To the extent that physicians divert attention and effort to their private practices, patients in public clinics and hospitals face longer waiting times and lower quality of care. But this effect could be offset by the higher average quality of physicians that practice in the government sector for any given salary level when they have legal recourse to supplementing income from private practice.*

The net impact of allowing dual practice on public sector quality of care is thus an empirical question.

Dual-practice providers also have incentive to distort quality toward dimensions that are observable to profitable patients, while skimping on

technical aspects of quality less monitorable by patients.[8] Since single-practice private physicians also have this incentive, the extent to which dual practice affects such quality distortions is also in an interesting empirical question.

For developing countries, arguably the cost of dual practice of most concern is the potential for providers to induce private demand among the poor and less educated, i.e., diverting them from free public clinics to expensive private clinics. In the next section we develop a simple model of a dual-practice physician's behavior, drawing upon theories of inducement for single-practice providers by Gruber and Owings (1996) and McGuire (2000).

2.0.2 Dual Practice Physician Behavior and Induced Demand

Consider a representative primary care physician employed in the public sector. Assuming some government permissiveness of dual practice ($D > 0$), she may choose whether or not to have a private practice, and if so, how much of her labor time to allocate to the government health clinic and to her private practice.

The physician receives a salary, S, which is a weakly increasing and concave function of the amount of time spent in the public clinic, T.[9] Since provider skill and effort are arguably the most important determinants of primary care quality, T also proxies for average government provider quality.

A dual practice provider competes with other private providers to attract paying patients. The provider influences demand for the private practice, q, through two channels: choice of private practice price, p, and level of inducement, I. Inducement refers to physician effort expended on self-referrals. These referrals direct patients seen in public practice to the private practice instead, or for the next episode of care. Given that the physician's skills are heavily subsidized to the patient when practicing at the public clinic, her referral to private practice in many cases stems more from a desire to raise income than a true belief that the patient will be better served. Hence, I represents a kind of *supplier-*

[8] Bir and Eggleston (2001) develop a model of dual practice based on Dranove and Satterthwaite (1992 and 2000) to illustrate provider incentives to emphasize patient-monitorable aspects of quality over technical quality.

[9] Although salaries of public providers generally increase with seniority and do not adjust explicitly according to how diligently the physician attends the public clinic, there is usually at least some loose connection. For example, a physician hired by the public clinic who never even initially showed up to work would presumably lose the job. Physicians who dutifully attend the clinic and exert effort on administrative tasks are presumably more likely to receive promotions and associated salary increases.

induced demand. Total inducement I is the product of hours spent in the public facility, T, and inducement effort per hour at the public practice, i:

$$I = T \cdot i \tag{3}$$

Assume demand for the physician's private practice takes the following simple functional form:

$$q(p, I) = q_o - p + d(I), \tag{4}$$

where the induced part of demand, $d(I)$, is increasing and strictly concave in total inducement effort: $d' > 0, d'' < 0$. Note that inducement includes both increasing the number of patients and increasing the number of services or visits per patient.

The provider derives utility from income Y and leisure L, and feels a loss of utility from inducement effort I (McGuire and Pauly 1991; Gruber and Owings 1996; McGuire 2000). Utility $U(Y, L, I)$ is strictly increasing and concave in income and leisure: $U_Y > 0$, $U_{YY} < 0$, $U_L > 0$, $U_{LL} < 0$. Inducement reduces utility at an increasing rate: $U_I < 0$, $U_{II} < 0$.

The physician's income depends upon her public practice salary S and net revenue from private practice, $q(p, I) \cdot [p - a]$, where a is the marginal cost of supplying a private practice visit. Leisure is the time remaining after working in public practice T hours and working in private practice enough to serve the demand at t hours per visit (e.g. $t = \frac{1}{6}$).[10] Thus the physician's optimization problem is

$$\begin{aligned} &\underset{<T,p,i>}{Max} \left[U(Y, L, I)\right] \\ Y &= S(T) + q(p, I)[p - a] \\ L &= 24 - T - t \cdot q(p, I) \\ I &= T \cdot i. \end{aligned} \tag{5}$$

The first order condition for choice of time devoted to public practice, T^*, is

$$U_Y \left(S' + \frac{dq}{dI} i^* (p - a)\right) = U_L \left(1 + t \frac{dq}{dI} i^*\right) - i^* U_I. \tag{6}$$

[10] See Bir and Eggleston (2001) for a model in which increased devotion of time and energy to a particular case are captured through higher levels of technical and amenities quality, leading to a higher 'effective demand' q (and lower leisure).

The marginal benefit of time in the public clinic, the left-hand side of (6), includes some likelihood of higher salary (perhaps through anticipated promotion, $S'(T)$) and the opportunity to induce profitable patients to attend the private practice and earn additional income: $\frac{dq}{dI} i^* (p - a)$. The marginal cost of T is foregone leisure and time for private practice (as well as disutility from inducing demand during public practice hours).

The marginal benefit of time in public practice might also include lower marginal cost of private treatment: $a'(T) < 0$. A physician with both public and private practices may use public resources to treat private patients, whether by lifting supplies (e.g., gauze, medications) or treating patients at the public facilities without paying any rent or charge for such use.[11] This puts sole-private-practice physicians at a competitive disadvantage vis-à-vis their dual practice counterparts.

To the extent that dual-practice physicians skimp on public practice hours to service private patients, T^* is below the government's intended level, damaging public sector quality and the goal of access.

The first order condition for private practice price, p^*, reveals a standard trade-off between the benefit from raising p^* of more revenue per patient and more leisure (from less demand), versus the cost of fewer patients and therefore less private practice revenue:[12]

$$U_Y q - U_L t \frac{dq}{dp} = U_Y \frac{dq}{dp} [p - a]. \tag{7}$$

The physician also chooses inducement effort per hour of public practice, i^*, according to the following first order condition:

$$U_Y \frac{dq}{dI} [p - a] = U_L t \frac{dq}{dI} - U_I. \tag{8}$$

The physician will induce demand up to the point where the marginal benefit of inducement from increased private practice revenue (the left hand side of (8)) equals the marginal cost of less leisure and reduced utility–since inducement exacts costs of effort and "guilty conscience."

[11] For example, Gruen et al. (2002) report that some of the in-depth interviews with dual-practice providers in Bangladesh "revealed illicit practices of transfer of subsidised resources to the private sector" (p.277). In Italy, "scandals are common, involving doctors who purchase equipment on the public budget but then use the equipment in their private practice" (Cutler 2002: 897).

[12] More generally, the pricing choice follows the usual inverse elasticity rule: the price-cost margin is higher for consumers with less elastic demand (such as wealthier patients). Prices are lower for more price-elastic consumers (such as middle-class patients). With patient heterogeneity in willingness to pay, such third-degree price discrimination can be an income-maximizing tool for the providers, and may also help to achieve social goals of targeting public resources to the poorest.

Competition will affect the physician's optimal choice of inducement effort. Because there is no evidence that differential pricing drives the empirical results on patterns of physician choice that we report below (i.e., differential use of private providers by the urban poor), we follow Gruber and Owings (1996) in focusing on the physician's choice of inducement effort, taking prices (and time-allocation across practices) as given.

Let an exogenous increase in competition be represented by a decrease in private-practice clientele (for a given level of inducement), q_o. When q_o decreases, overall private practice demand decreases. This decreases the physician's income, thus increasing the marginal utility of income and the marginal benefit of demand inducement. A drop in private practice demand also increases leisure, which decreases the marginal utility of leisure and decreases the marginal cost of demand inducement. These effects combine to create an unambiguous increase in inducement effort.

Proposition 2 *Assume T^* and p^* are fixed in the short-term. Increased competition for private practice patients leads to greater demand inducement from public practice: $\frac{di^*}{dq_o} < 0$.*

Proof. Let $m \equiv p - a$. Totalling differentiating (8) assuming T and p are fixed yields

$$\frac{di^*}{dq_o} = \frac{-d'\left(U_{YY}m^2 + U_{LL}t^2\right)}{T\left(U_Y md'' + U_{YY}\left[md'\right]^2 - U_L td'' + U_{LL}\left[td'\right]^2 + U_{II}\right)} < 0. \quad (9)$$

The denominator is negative by the second order condition for maximization of i^*. The numerator is positive since $U_{YY} < 0$ and $U_{LL} < 0$. The proposition follows, noting that an increase in competition corresponds to a decrease in q_o. ■

As McGuire (2000) emphasizes, such a market-level effect on inducement operates through physician income effects. If competition for patients drives private practice income and thus Y low, the resulting high marginal utility of income will tend to swamp the disutility from inducement, leading to greater propensity to induce demand through referrals to private practice.

If patients differ in their responsiveness to inducement, physicians will concentrate inducement effort on those most likely to respond. Such patients may not be only those of high socioeconomic status. For example, poor patients with low education might nevertheless be referred to the private practice if the provider suspects the patient can be easily persuaded to pay for a private visit.

The social costs of dual-practice physician inducement also differ across patients. To the extent that patients with high demand are rationed to fewer services than they desire in the public sector, provision of additional private services does not constitute inducement. And if providers go beyond satisfying demand to inducing it for wealthy patients, this would seem to be a problem of second-order magnitude for developing countries. Inducement focused on the wealthy may contribute to cost escalation in the health sector, but it also allows subsidized public healthcare resources to be better targeted on the poor. Of much greater concern is the possibility that providers will exploit poor patients of low education or otherwise most susceptible to inducement by persuading them to pay for expensive private treatment instead of subsidized public care.

We next empirically examine consumer choice of primary care provider in Indonesia, where dual practice is prevalent. Unfortunately data limitations and lack of exogenous variation in dual practice conditions preclude a direct test of inducement behavior. Instead we focus on whether measurable quality can explain patient choice of provider, and whether the propensity of lower-income patients to use expensive private providers differs across areas where providers face different competition for patients, such as in urban versus rural areas.

3 Indonesian Primary Care and Dual Practice

Indonesia, the fourth most populous country in the world, unites 13,000 islands of an archipelago that houses 300 distinct ethnolinguistic groups (Hugo et al. 1987). At the time of the first Indonesian Family Life Survey (IFLS) in 1993, Indonesia's economy was growing rapidly, and health indicators were improving. In 1990, annual expenditures on health amounted to only 2% of GDP, or $12 per capita. In both indicators of health care activities and in expenditure patterns, the national figures mask a great deal of regional variation.

Most Indonesians do not have health insurance. The public sector health care delivery system is extensive and provides implicit coverage by charging patients only about five percent of average cost (World Bank 1994). The extent to which this public spending effectively targets the poor is "a long-standing concern in Indonesia" (van de Walle 1995: 227).

Government health centers are the centerpiece of the government strategy for primary care. Each sub-district has at least one health center, and urban areas with higher population density may have more than one. There are 5,600 centers for 3,400 sub-districts (Frankenberg and Karoly 1995). Health centers are responsible for medical care, family planning, communicable disease control, environmental health and

sanitation, health education, lab services, and recording and reporting. A medical doctor, usually a recent graduate serving her required term of public service after medical school, typically heads the center. In remote areas some centers share a physician.

Private sector delivery of primary care is well established in Indonesia, as is the government's recognition that the private sector can supplement public primary care services. The majority of public sector health workers provide care in the private sector in the evening, either through their own practice or a private clinic or hospital. Villagers typically have access to one doctor, one nurse-midwife and several paramedics in private practice.

As mentioned previously, the data allow us to separate "ownership effects" from "quality effects" to see whether "publicness" or "privateness" influence consumer choice after controlling for measured dimensions of price and quality. A priori the ownership effect is ambiguous. Ownership could reflect the collective reputation of providers in a sector or unmeasured aspects of quality and convenience. If consumers use non-profit status as a signal of trust (Arrow 1963; Hansmann 1980), an ownership effect could favor the public sector. Yet Indonesian public health facilities seem to have a poor reputation (World Bank 1989), so that reputation and quality-premium explanations could be consistent with an ownership effect that favors the private sector.

Because historically physicians began with obligatory training in public facilities and moved on into splitting their time, physicians with private practices might have better reputations and be more experienced than those with only public practices. This career pattern would suggest that despite the high prevalence of dual practice, there is still some residual sorting by skill between sectors. As shown in Table 1, physicians with a single private practice on average report more than twice the years in practice as physicians practicing only at government facilities, with dual-practice physicians falling in between. Physicians in private practices are the most likely to speak the regional language, followed by those with dual practice and lastly those with only a public sector position. Private-practice-only physicians are also most likely to originate from the province in which they work.

In Indonesia, practicing medicine in the public sector carries prestige and some non-pecuniary benefits associated with civil service, including training, housing benefits, the potential to generate a private clientele, and a stable albeit small salary. These benefits come at the relatively low cost of devoting some time to a public facility. Generally, physician hours in public practice are not monitored, and anecdotal evidence suggests that many spend most of their time in private practices (captured in

the model as low T^*). The most sought-after public positions are those in areas with the best potential for lucrative private practices, typically those with fewer competing providers but an adequate clientele. Public promotion is largely based on seniority, which reinforces the tendency to be minimally present in one's public practice. The benefits of private practice are mostly extra income, and charges are far above the fees for public care. For comparison, in India, private fees increase with specialization and years of practice, and the likelihood of having a second (dual) practice increases with the number of dependents a physician has (Chawla 1996).

Figure 1 shows the average allocation of work hours among tasks for Indonesian government-center physicians who only work at the center ('public physicians') and those who also have a private practice ('dual practice physicians'). Dual practice physicians spend less time examining patients and doing administrative work, but more time engaged in field work, than single-practice physicians. This data is consistent with the incentives of multitasking when some tasks (e.g., field work) are less easily monitored (Holmstrom and Milgrom 1991).

4 Empirical Analysis of Patient Choice of Provider

Our empirical analysis focuses on estimating patient demand $q(.)$ when dual practice is prevalent. Since data limitations preclude directly testing for the impact on demand patterns of an exogenous change in dual practice incentives, we instead focus on whether measurable quality can explain patient choice of provider, and whether the propensity of lower-income patients to use expensive private providers differs across areas where competition for patients differs, such as in urban versus rural areas.

The data used in these analyses links the household and community survey components of the first (1993) round of the Indonesian Family Life Survey (IFLS). The sample is representative of about 83% of the Indonesian population and contains over 30,000 individuals living in 13 of the 27 provinces in the country.[13] The number of individual respondents in the household survey was 33,082. Of these, 4,275 (13%) were users of outpatient health care in the past four weeks. The sample used in

[13]The original IFLS sampling scheme balanced the costs of surveying the more remote and sparsely-populated regions of Indonesia against the benefits of capturing the ethnic and socioeconomic diversity of the country. Within 13 provinces, the scheme randomly sampled households from 321 enumeration areas, which were selected from a nationally representative sample. A complex weighting scheme for the data is available, but has not been used in this analysis, since the results are not intended to be generalizable to the entire Indonesian population.

this analysis includes the 2,373 people who chose to visit a physician in a health center or private practice.

Measures of infrastructure quality and availability of services were constructed from the Community-Facility Survey, which included government health centers and private providers (private clinics and the private practices of doctors, midwives, nurses, and paramedics). The sampling methodology could introduce several potential biases. Because facilities were ranked in order of the frequency with which household survey respondents mentioned them, the quality measures could be higher than average. Moreover, since consumers would likely choose the best quality public facility without much regard for price, but to balance price and quality when selecting a private facility, the sampled facilities probably include the best quality public facilities and mediocre-quality private facilities with reasonable prices. Because in most areas there is only one full health center (although there are several subcenters), the choice of health center as a facility to survey is not likely to suffer from this bias. For private facilities the sampling method is more of a concern; the quality measures of the sampled facilities probably do not reflect the highest private quality available, but rather the quality level most frequently chosen.

The consumer and community surveys can be linked. Match rates between household questionnaire sections and health facilities were close to 90% for public health centers and 40% for private doctors and clinics. The IFLS data offers a relatively rich set of price and quality data for public and private providers (see Appendix).

4.1 Specification

The dependent variable is an indicator for the facility that a particular household chose to visit out of the neighborhood facilities available to it, given a visit in the four-week recall period. A neighborhood is defined to be an enumeration area.[14] We only use first visits.[15]

The independent variables include characteristics of the consumer (gender, age, education, household income, wealth, and severity of symp-

[14] Although enumeration areas are administratively determined, there is some evidence that they correspond to markets. Of those responding that they had sought outpatient care, 91% had sought care in their enumeration area. Four percent received care outside of their home province, which leaves only 5% who may live on the border of an enumeration area and choose to seek care in the neighboring area.

[15] This conservative restriction means that any patterns of choice consistent with physician inducement that we identify will represent an underestimate of the full social costs of inducement, since it excludes repeat visits, which are even more within a physician's control.

toms[16]) and characteristics of the provider such as price and quality, waiting time, how much time physicians spend with patients, hours open and other amenities. Price variables include the provider-reported price associated with a visit and provider-reported per-unit cost associated with penicillin. Structural quality variables include scores on basic equipment, drug availability, and room cleanliness. Process quality was measured with constructed scores on family planning, prenatal care, cough and cold, and diarrhea and vomiting case studies. The appendix provides more details on these price and quality measures. Finally, since the convenience of not skipping work to see the doctor may affect choice, we include a measure of flexible provider hours (evening availability).[17] Since public and private providers do not differ significantly in number of patients seen per hour, and in preliminary regressions this measure was not significant, it is not included in the specifications reported here.

Using community survey information addresses the selection problem that arises when using quality reports from only those who had chosen to use facilities, as well as the problem of only having facility characteristics for chosen facilities.[18] Because there is evidence that certain provider-reported dimensions of quality are correlated with consumers' perceptions of quality, this approach has merit.[19]

Previous studies of consumer choice of provider (e.g., Gertler and van der Gaag 1990) have focused on the multinomial and nested multinomial logit models, thus accepting that the errors are identical across provider alternatives, though they may or may not be independent. To

[16] Education is a categorical variable describing those who report their highest level of schooling to be no schooling or grade school (0), and those who report anything higher than grade school (1). The household income includes both the individual labor and the family non-labor income components. These components were summed for each household member, then summed over members of the household and attributed to all members of the household. Income is reported in thousands of 1993 Rupiah. The list of symptoms includes headache, toothache, sore eyes, cough, cold and flu, vomiting, chest pain, asthma, fever, infections, diarrhea, and rheumatism. Positive responses per person are summed for symptoms reported in the past 4 weeks.

[17] From providers' reported hours each day, providers reporting working from 5-7 any evening are assigned a 1; those who work only between 8am-5pm are given a 0.

[18] When facility-specific information is not available for the full set of providers available, typically the average of a characteristic by facility type within enumeration area is used.

[19] Provider quality, at least in terms of measures of process quality, has been shown to be correlated with consumers' perceptions of quality and outcomes (Peabody et al. 1995). It is also intuitive that the thoroughness of the physician in the process measures would be related to patient satisfaction because time spent with the physician and service intensity have been shown to improve patient satisfaction (Orient et al. 1983; Marton et al. 1982). Availability of basic supplies, equipment and drugs are also often correlated with patient satisfaction.

preview, the present study rejects the multinomial logit and the nested multinomial logit in favor of non-identical but independent random errors with the HEV model (Greene 1993). Assuming non-identical errors has implications for which determinants of choice are statistically and economically significant.

4.2 Descriptive Results

As shown in Table 2, the public sector has higher scores than the private sector for structural quality measures, except for equipment. Interestingly, although the private providers score high on equipment available (which perhaps is quite observable to patients), they score lower than public providers do on whether the equipment was functional, a measure of quality that patients can less readily observe. Contrary to the perception that private facilities are better maintained and thus more attractive to consumers, public facilities score better on the cleanliness composite. Private sector process quality scores are lower than those of public providers for family planning, prenatal care services, and gastrointestinal upset, but higher for cough and cold. This pattern may reflect the effort focused on family planning and prenatal care and the use of treatment protocols in the public sector.

Private care is almost always available during evening hours, and public care rarely is. Both public and private providers see somewhere between 20-30 patients per hour. The difference is not significant, except that public providers do not see any patients on Sunday, and private providers do.[20]

The large price difference for treatment costs is the most dramatic difference between public and private providers. The private exam fee alone is on average ten times that for public providers. Price differences for penicillin and paracetomol are also large, albeit less significantly so.[21]

Women, people in rural areas, and those with less education seek public care in greater numbers (Table 3). In most other groups, just under half of those seeking care go to the private sector. In urban areas, slightly more than half visit private facilities. Although the mean income of those seeking public care is much lower than the mean income of

[20] These numbers, especially for the public sector, are subject to measurement error because they are "reported hours practiced" divided by "number of patients seen." In some cases the latter number may include all patients of the health center, not simply those seen by one physician.

[21] Data constraints prevent us from adjusting the per-unit provider-reported prices to account for whether larger numbers of units are prescribed in the private sector. Private physicians give prescriptions far more often, but this pattern may reflect the fact that patients at public clinics often receive the drugs directly. The differences in travel time, travel cost and waiting time are small on average.

those seeking private care, those in the *lowest* as well as highest income quartiles seek private care more than do those in the middle quartiles. This utilization of private care by the poorest patients is worrisome for policymakers seeking to target public financing of government clinics on the poor.

4.3 Multivariate Results

We present results for three models—multinomial logit, nested multinomial logit, and the heteroscedastic extreme value model (Table 4). The dependent variable in all three cases is an indicator for which facility a consumer chose, given all the facilities in their area. For identification purposes, we interact the demographic variables[22] with a set of facility dummies for the first public facility (usually the area's health center). Positive coefficients on demographic variables indicate that a specific group is more likely to seek care from a public health center relative to other providers.

Since distance to provider and travel time did not vary much by provider type, and since these were consumer reports that would be endogenous and unavailable for the randomly matched part of the sample, these are not included in the final specification.

Three tests indicate that multinomial logit is not the ideal model in this case. First, the Hausman-McFadden test indicates that the Independence of Irrelevant Alternatives assumption is violated (χ^2= 72.5, 19df, p<0.0005). This means that inference based on the multinomial logit model (MNL) could be misleading due to inefficient and inconsistent parameter estimates. Second, the inclusive values from the nested model are significant. This means that the nested model does not simply reduce to the MNL, because errors are correlated among choices. Finally, the likelihood ratio test accepts the nesting restriction on the simple MNL. There is clearly some correlation between the errors of the different alternatives. The nested model cannot be rejected as a restriction on the HEV model (LLR=-2, p<.8). Nevertheless, because the inclusive value for the private providers is negative, this tree structure may not be the best.

Since the inclusive values represent the utility consumers get from the particular type of choice, negative signs typically indicate that the nested model is inconsistent with the assumptions of utility maximization. The HEV model, which allows all alternatives to have non-identical errors (Greene 1993), thus seems most appropriate. Nevertheless, it is

[22] These variables include gender, age, urban residence, education, household size, income, severity of illness, and a dummy variable for those in the lowest income quartile.

instructive to consider which results hold across the three models, since such results evidently are robust to different assumptions about the correlation of error terms.

Examining the signs, magnitudes and significance of the coefficients can be informative. However, because of the nonlinearity of the logit function, effects are best interpreted through predicted probabilities based on the HEV model, which we present below. Because the HEV model treats the errors associated with provider alternatives as independent but not identical, the effects of price and quality changes for a particular sector may not be uniform across facilities in a sector. For example, a public sector quality increase would be expected to lead to a higher predicted probability that all public sector facilities would be chosen by consumers. Predicted probabilities of choice based on the nested multinomial logit model would constrain quality changes in the public sector to affect all public sector facilities in the same way. The assumption of the HEV model that errors are not identical across providers allows for heteroscedasticity, which also affects the sign, magnitude and significance of determinants of choice.

4.3.1 Price effect

The visit fee charged by a provider is inversely related to the probability that a particular provider will be chosen, consistent with (4) and (7). This expected effect is significant in all three models, and is of a similar albeit small magnitude. Higher costs associated with drugs are positively associated with choice, but are not significant. One might expect price sensitivity to vary with income. However, models interacting a dummy variable for income (lowest or highest quartile) with price found no significant interaction effect.

To illustrate consumer sensitivity to price changes, we look at the differences in the predicted probabilities in response to visit fee increases in public and private facilities (Table 5). As expected, a 20% increase in the price of a public visit makes people slightly more likely to seek care in the private sector. A 20% increase in private price appears to have no significant effect on the choice of provider overall. These results are consistent with the idea that more price-sensitive consumers choose the heavily subsidized public providers, whereas those choosing private providers are less price sensitive (although the price elasticity of demand for an individual private practice physician could be quite high). Overall, price increases do not have a large effect on demand, given large initial price differences between sectors.

From the provider's perspective, lack of sensitivity to price creates a good environment for dual practice, since patients may be more willing

to switch from public to private provision. From the government's perspective, however, lack of price sensitivity raises concerns that private sector demand may be induced. Moreover, lack of evidence for differential price sensitivity by income suggest that referral of patients from public to private practice may not be concentrated only on those of high income.

4.3.2 Quality Effect

Of the different quality measures, structural elements of quality most visible to patients seem to be the most important determinants of consumer choice of provider. In this case the single measure of quality that is significant across models is the index of equipment, which is positively related to choice except in the simple multinomial model. The index of room cleanliness was significant in the first two models and has a positive effect on choice. In the HEV model the effect is small, negative and not significant. The existence of evening hours is significant in the first two models as well, although it is of a different sign in the two models.

The process quality measures, based on providers' responses to particular cases, most closely reflect technical quality. It is not surprising that consumers are less sensitive to this measure of quality, although if tested together these measures are significant and positive.[23] Drug availability and evening hours do not significantly affect choice in the HEV model.

Simulations of how patients would respond to increased private sector quality reveal small shifts in patient demand from public to private providers (Table 6). The shifts are generally quite small, since a 20% increase in the equipment index corresponds to approximately two basic supplies being made available; consumers are unlikely to be very sensitive to the presence of bandages or a new diagnostic dye.

Looking at price and quality results together, it is clear that the magnitude of the effect of quality is larger than the magnitude of the effect of price. The dimensions of quality that consumers respond most readily to are those that are most visible to them. This result indicates an ideal situation for self-referral, since visible quality shifts demand

[23] The process measures for family planning (in the first two models) and prenatal care (in all three models) are negative when disaggregated, indicating that there may be specific facilities that are known for providing this type of care that are not part of the choice set for those who require general primary care. It is also possible that the Hawthorne effect, by exaggerating the desirable responses to case questions, minimizes differences between providers. In the descriptive statistics, however, there were significant differences between public and private providers on process measures for three out of four cases. Each score also displays substantial variation around the mean.

more than does price. A remaining question of policy significance is whether demand shifts occur for the higher income consumers, or across the income ranges.

4.3.3 Ownership Effect

The results indicate that, all else equal, patients weakly prefer public over private providers. That is, after controlling for price and measurable quality, the residual effect of "publicness" on consumer choice is positive, albeit small. However, the coefficient on public ownership is not statistically significant in the HEV model. This provides some evidence that in the most general specification, relaxing assumptions on the error terms of alternative providers, ownership does not seem to matter. This lends credence to the idea that our measures of price and quality capture the important determinants of provider choice. Moreover, since the actual provider is in many cases the same person regardless of ownership, this finding of no residual "ownership effect" is not that surprising. Aspects of quality that may not be readily observable are more similar across public and private providers when the same physicians practice in both sectors.

4.3.4 Socioeconomic and demographic effects

As noted above, to identify the model, we must interact demographic variables with a set of facility dummies. Results for demographic variables are given for all public facilities relative to all private ones. The utility function for choice of facility (facility 1-8) based on facility characteristics is allowed to differ from the utility of the choice of sector in which to seek care (public or private), which is based on individual characteristics. Therefore, the HEV model results indicate that those with higher incomes are less likely to use public facilities than are those with middle incomes, larger households, more symptoms and more education. Those in the lowest income quintile are also less likely to choose public facilities relative to those in the middle income quartiles, although this result is not significant except in the nested model. Urban and male consumers are more likely to choose the largest public facility.

Compared to the original estimates, predicted probabilities based on particular demographic groups (Tables 7A and 7B) show that the poor are about 3% less likely to use public care as the overall population. Those in rural areas are 2% more likely to seek care from public providers, while those in urban areas are more than 3% less likely to see public providers.

The urban population, especially the urban poor, is less likely to use public providers than their rural counterparts. The change in predicted probability for the urban poor is more than 4%, compared to 3% for

the urban non-poor. The rural non-poor are almost 3% more likely to choose public providers, and the rural poor appear to use public care only slightly less than the overall population.

5 Discussion and Conclusion

Allowing dual practice enables governments to provide access to basic health services through government-employed physicians of reasonable quality, while paying low salaries. Governments can meet the participation constraint of physicians without paying salaries commensurate to physicians' abilities because physicians also value the "perk" or "non-salary benefit" of the opportunity to earn significant private practice revenues. Several policy studies have noted the strong positive correlation between low public sector salaries and private income-generating activities. For example, a WHO summary of ten country case studies[24] found "a tendency for professionals in the public sector to spend most of their time and energy in private practice, or to charge informal fees, where salary levels are low or pay is delayed" (Hicks and Adams 2001: 9). The first incentives listed for recruiting public-sector physicians, after paying competitive salaries, are "allowing after-hours private practice in public institutions" (which was considered successful in Bahrain) and "tolerating informal payments" (ibid). In fact, some policies explicitly trade off allowance of private practice with cash payments. Examples include paying doctors a "non-practicing allowance" to encourage teaching and research in lieu of private practice (ibid), or offering higher cash wages to physicians in rural areas explicitly to offset more limited rural opportunities for private-practice revenue.

Dual practice also provides an easy source of private patients through self-referral induced demand from the public sector. Since the wealthy have a higher willingness to pay for care, self-interested providers would rationally seek to focus inducement effort on these patients. Physician altruism would reinforce this behavior, since altruistic providers should be even more inclined to counsel poor patients to receive free or subsidized care in the public clinic or hospital, while referring only those most clearly able to pay to their private practice.

Thus, dual practice can boost physician incomes while simultaneously promoting efficient sorting of consumers across sectors. However, physician incentives to concentrate inducement on those most responsive to inducement–often the poor and uneducated–may act counter to such a social objective. Dual practice also gives incentive for physicians

[24] The ten countries were Bahrain, Bangladesh,Côte d'Ivoire, Estonia, Ghana, Islamic Republic of Iran, Kyrgyzstan, Mongolia, Nepal and New Zealand.

to skimp on public practice duties and to 'free ride' on public facilities (by appropriating supplies and using public equipment without paying rent). An appropriate policy response would be to promote transparent contractual relationships between public and private practices, such as rental of facilities and sub-contracting for specific services.

Physician self-referral to private practice would only constitute "undue influence," and hence induced demand, if the incremental quality of private services does not justify the much higher patient price for care. Unsurprisingly, when surveyed about why patients in Bangladesh seek private care when free services are available in public facilities, dual-practice physicians suggested that patients were paying for aspects of quality, such as short waiting times, cleanliness and better interpersonal aspects of care. Perhaps more interestingly, twelve percent of Bangladesh dual-practice physicians agreed with the view that patients using private services are badly informed, and four percent agreed with the view that doctors divert patients to private practice (Gruen et al. 2002: 274-5).

Our empirical results of Indonesian consumer choice of provider, although falling short of a direct "test" of dual practice behavior, nevertheless are consistent with the incentives identified with dual practice. Consumers' choice of private providers cannot be fully explained by higher quality of care or convenience of flexible hours. Because of the labor-sharing between sectors in Indonesia, the effects of provider quality sorting are attenuated to some degree. Moreover, the ownership effect (controlling for price and measurable aspects of quality), when significant, favors the public sector.

Unfortunately, this analysis does not provide a definitive answer to the question of why the poorest, especially in urban areas, choose expensive private providers over heavily subsidized public ones. Because all modeling efforts interacting the dummy for lowest quartile of income with visit price, drug price, and quality measures were not conclusive, it does not seem that price and quality differentially affect the low-income consumers. Possible explanations include greater availability of private providers (although the empirical analysis includes travel time), and greater segmentation of healthcare delivery in urban areas.[25] Further research with even more detailed data might usefully focus on disentangling these competing hypotheses.

Although the data preclude addressing dual practice referrals directly, it is plausible that the higher density of physicians in urban areas, and hence greater competition for private practice patients, leads to in-

[25] Disproportionate use of private providers by poor urban residents might reflect use of such providers by migrant laboring men for coughs and colds, while public clinics specialize in family planning and prenatal care.

creases in referrals from public to private practices. Such referrals could be consistent with efficient patient sorting and altruism if physicians cross-subsidize poor patients with charges from rich patients. However, since public sector care is already essentially free for patients, it is unclear why an altruistic provider would not prefer to "cross-subsidize" the poor by treating them at the public practice while referring only the wealthier patients to private practice. Moreover, although differences in provider altruism across urban and rural areas might account for the observed patterns of choice, this seems less plausible than the theoretical prediction of greater inducement in competitive urban areas.[26]

The literature on physician-induced demand suggests that inducement is more likely and of greater magnitude when income effects are strong (McGuire and Pauly 1991; McGuire 2000). Given the low incomes of most Indonesian public sector physicians, it seems likely that inducement of poor patients to private practice in competitive urban areas is consistent with large income effects.

If provider dual practice and self-referral are important explanations for care-seeking patterns for Indonesian primary care, then physicians may be exploiting the poor and less educated when competitive pressures are higher. Unfortunately the data do not allow identifying other potential social costs of dual practice, such as the extent to which doctors divert public sector resources to their private practices. It is also unclear what the administrative and social costs would be of enforcing a ban on dual practice. Arguably Indonesians benefit from greater access to care when competent physicians, attracted partly by the freedom to engage in dual practice, remain in the public sector. Further analysis of why poor Indonesians and patients in other developing countries choose expensive private providers over subsidized public ones might usefully focus on identifying exogenous variation in dual practice conditions that would allow a direct test of inducement behavior, as well as even more detailed data on dimensions of quality that might differentially attract poor patients.

[26] A survey of dual-practice physicians in Bangladesh found that "fears of too much competition between doctors was more pronounced in metropolitan areas where the physician density is higher than in other areas of the country" (Gruen et al. 2002: 274). It is interesting to note that for a much different context–the 1970s US–Pauly (1980) also found an "availability effect," when present at all, most notable for the lower-income and lower-educated patients in *urban* areas.

A Appendix: The IFLS 1993 Quality and Price Measures

The IFLS 1993 data include several different quality measures. The types and numbers of health instruments (e.g., stethoscopes) available in the facility were reported by providers and observed by the researchers performing the survey.[27] Providers reported whether they had basic equipment available to them, and independent observers reported on the room condition, drug and vaccine availability. This means that within a public facility, there will be no variation between individual providers, because typically only one provider per facility (usually the facility director) is surveyed. There is variation between public facilities. Direct observation helps to avoid the common pitfall with facility-based surveys that responses do not reflect the day-to-day reality. Structural measures of quality were constructed from data on the availability of basic equipment, more sophisticated equipment, drugs and vaccines. In each case, responses to questions like "does your facility have x?" were summed and normalized. In the case of drugs and vaccines, responses reflect the number of drugs or vaccines that were available that day. Another structural quality measure uses information on observed facility cleanliness.

Each interviewed provider was also asked to respond to several clinical vignettes: an office visit for the purpose of obtaining an IUD, a pregnancy check up, care for an infant with diarrhea and vomiting symptoms, and care for an adult with cough and fever. In each case the provider was given the highest score for spontaneously reporting a step that was necessary, and a low score for not reporting performing a necessary step. Each case included approximately 20 different steps. The cases were only presented to providers who stated they did provide the related care.[28] We constructed process quality indices for each of the four types of care by summing the responses to the different questions posed.[29]

[27] For provider-reported information, reports are validated by a second set of questions asking if available equipment functions. Correlations between the score for having equipment and reporting that equipment was functional are above 85%, so just reports of whether equipment was present are used. Directly observed assessments of room cleanliness, vaccine and drug availability and storage were not reported by providers.

[28] Because all the steps were positive ones that should be performed, we did not include in the quality indices information on steps that the provider mentioned only after interviewer prompting.

[29] These responses were yes or no; yes was correct and coded as 1. The responses were not assigned different weights, because there is no consensus on the evidence that would help to determine weights.

Three potential sources of bias plague this collection of provider process quality information. The Hawthorne effect—that even asking or observing the respondent

The price variable that is the focus of this analysis is expected consumer cost of visiting the different providers in their choice set, including drug costs and opportunity cost of travel and waiting time (Gertler and van der Gaag 1990). Ideally, all respondents to the household survey would report expected price of treatment, drugs, and time involved in seeing each type of provider. Unfortunately, this information is not available. We instead employ provider reports of fees. There are three advantages to using these prices to reflect ex ante treatment costs. First, they are available for all facilities, including the ones not chosen by a particular household. Second, these prices are unaffected by who decides to use care and what choices they make, i.e., they are exogenous to each individual consumer. Third, provider-reported prices should reflect the consumer's expectation of treatment and drug cost associated with a visit, at least in terms of the relative magnitude of costs between provider options.

Information on drug prices was missing for a large number of providers except in the case of penicillin. Because penicillin is frequently used in both public and private sectors, it seemed reasonable to use its reported price per unit as a proxy for drug prices. There is some indication that different courses of penicillin are prescribed by providers in different sectors, so we used the price per unit.[30] Information on travel time and waiting time are only available from the household survey, and thus suffer from the selection problems mentioned above.

A final measure involves the opportunity cost of a visit. A leading hypothesis for the use of the private sector by the poor in Egypt centered on the availability of after-hours care. Although the value of time for poor people is less than for the wealthy if it is calculated using the wage as a measure of opportunity cost, perhaps the poor are much less flexible in their time so that the availability of evening hours is an important

would alter their answers to make them more favorable—is difficult to avoid in surveys. The second potential bias is that the director of the health sector would likely choose a better-performing staff member to respond to questions. For both of these reasons, the information collected from providers on quality is considered an upper bound. Because the Hawthorne effect is present in both public and private provider responses, it is unlikely to distort the results of quality comparisons between sectors. Typically there would not be much choice in which physicians to ask to respond, since in both sectors there is usually only one physician present. The third bias, and one that may overestimate the public sector process reports, is that the use of protocols is more developed within the public sector.

[30] One drawback in using penicillin is that the variation in price between sectors is small. Certain painkillers had a much larger variation in price between sectors. There is also a difference between use of branded versus generic drugs in the two sectors which increases price variation. The data were incomplete, however, and were not used.

determinant of demand.[31]

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Table 1. Comparing Dual- and Single-Practice Physicians			
	Years in practice	Speak regional language	Hours/wk. at govt. health center
Public practice only	3.70	86%	27.64
Dual practice*	5.80	93%	26.90
Private practice only	8.04	94%	0.00

*Public-sector physicians reporting a private practice.

Source: Authors' analysis of Indonesian Family Life Survey 1993 data.

TABLE 2. DESCRIPTIVE STATISTICS

Variable	Unit	Obs	Mean Public	SD	Mean Private	SD	T stat	Min	Max
Structural Quality									
structure-room	score	315	0.54	0.19	0.32	0.12	17.4*	0	1
structure-drug	score	315	0.67	0.11	0.41	0.27	16.1*	0	1
structure-vaccines	score	315	0.68	0.28	0.22	0.34	18.9*	0	1
structure- functional	score	315	0.40	0.13	0.29	0.23	7.1*	0	1
structure- equipment	score	315	0.49	0.13	0.73	0.15	22.0*	0	1
Process Quality									
process-family planning	score	315	0.44	0.18	0.32	0.20	21.5*	0	1
process-prenatal care	score	315	0.49	0.13	0.26	0.24	19.2*	0	1
process-cough, cold	score	315	0.44	0.14	0.45	0.21	1.0	0	1
process-GI upset	score	315	0.31	0.07	0.30	0.13	7.8*	0	1
Outcome Quality									
second visit in 4 wks	yes/no	321	0.21	0.19	0.14	0.15		0	1
Amenity Quality									
evening hours	yes/no	315	0.19	0.31	0.99	0.09	43.6*	0	1
patients per hour	Monday	305	23	36	24	29	.2	0	264
patients per hour	Tuesday	315	27	44	22	25	.7	1	420
patients per hour	Wednesday	314	27	39	23	25	.7	1	360
patients per hour	Thursday	315	28	45	21	23	1.1	1	420
patients per hour	Friday	312	19	27	25	27	1.2	1	270
patients per hour	Saturday	263	29	49	21	24	1.0	1	360
patients per hour	Sunday	320	0	0	16	8	40.4*	0	30
given prescription	yes/no	321	0.05	0.15	0.18	0.24	6.3	0	1
saw doctor	yes/no	321	0.31	0.32	0.44	0.33	1.8	0	1
Price Variables									
cost of penicillin	Rp/1000mg	198	0.06	0.00	9.44	0.07	1.4	0	1
cost of paracetomol	Rp/1000mg	122	0.05	0.00	21.82	0.16	1.9	0	1
exam fee	rupiah/visit	315	388	156	3767	2572	23.2*	0	20000
distance	kilometers	321	16	81	13	54	1.5	0	1000
travel time	minutes	321	25	43	21	35	1.3	0	610
waiting time	minutes	321	27	35	29	30	.3	0	475
travel cost	rupiah	321	304	612	334	414	1.5	0	5833

* Indicates that the T statistic testing Ho that means are equal for public and private providers could be rejected ($p<0.05$).

TABLE 3: CHARACTERISTICS OF THOSE WHO REPORT USING PRIMARY CARE (4 WEEK RECALL)

Demographic	Public		Private	
	N	%	N	%
Male	686	54	594	46
Female	1408	66	740	34
Age 15-29	432	61	274	39
Age 30-44	758	61	482	39
Age 45-59	500	60	334	40
Age 60+	332	61	212	39
Urban	878	47	980	53
Rural	1216	77	354	23
Education (high)	510	43	664	57
Education (low)	1582	70	670	30
Income quartile (lowest)	506	52	464	48
	538	71	218	29
	598	70	260	30
Income quartile (highest)	452	54	392	46
Healthy (self-report)	1476	62	912	38
Sick (self-report)	618	59	422	41

TABLE 4: RESULTS OF MULTINOMIAL, NESTED AND HEV MODELS

	MNL		NMNL		HEV	
Variable	Coeff	P[|Z|>z]	Coeff	P[|Z|>z]	Coeff	P[|Z|>z]
PUBLIC	1.09297**	0.0000	2.30060**	0.00000	0.36179	0.13830
VISIT_FEE	-0.00006**	0.0000	-0.00003**	0.00260	-0.00005**	0.00000
DRUG_FEE	0.73845	0.6252	3.12523	0.24660	0.74540	0.63850
PR_FP	-0.05675	0.6709	-0.12692	0.37890	0.01484	0.91640
PR_PNC	-0.25970	0.0761	-0.17558	0.27710	-0.14913	0.34570
PR_COLD	0.00885	0.1929	0.00993	0.17710	0.00462	0.52830
PR_GASTR	0.55632	0.0548	0.31579	0.32330	-0.13788	0.64960
DRUGAVAI	0.37911**	0.0031	0.50608	0.00040	-0.01784	0.89710
EQUIPMT	-0.23337**	0.0010	0.36026**	0.01420	0.97343**	0.00000
ROOM	0.07951**	0.0000	0.63389**	0.00010	-0.26958	0.09680
FLEX	0.02413**	0.0001	-0.20595**	0.02040	-0.02972	0.72440
INCOME	0.02944**	0.0347	-0.13466**	0.00000	-0.04952	0.11270
HLDSIZE	0.03913**	0.0494	-0.00543	0.83400	-0.11561**	0.00010
SYMPTOM	0.13665**	0.0040	-0.11967	0.08690	-0.31821**	0.00010
URBAN	-0.59172**	0.0000	-0.27922	0.07400	0.41350**	0.00410
MALE	-0.02336	0.8034	1.47748	0.15650	9.09845**	0.00000
EDUC	0.20223	0.0996	-0.00464	0.15280	-0.11662	0.30050
LOW	-0.00046	0.8771	-1.70222**	0.00000	-0.29796	0.42040
AGE	0.36312	0.0595	0.15038	0.26090	0.00184	0.50610
Inclusive values						
PUB			0.42773**	0.01490		
PRIV			-0.48615**	0.01250		
LLR	-6199		-4446.52		-4446.40	
	3500(21df)		-2(26df)		-2(26df)	
N (individuals)	2373		2373		2373	

** indicates p<0.05

Note: Demographic effects are for choice of the public sector versus the private sector.

TABLE 5: THE EFFECT OF PRICE CHANGES ON PREDICTED PROBABILITIES OF FACILITY CHOICE

Provider	Original Estimates	Std err	Public price +20%	Std err	Private price +20%	Std err
Public 1	.3223	.13	.3216	.08	.3227	.13
Public 2	.1355	.03	.1352	.03	.1350	.02
Public 3	.0930	.02	.0930	.03	.0927	.02
Public 4	.0846	.02	.0844	.03	.0833	.02
	.6354		**.6342**		**.6337**	
Private 1	.1224	.04	.1215	.04	.1238	.04
Private 2	.0912	.03	.0930	.03	.0933	.04
Private 3	.0768	.02	.0770	.02	.0759	.02
Private 4	.0743	.02	.0746	.01	.0739	.02
	.3647		**.3661**		**.3669**	

TABLE 6: THE EFFECT OF QUALITY CHANGES ON PREDICTED PROBABILITIES OF FACILITY CHOICE

Provider	Original Estimate	SE	Public Equip+20%	SE	Public Room+20%	SE	Private Equip+20%	SE	Private Room+20%	SE
Public 1	.3223	.13	.3126	.18	.3185	.18	.3094	.09	.3182	.13
Public 2	.1355	.03	.1345	.05	.1380	.04	.1361	.03	.1379	.04
Public 3	.0930	.02	.0967	.04	.0941	.04	.0945	.03	.0941	.04
Public 4	.0846	.02	.0929	.04	.0887	.04	.0866	.03	.0890	.04
	0.6354		**0.6367**		**0.6393**		**0.6266**		**0.6392**	
Private 1	.1224	.04	.1194	.04	.1200	.05	.1267	.04	.1198	.05
Private 2	.0912	.03	.0915	.03	.0922	.04	.0939	.03	.0921	.04
Private 3	.0768	.02	.0818	.04	.0753	.03	.0764	.02	.0756	.03
Private 4	.0743	.02	.0786	.04	.0740	.03	.0740	.02	.0751	.06
	0.3647		**0.3713**		**0.3615**		**0.3710**		**0.3626**	

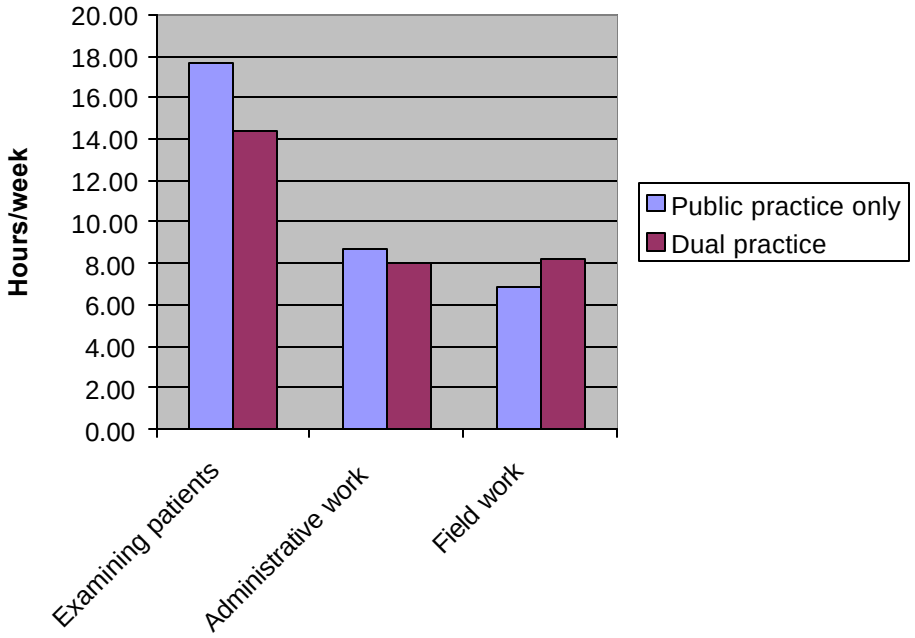
TABLE 7A: DEMOGRAPHIC EFFECT ON PREDICTED PROBABILITIES OF FACILITY CHOICE

Provider	Original Estimate	SE	Poor (644)	SE	Non poor (1729)	SE	Rural (1175)	SE	Urban (1198)	SE
Public 1	.3223	.13	.2700	.07	.3269	.08	.3742	.06	.2495	.05
Public 2	.1355	.03	.1456	.03	.1323	.03	.1202	.02	.1516	.03
Public 3	.0930	.02	.0991	.03	.0909	.03	.0822	.02	.1036	.03
Public 4	.0846	.02	.0923	.02	.0845	.02	.0767	.02	.0961	.02
PUBLIC	**0.6354**		**0.607**		**0.6346**		**0.6533**		**0.6008**	
Private 1	.1224	.04	.1271	.04	.1217	.04	.1157	.04	.1297	.04
Private 2	.0912	.03	.0976	.03	.0895	.03	.0851	.03	.0973	.03
Private 3	.0768	.02	.0846	.02	.0773	.02	.0723	.02	.0864	.02
Private 4	.0743	.02	.0811	.01	.0743	.01	.0693	.01	.0832	.01
PRIVATE	**0.3647**		**0.3904**		**0.3628**		**0.3424**		**0.3966**	

TABLE 7B: DEMOGRAPHIC EFFECT ON PREDICTED PROBABILITIES OF FACILITY CHOICE

Provider	Original Estimate	SE	Urban nonpoor (813)	SE	Rural nonpoor (916)	SE	Urban poor (385)	SE	Rural Poor (259)	SE
Public 1	.3223	.13	.2606	.05	.3858	.06	.2257	.04	.3331	.05
Public 2	.1355	.03	.1484	.03	.1180	.02	.1572	.03	.1280	.02
Public 3	.0930	.02	.1003	.03	.0810	.02	.1075	.03	.0867	.02
Public 4	.0846	.02	.0944	.03	.0757	.02	.1000	.02	.0816	.02
PUBLIC	**0.6354**		**0.6037**		**0.6605**		**0.5904**		**0.6294**	
Private 1	.1224	.04	.1310	.04	.1134	.04	.1298	.04	.1238	.05
Private 2	.0912	.03	.0961	.03	.0836	.03	.1026	.03	.0905	.03
Private 3	.0768	.02	.0849	.02	.0706	.01	.0894	.02	.0784	.02
Private 4	.0743	.02	.0818	.01	.0678	.01	.0856	.01	.0747	.01
PRIVATE	**0.3647**		**0.3938**		**0.3354**		**0.4074**		**0.3674**	

Figure 1. Allocating Work Hours:
Comparing Public and Dual-Practice Physicians



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