POLICY RESEARCH WORKING PAPER 3058

Working for God?

Evaluating Service Delivery of Religious Not-for-Profit Health Care Providers in Uganda

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The World Bank
Development Research Group
Public Services
May 2003

Abstract

Reinikka and Svensson exploit a unique micro-level data set on primary health care facilities in Uganda to address the question: What motivates religious not-for-profit (RNP) health care providers? The authors use two approaches to identify whether an altruistic (religious) effect exists in the data. First, examining cross-section variation, they show that RNP facilities hire qualified medical staff below the market wage, are more likely to provide propoor services and services with a public good element, and charge lower prices for services than for-profit facilities, although they provide a similar (observable) quality of care. RNP and for-profit facilities both provide better quality care than their government counterparts, although government facilities have better equipment. These findings are consistent with the view that RNP facilities are driven in part by altruistic concerns and that these preferences matter quantitatively. Second, the authors exploit a near natural experiment in which the government initiated a program of financial aid for the RNP sector. They show that financial aid leads to more laboratory testing of suspected malaria and intestinal worm cases, and hence higher quality of service and lower prices, but only in RNP facilities. The findings suggest that working for God matters.

This paper—a product of Public Services, Development Research Group—is part of a larger effort in the department to evaluate frontline health care delivery in poor countries. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Hedy Sladovich, room MC3-607, telephone 202-473-7698, fax 202-522-1154, email address hsladovich@worldbank.org. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted at rreinikka@worldbank.org or jsvensson@worldbank.org. May 2003. (49 pages)

Produced by Partnerships, Capacity Building, and Outreach

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*We are grateful for comments and suggestions by James Adams, Markus Goldstein, Daniele Guisti, Michael Kremer, Magnus Lindelöw, Peter Okwero, Tomas Philipson, Halsey Rogers, Rob Yates, and Poverty and Applied Micro seminar participants at the World Bank. We also thank Makerere Institute of Social Research for their assistance in survey implementation Financial support from the Japanese PHRD grant is gratefully acknowledged The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors and do not necessarily represent the views of the World Bank, its Executive Directors, or the countries they represent Working papers describe research in progress by the author(s) and are published to elicit comments and to further debate.

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1 Introduction

In many developing countries the not-for-profit sector plays an important role in the provision of social services. In the health and education sectors, religious organizations are particularly prevalent. What implications does this have for the quantity, quality, and the price of services? Clearly, the answer to this question requires knowledge about the not-for-profit actors' objectives and behavior as service providers. Despite their importance, however, there is currently little such information available from developing countries.[1] In this paper, we fill this gap with unique data obtained from a quantitative survey of government, private for-profit, and private not-for-profit (religious) providers of primary health care in Uganda.

The literature provides two general explanations for what drives not-for-profit actors. The first explanation is based on the premise that not-for-profit health facilities are driven by altruistic (or religious) concerns. This is the very reason why they have chosen to operate as a "not-for-profit." The alternative hypothesis stresses the potential benefit of the regulatory not-for-profit status. Specifically, not-for-profits (at least in the United States) enjoy exemption from taxation and are the main beneficiaries of charitable donations. At the same time, not-for-profits cannot directly appropriate profits. Thus, any surplus must be used to finance perks (wages and perquisites) for the management and/or staff. The differential tax treatment and differential access to grants and donations between for-profit and not-for-profit may explain why it may be optimal for an entrepreneur to choose a not-for-profit status. The regulatory status, i.e., the nondistribution constraint, may also have an additional benefit as hypothesized in Hansmann (1980) and formalized in Glaeser and Shleifer (2000). Namely, the nondistribution constrain will make profits less valuable

[1] A large literature attempts to identify the behavior of not-for-profit firms or organizations in the developed world, especially in the United States. The theoretical work has mainly evolved around three types of models; altruism models, which have quantity and quality of output in the firm's objective function; physician cooperative models that are analogous to earlier cooperative firm theories (Pauly and Redisch 1973), and non-contractible quality models, where for-profit firms have an incentive to shirk on the quality of service to cut costs (for a review, see Malani, Philipson, and David 2002; Lakdawalla and Philipson 2001) With respect to the U.S. health sector, where most services are produced by the not-for-profit sector, empirical evidence shows that not-for-profits are larger (for example, Rose-Ackerman 1996), produce the same or higher quality services than for-profit firms (Sloan and others 1998, McClellan and Staiger 2000), while the results on costs are mixed. Furthermore, the empirical literature finds that demand shocks increase the market share of for-profit firms; tax increases either raise the share of not-for-profits, or does not affect it at all; and somewhat surprisingly, that not-for-profit firms appear to be more profitable than for-profits However, their prices are not significantly higher than for-profits (Malani, Philipson, and David 2002; Philipson 2000, Sloan and others 1998)

for not-for-profit firms, which in turn will provide them with softer incentives and thereby protect consumers from ex post appropriation. Since private for-profit firms are more responsive to profits, they will have stronger incentives to cut costs and pursue ex ante nonverifiable quality reductions on the service(s) provided. This commitment problem may lead entrepreneurs to choose the not-for-profit status as a means of committing not to reduce quality.

The evidence, almost exclusively based on data from the United States, on distinguishing the different theories of non-profit firms is mixed (see footnote 1). One reason it may be difficult to disentangle the three theories is that the type of ownership may be endogenous. For example, a non-altruistic entrepreneur may choose a not-for-profit status and locate in a poor neighborhood if she expects to benefit from charitable donations as a consequence of this ownership/location choice. Thus, although the location choice will have adverse financial consequences, higher expected donations will compensate for them and make the ownership/location choice optimal (i.e., the total expected cash value of perks is higher when taking donations into account).

In this paper we exploit data from primary health care providers in Uganda. Studying a poor developing country has two clear advantages when assessing the underlying preferences of service providers. First, as discussed in more detail below, not-for-profit primary health care providers in Uganda are to a large extent self-regulated. The nondistribution constraint may therefore not be binding, in which case the Hansmann (1980) and Glaeser and Shleifer (2000) theory is less relevant. Second, the not-for-profit facilities have no obvious tax advantages over private-for-profit firms. In fact, for the mostly rural primary health facilities we are considering, neither type of owner pays any direct or indirect taxes. Moreover, until 1999/2000 (the fiscal year for which we have data) donations play a marginal role in financing primary health care providers' recurrent operations. Thus, at least prior to 1999/2000, there were no obvious advantages for a nonaltruistic entrepreneur to choose a not-for-profit status.

However, the self-regulatory status raises another concern, namely that the preferences of the owner, or the founder (for instance a Catholic parish) and the manager may differ. In particular, the facility may be captured by a manager with different objectives from the owner.[2] Clearly, capture can take many forms (and be of varying degrees) and some forms (degrees) cannot easily be

[2] Glaeser (2002) argues that weak board control may be just as important as the differential tax privileges/donations and nondistribution constraint in explaining the behavior of the not-for-profit firms Thus capture is not specific to not-for-profits in poor developing countries, although it seems plausible that boards in general have stronger control in the U.S. not-for-profit sector than in the Ugandan primary health care sector (see discussion in section 2). The capture argument is also close to the Pauly and Redisch (1973) view of hospitals as physicians' cooperatives.

measured. In particular, as argued by Glaeser (2002), the workers' preferences are often themselves altruistic and they often internalize the stated goals of the firm or organization. What we can test is whether the not-for-profit service facilities act as profit- or perquisites-maximizing firms, or whether they are systematically different.

We take two approaches to identify whether religious affiliation (not-for-profit status) matters. The first builds on the assumption that we can identify the behavior of the not-for-profit providers by comparing their performance in various dimensions with government and private for-profit providers. Specifically, we exploit the cross-section variation across types of ownership, controlling for other confounding observable characteristics and unobserved location-specific effects. The idea is that since the behavior of private for-profit providers (presumably driven by profit maximization) and government-operated units (to a large extent regulated by central and local authorities to deliver a minimum package of services) is generally quite well understood, by comparing outcomes, we can learn about the objectives of the not-for-profit actors. To guide the empirical work, we develop a simple model of the not-for-profit providers and derive the implications for their choice of wages, prices, service mix, and quality of care under the two alternative hypotheses laid out above.

The second approach relies on a near natural policy experiment of public financial aid for the not-for-profit sector.[3] In 1999, the year of the survey, the government initiated a program in which each not-for-profit health unit in a given category (e.g., dispensaries) was to receive an untied grant for the fiscal year. As this was a new and unanticipated program and due to poor communications on the government's part, some not-for-profit facilities did not receive their grant until the following year. This de facto phasing-in of the financial aid program provides a source of (what we argue to be) exogenous variation that we can exploit to identify the effects of ownership.

In the cross section, we find that religious not-for-profit facilities hire qualified medical staff below the market wage. Moreover, religious not-for-profit facilities are more likely to provide pro-poor services and services with a public good element, and charge strictly lower prices for services than for-profit units. Religious not-for-profit and for-profit facilities both provide better quality care than their government counterparts, although government facilities have better equipment. These findings are consistent with a premium in working in a reli-

[3] Duggan (2000) also studies the diffential response of not-for-profit versus for-profit health facilities (hospitals) to a natural experiment induced by a government subsidy program. He examines hospitals affected by California's Disproportionate Share program and shows that the behavior of not-for-profit hospitals varies with the share of nearby hospitals organized as for-profit firms. increased for-profit penetration makes not-for-profit hospitals more profit-oriented.

gious not-for-profit facility and that religious not-for-profits are driven (partly) by altruistic concerns. The near natural experiment reveals that financial aid leads to more testing of suspected malaria and intestinal worm cases and lower prices in religious-not-for-profit facilities. Moreover, the estimated effects are substantial. Thus, working for God appears to matter!

The rest of the paper is organized as follows. Section 2 describes the institutional setting of health care in Uganda, including ownership and management of health facilities (in particular dispensaries), the labor market and human resources in health care, and the government financial aid program to not-for-profit health providers. Sections 3 and 4 present a simple model of the behavior of a religious not-for-profit health facility, develop two extensions of the model, and lay out the inference procedure. Section 5 discusses the survey data used in the empirical analysis. Section 6 presents the empirical evidence from the cross-section regressions. Section 7 explores the impact of financial aid on service delivery. Section 8 concludes.

2 Institutional setting in health care

It is commonly held that Uganda had a well-functioning public service delivery system in the 1960s. Health care was provided free of charge, and access to care was relatively good. Steady improvements were experienced in most health indicators. However, as a result of the political and military turmoil of the 1970s and 1980s, the government de facto retreated from funding and providing public services. In primary education, which was nationalized in the 1970s, the vacuum was filled by parents who gradually took over running the public schools (Reinikka and Svensson 2002). In health care the burden was taken up by private for-profit sector and religious providers. The latter were able to mobilize external resources to sustain activities during the turbulent times (Republic of Uganda 2001a). Despite efforts by the private for-profit and not-for-profit sectors, health indicators fell dramatically.

Following restoration of peace in the late-1980s and subsequent economic recovery, government implemented a major program of infrastructure rehabilitation in the (public) health sector in the 1990s. This coincided with political, administrative, and financial decentralization, which led to limited recurrent funding for health facilities, as districts prioritized areas other than health care (Jeppson 2001). As a result the quality of public services did not improve at the same pace with infrastructure, which is reflected in the continued high demand for privately provided care (Hutchinson 2001). Some key health indicators did not improve as expected, despite a GDP growth rate of over 6

percent and a 40-percent reduction in consumption poverty in the 1990s (Appleton 2001). Specifically, the infant mortality rate stagnated during the latter half of the 1990s at 88 deaths per 1,000 live births in 2001 (Republic of Uganda 2002). Mortality during the first month is particularly high. The underlying reasons for the stagnant trend include high fertility, short birth intervals, and a high proportion of home deliveries. These factors remained constant during the period. The fall in immunization rates—partly attributed to decentralization—made the situation worse (Moeller 2002). HIV/AIDS must play a role in this stagnation, but malaria (51 percent) and diarrhoea (19 percent) are the most important direct causes of infant mortality in Uganda. Recent trends in the clinical causes of infant deaths are, however, not available.

Today the modern health sector in Uganda is composed of four types of facilities: hospitals, health centers, dispensaries (health center III), and aid posts or subdispensaries. These facilities can be government, private for-profit, or private not-for-profit operated and owned. The health facility survey we exploit in this paper has the dispensary (with or without a maternity unit) as its unit of observation. Dispensaries are the most common health facility and an important health service provider in Uganda. Most dispensaries are rural (89 percent).

According to the government health sector strategic plan, the standard for dispensaries includes preventive, promotional, outpatient care, maternity, general ward, and laboratory services (Republic of Uganda 2000). An average dispensary has eight beds for inpatient care and serves a population of 20,000. Dispensaries usually do not have a medical doctor (although some do), and are managed by a either clinical officer or a comprehensive or registered nurse.

Factors that have determined where dispensaries have been located over time include population density and growth, accessibility, existence of other units, health needs, and poverty rates. Similarly, national and local politics, communities building their own units, and the preferences of not-for-profits, donors and even the colonial authorities have had their impact. More recently, both the government and the medical bureaux have attempted to provide (sometimes conflicting) guidelines on where to put new not-for-profit facilities, mostly centered around filling gaps in geographic coverage.

2.1 Ownership and management of health facilities

The *private not-for-profit* health sector in Uganda consists of religious and nonreligious providers.[4] The first ever census on the not-for-profit health care

[4]This section draws considerably on interviews and communications with health practioners and public officials in Uganda, as many aspects of private health care provision are poorly

sector in Uganda carried out in 2001 indicated that autonomous dioceses and parishes own 70 percent of all private not-for-profit health facilities, which total 450 lower-level units and 42 hospitals (Republic of Uganda 2001b). The rest are owned by nongovernmental organizations (16 percent), some of which are also religious, community-based organizations (6 percent), and by district councils, mosques, and individuals (8 percent). The census also shows that most private not-for-profit health facilities (82 percent) are coordinated by one of three national umbrella organizations: Catholic, Protestant, and Muslim medical bureaux.

The first religious not-for-profit health unit was established by missionaries in 1897 (Republic of Uganda 2001a). Thereafter churches and missionaries have set up hospital and health centers throughout the country.[5] At their departure, missionaries handed over the management to the local church (diocese or parish). In the last three decades, as new parishes were established, they (usually initiated by the parish priest) routinely set up their own social services, particularly health services. In many cases parishioners contributed to the investment cost of these facilities, sometimes aided by donations from the respective medial bureau or outside sources. The majority of dispensaries owned by religious providers were built between 1960 and 1990. In our sample, the median year of establishment is 1983.

Not-for-profit health care providers are self-regulated and self-governing. At the time of our survey, there was no certification for not-for-profit status (either by a medical bureau or by the government). Hence, the in-charge of the not-for-profit health unit together with the unit-specific management committee were free to decide on the mix and price of services provided by the facility.

The Uganda Catholic Medical Bureau recently initiated an accreditation process and issued guidelines for lower-level health units affiliated with it stating the following (2001, p.1):

> "Diocesan health units are different, they do not aim at profit. The money left over is to be used for improving the services, lowering the fees, or increasing the salaries. No funds should go to the owner or the parish. These health units aim to offer health services as good and as cheap as possible, from a healing mission. They try to be well organized, aim at integration in the District, and are community-oriented."

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documented

[5] Since expatriates were not allowed to own fixed assets, missionaries established the units in the name of the diocese or parish

The accreditation procedure was initiated in response to government's financial aid program to non-profits (see details in section 2.3). But in 1999/2000 (the year of the survey), if any of these rules were followed, compliance by the facilities was voluntary.

It is worth noting that the institutional structure of the not-for-profit sector is considerably different from the government's institutional framework. Most importantly, the medical bureaux operated by various religious denominations do not have administrative authority over the individual units or owners (that is, dioceses or parishes).

In the *public sector*, the Health Sector Strategic Plan determines facility standards and the mix of services to be provided at each level (Republic of Uganda 2000). Both central and local government authorities attempt to enforce these standards by controlling inputs, say, by setting staffing norms, by supplying pharmaceuticals, vaccines, and equipment, and by direct transfers and investment funding. In addition, they issue management and technical guidelines and supervise health facilities. Public health facilities have also a unit-specific management committee to represent the local community and patients. Due to a variety of factors, such as difficulties in recruitment of qualified medical staff, and the availability or absence of funding, the actual picture on the ground may vary from the set standards.

Private for-profit practice began decades ago with a few medical practitioners in urban areas. Their numbers grew dramatically during the economic and political turmoil of the 1970s and 1980s (Republic of Uganda 2001a). Private health care was provided by a mixture of licensed and unlicensed private clinics, pharmacies, drug shops, and home providers,[6] and little systematic information is available on these providers. Many medical professionals working in the public sector are believed to also have a private practice to earn extra income (McPake and others 1999), but factual evidence of this practice, particularly in the case of dispensaries, is limited.

Finally, while all health service providers are exempt from the value added tax, private for-profit provider are, in principle, expected to pay income tax, as well as the pay-as-you-earn tax for their employees. But there are major problems in compliance. Thus, apart from a few private clinics in Kampala (the capital), the private for-profit dispensaries are de facto tax exempt. Religious providers are also exempt from the income tax.[7]

[6] In principle, the national professional councils are supposed to regulate both private for-profit and not-for-profit facilities (but not government facilities) by licensing them, setting standards, and monitoring their premises. This regulatory system is not working in practice.

[7] Actually, the current tax code in Uganda does not even recognize the not-for-profit status Still (or as a result of this), there have been attempts by local authorities to impose taxation on the not-for-profit facilities' revenues, but the facilities and medical bureaux have successfully

2.2 Labor market and human resources in health care

While the total number of medical personnel has increased since 1972, it has not kept pace with population growth (Hutchinson 2001). Many medical students leave the country after completing their education to work in neighboring countries or go further afield where salaries are higher. In 1996 one medical person was available for every 2,350 people, while in 1972 one medical person was available for half that many people. The absolute number of doctors actually declined during the same period (by 18 percent).

The distribution of medical personnel is uneven. The three largest cities with less than 10 percent of the country's population account for nearly 60 percent of its doctors. Since almost half of government health sector employees work in hospitals, many careseekers bypass the lower-level units and use hospitals instead: in 1998 only 15 percent of hospital patients had been referred from lower-level facilities (Okello and others 1998).

The quality of health personnel is also a major problem. In the public and not-for profit sectors, about 40 percent of established health positions are currently filled by staff with medical training. The remaining positions are filled by nursing aides—with no medical training—hired by local governments or facilities themselves, or are left vacant.

2.3 Financial aid for non-profits

The two umbrella organizations for not-for-profit health providers—the Uganda Protestant Medical Bureau and the Uganda Catholic Medical Bureau—were established in the 1950s to coordinate disbursement of government grants to religious health care providers. While public subsidies continued after independence, over time the relations between religious providers and the government deteriorated, as there was competition and a perceived difference in pay and privileges (Republic of Uganda 2001a). During the decline in public services in the 1970s and 1980s, subsidies to not-for-profits dwindled and eventually ceased altogether. In response to the disappearing public support, not-for-profits had to resort to user fees and external donations. The two bureaux also established a joint medical store to supply their affiliated facilities with drugs and other medical consumables and equipment.[8] In the early 1970s the Uganda Muslim Supreme Council also established a similar permanent coordinating structure.

Over time, the importance of external donations declined. In our sample

lobbied against the tax claims.

[8]Today all types of health-care providers can purchase drugs from the joint medical store and hence take advantage of its bulk purchase prices.

of (religious) not-for-profit facilities, only 3 out of 44 not-for-profit dispensaries received donations from private sources and only 2 out of 44 facilities received funds from the donor community in fiscal year 1999/2000.[9]

In 1997/98 the government reinstated financial aid to hospitals. In 1999/2000 a new program extended a similar subsidy to lower-level health units. The financial aid program prescribed that each not-for-profit unit in a given category (e.g., dispensaries) was to receive a fixed-amount grant for the fiscal year. Each dispensary was to receive the same amount, namely 2.5 million shillings ($US 1,400) a year. Each dispensary with a maternity unit was to receive 3.4 million Ush ($US 1,900). In subsequent years the allocation system was to become more refined, to include both performance and needs-based criteria. The administrative problems getting program off the ground are discussed in section 7.

3 Conceptual framework

Next we lay out a simple framework to analyze not-for-profit behavior. We consider three models. The first two models implicitly assume that the (altruistic owner's) not-for-profit facility is captured by a nonaltruistic manager(s). In the first model, the nondistribution constraint is not binding, so the not-for-profit provider acts as a profit-maximizer. In the second version, we assume the constraint binds (i.e., it is enforced), in which case the not-for-profit provider maximizes perquisites instead. The third model assumes that (religious) not-for-profit facilities maximize the total health impact of its activities, here conceptualized as the number of patients treated.[10]

We start by solving the simplest version of the three models, and then consider two extensions: endogenous quality and costs.

3.1 Basics

A manager for a not-for-profit health facility i must hire workers to work in the facility and agree on wages w_{ij}. Each worker j can perform one task or service.

[9] As stressed above, donations were more important in the 1970s and 1980s, as well as at the start-up phase, when raising funds for construction We have some indirect evidence for the latter. Of the 29 not-for-profit facilities that had renovated their facility in the past, 14 received financial support from private and/or donor sources.

[10] Clearly, conceptualizing altruism in the health sector with the number of patients treated is not uncontroversial. See Malani, Philipson, and David (2002) for a review of altruism models that typically have quantity (and/or quality) of output in the not-for-profit's objective function.

There are S potential services. Thus, a facility can at the most have S workers. There is a pool of workers who differ with respect to the value placed on working in a not-for-profit facility. Specifically, a worker j's utility is $u(w_{ij}) + \delta_j NFP$, where $u(w)$ is a concave function, NFP is an indicator variable taking the value 1 if the worker is employed by an altruistic not-for-profit facility (and zero otherwise), and δ_j is the nonmonetary gains of worker j of working in a not-for-profit facility. δ_j is thus a measure of a worker's altruism or (religious) beliefs about the importance of working in a not-for-profit facility. We label δ_j as the "religious premium". Each worker can get a job in the public sector, which pays the wage $\bar{w}$.[11]

The manager must also decide what services to provide and prices of these services. The total cost of producing a given service $s \in S$ that x_s patients will be buying is $w_s + cx_s$, where w_s is the wage cost of the worker assigned to produce service s, and c is the (constant) marginal cost. We thus assume that a worker will be paid the same amount irrespective of the number patients treated. The inverse-demand function for health service s is $p_s = P(x_s)$ where p_s is the price and $P_x(x_s) < 0$. We let ϵ_s denote the elasticity of demand with respect to price for service s. The facility is assumed to be a local monopolist.

3.2 The profit-maximizing not-for-profit facility

The total cash profits of facility i is $\pi = \sum^{S_i} [P(x_s)x_s - w_s - cx_s]$, where S_i is the set of services offered by facility i. We assume that workers do not obtain any additional noncash gains of working in a profit-maximizing not-for-profit facility; that is, $\delta_j = 0$. A profit-maximizing facility can hire an unlimited number of workers at the wage $\bar{w}$. Its maximization problem is thus,

$$\max \sum^{S_i} [P(x_s)x_s - \bar{w} - cx_s] \ . \tag{1}$$

The first order condition of activity s can be stated as,

$$P(x_s)\left[1 - \frac{1}{\epsilon_s}\right] - c \leq 0 \, . \tag{2}$$

Equation (2) is a standard condition for profit maximization; the price will be set to equate the marginal revenue (first term in (2)) with the (constant) marginal cost. Equation (2) implicitly defines the optimal quantity x_s^* and by

[11] The assumption of excess demand of workers by the public sector at (the administrative set) wage $\bar{w}$, is a good approximation of the health market for qualified staff in Uganda given the economywide shortage of qualified staff.

the inverse-demand function the price p_s^* that creates this demand. Since the marginal cost is the same for each service, the marginal revenue for each service being provided must also be the same. That is,

$$P(x_s)\left[1-\frac{1}{\epsilon_s}\right] = P(x_t)\left[1-\frac{1}{\epsilon_t}\right] = c. \tag{3}$$

Clearly, from (3) it follows that the facility will charge a higher price for the service with low elasticity of demand.

Equation (2) is a necessary condition for profit maximization. In addition, each service must yield non-negative profits. That is, the facility will provide the service s only if

$$P(x_s^*)x_s^* - \bar{w} - cx_s^* > 0. \tag{4}$$

3.3 The perquisites-maximizing not-for-profit facility

Following Glaeser and Shleifer (2001), we assume that if the nondistribution constraint binds, the manager is forced to spend profits on perquisites, denoted by z. The utility of spending profits on perquisites is $v(z) = \alpha z$, where $\alpha < 1$ is a constant.

As with the profit maximizer, we assume that workers do not obtain any additional noncash gains of working in a perquisites-maximizing not-for-profit facilities; that is, $\delta_J = 0$. Its maximization problem is thus,

$$\max \alpha \sum^{S_i} \left[P(x_s)x_s - \bar{w} - cx_s\right] . \tag{5}$$

Clearly, the first-order condition of activity s, and the non-negative profit constraint are identical to (2) and (4). Thus, a perquisites-maximizing not-for-profit facility will set the same prices p_s^* as a for-profit facility. Moreover, it will pay workers the same wage as a for-profit facility, and it will also choose to provide the same set of services.

If private-for-profit and private not-for-profit facilities only differ in the ease in with which a facility can appropriate profits, and if facilities decision variables are (i) which services to provide, (ii) the prices of these services, and (iii) wages to their workers, we should not observe any differences between private-for-profit and private not-for-profit facilities.

3.4 The altruistic not-for-profit facility

The third assumes that private not-for-profit facilities maximize the total health impact of its activities. Clearly, the total health impact could be defined in a

variety of ways. Here we choose to operationalize it as the number of (poor) patients treated. That is, the private not-for-profit facilities maximize $\sum^{S_i} x_s$, subject to the constraint that $\sum^{S_i} [P(x_s)x_s - \bar{w} - cx_s] \geq 0$.

Consider first the choice of workers. A manager for an altruistic facility will try to hire workers biased toward working in a not-for-profit facility. To simplify the exposition, assume there are two large group of workers, one with $\delta_s = 0$ and one with $\delta_s = \delta > 0$. The not-for-profit facility will hire workers with $\delta_s = \delta$ and pay them the wage $\underline{w} = u^{-1}[u(\bar{w}) - \delta]$. Note that $\underline{w} < \bar{w}$. Thus, the not-for-profit facility will exploit the workers' moral gains of working in a not-for-profit facility by offering a lower wage. The wage is set so that at the margin, a worker with a positive religious premium is indifferent to working in a not-for-profit facility or a for-profit facility.

To solve the altruistic not-for-profit manager's maximization problem we formulate the Lagrange function,

$$L = \sum^{S_i} x_s + \lambda \left(\sum^{S_i} [P(x_s)x_s - \bar{w} - cx_s] \right) , \tag{6}$$

where λ is the Lagrange multiplier. Maximizing the Lagrange function yields the following first order conditions,

$$1 + \lambda \left[P(x_s) \left[1 - \frac{1}{\epsilon_s} \right] - c \right] \leq 0 \ \ \forall s \in S_i \tag{7}$$

and

$$\sum^{S_i} [P(x_s)x_s - \bar{w} - cx_s] = 0 \ . \tag{8}$$

Dividing the first-order conditions (7) for two services s and t, we see that

$$1 = \frac{P(x_s)\left[1 - \frac{1}{\epsilon_s}\right] - c}{P(x_t)\left[1 - \frac{1}{\epsilon_t}\right] - c}. \tag{9}$$

That is,

$$P(x_s)\left[1 - \frac{1}{\epsilon_s}\right] = P(x_t)\left[1 - \frac{1}{\epsilon_t}\right]. \tag{10}$$

Thus, as for the profit- or perquisites-maximizing not-for-profit facility, the marginal revenue for each service being provided will be the same. Thus, higher prices will be charged for services with low elasticity of demand. The intuition is straightforward. Given the zero-profit condition (8), and given that different patient types are perfect substitutes, if the marginal revenues differ, the facility

can provide one less patient with the service with the lowest marginal revenue, and instead provide more than one extra patient with the service with the highest revenue. Thus, by shifting types of patients treated, the aggregate number of patients treated could be raised.

Note that (7) implies that prices will be set such that the marginal return is strictly lower than the marginal cost. That is, an altruistic not-for-profit facility will charge lower prices than a profit- or perquisites-maximizing not-for-profit facility. Thus, an altruistic provider will tend to cross-subsidize services. In particular, whereas a perquisites-maximizing not-for-profit facility (or a private for-profit facility) would never provide a service it cannot make a positive profit from; i.e., for which (4) does not hold, an altruistic provider may do so in order to increase the total number of patients treated.

3.5 Quality of care

So far we have assumed that quality of care is exogenous. Assume now instead that before (or simultaneously) choosing what services to provide, the manager/facility also makes an effort choice that influences the quality of the services being provided. Let the inverse demand function be $p_s = P(x_s, q)$, where q is effort and $P_q > 0$ and $P_{xq} > 0$. We assume that higher quality services imply both higher financial and nonfinancial (effort) costs. Total cash profit is now $\pi = \sum^{S_+} [P(x_s, q)x_s - w_s - cx_s - C(q)]$, where $C_q(q) > 0$ and $C_{qq}(q) > 0$. The manager must also bear a noncash cost of exerting effort given by $\gamma(q)$, where $\gamma_q(q) > 0$ and $\gamma_{qq}(q) > 0$.

Consider first a for-profit provider. The additional first-order condition is given in (11),

$$-\gamma_q(q) + \sum^{S_+} P_q(x_s, q)x_s - C_q(q) \leq 0\,. \tag{11}$$

The two first-order conditions (11) and (2) define the optimal price and quality for service s.

The first-order condition for the quality choice for a perquisites-maximizing provider is

$$-\gamma_q(q) + \alpha\left(\sum^{S_+} P_q(x_s, q)x_s - C_q(q)\right) \leq 0\,. \tag{12}$$

Totally differentiating the first-order conditions (12) and (2), using the implicit function theorem (see appendix), it is possible to show that the quality of care of the for-profit facility exceeds that of the perquisites-maximizing facility. Higher quality of services will also allow the facility to demand a higher price.

This is an intuitive result. Providing higher quality services requires nonfinancial costs (effort). Since private for-profit firms are more responsive to profits, a for-profit provider has stronger incentives to put in high effort.

Consider next the altruistic facility. The first-order conditions of the altruistic provider's maximization program are given in (7), (13) and (14).

$$-\gamma_q(q) - \lambda\left(\sum^{S_i} P_q(x_s, q)x_s - C_q(q)\right) \leq 0 \tag{13}$$

$$\sum^{S_i} [P(x_s, q)x_s - w_s - cx_s] - C(q) \leq 0 \tag{14}$$

Higher quality will increase demand and allow the altruistic provider to treat more patients.[12] Without further restrictions on the model, however, we cannot say if the altruistic facility will exert more or less effort than the for-profit provider. However, what we can say is that only an altruistic provider will tend to cross-subsidize services, and thus can provide a service it cannot make a profit from. It will also pay their workers less. Moreover, conditional on the quality choice being similar, an altruistic provider will charge strictly lower prices.

3.6 Endogenizing cost

In the baseline model, (marginal) cost is constant and exogenous. However, it is reasonable to think that facilities can partly influence their cost structure. For example, a facility could reduce cost by ex post shirking on quality. Below we consider how such an extension would affect the results.

Glaeser and Shleifer (2001), building on Hansmann (1980), argue that private not-for-profit firms face softer incentives which protect consumers from ex post appropriation. Since private for-profit firms are more responsive to profits, they will have stronger incentives to pursue cost and nonverifiable quality reductions on the service(s) provided. It is straightforward to incorporate Glaeser and Shleifer's mechanism in the model

Let the inverse demand function now be given by $p_s = P(x_s, q^e)$ where q^e is the expected quality of the service being provided, with $P_q > 0$. Unit cost is $c = C(q)$, with $C_q > 0$ and $C_q > 0$. As in Glaeser and Shleifer (2001), the manager must bear a noncash cost of $\beta(q^e - q)$ of shirking on quality.

[12] In the standard (reduced form) altruism model, the provider cares about quantity and quality. Obviously, if quality has its own value for the altruistic provider, this would provide even stronger incentives to supply high-quality care.

In this set up, when the manager chooses q, he has already collected revenues (thus he takes the price and demand as given). The perquisites-maximizing not-for-profit facility's optimal quality reducing choice is given by,

$$-\alpha C_q(q)\left(\sum^{S_i} x_s\right)+\beta \leq 0 \ . \tag{15}$$

Rational patients will anticipate the manager's ex post incentives. Thus, in equilibrium $q^* = q^e$. The for-profit provider's equilibrium condition is the same as in (15), with $\alpha = 1$.

Total differentiating (15) yields,

$$\frac{dq}{d\alpha} = -\frac{C_q}{\alpha C_{qq}} < 0 \ .$$

Thus, the nonverifiable quality of the not-for-profit facility exceeds that of the for-profit facility. Lower quality (which is expected in equilibrium) will lead to lower costs. Lower quality will also lead to lower demand. Both factors lead to lower prices. Lower demand will tend to reduce the number of services that can be provided, although this force is counteracted by lower cost. Without further restrictions on the model, it is unclear how service provision will be affected.

The altruistic facility will have no incentives to shirk ex post on quality, since this will not affect (ex post) the number of patients that could be treated.

4 Implications and specification

The predictions of the baseline and the extended versions of the model are summarized in Table 1. The baseline model suggests that we could test for the not-for-profit facilities' objective function by running the following regression on a sample of facilities with different owners,

$$y_{is} = \beta_0^y + \beta_{NP}^y NP_i + \beta_{FP}^y FP_i + \varepsilon_{is} \tag{16}$$

where the dependent variable y_{is} is either s_{is}; a indicator if service s is being provided or not by facility i, p_{is}; the price of service s charged by facility i, w_{ij}; the wage paid to worker of type j in facility i, or q_i; the quality of services. NP_i is a dummy indicating if the facility is not-for-profit, and FP_i is a dummy indicating if the facility is private for-profit. The ownership category excluded in (16) is government. The perquisites-maximizing not-for-profit facility hypothesis suggests that $\beta_{NP}^y = \beta_{FP}^y$ for $y_{is} = \{s_{is}, p_{is}, w_{ij}\}$, whereas the altruistic

not-for-profit facility hypothesis suggests that $\beta^s_{NP} > \beta^s_{FP}$, $\beta^p_{NP} < \beta^p_{FP}$, and $\beta^w_{NP} < \beta^w_{FP}$.

Endogenizing cost and allowing facilities to also choose quality, makes it more difficult, using observed prices, wages, and service provision, to distinguish between the not-for-profit's objectives. In particular, there are parameter configurations for which we cannot reject either of the two hypotheses. However, only the altruistic model, under all model specifications, is consistent with the prediction that $\beta^s_{NP} > \beta^s_{FP}$, $\beta^p_{NP} < \beta^p_{FP}$, $\beta^w_{NP} < \beta^w_{FP}$ and $\beta^q_{NP} = \beta^w_{FP}$. This implication therefore forms the basis for the empirical analysis.

While the model provides a starting point to assess the behavior of not-for-profit facilities, it is clearly based on a number of simplifying assumptions. Thus, the question is whether an association between ownership and outcomes, from a regression like (16), is a causal relationship. In particular, the different types may have other characteristics that are also associated with the dependent variable y. For example, for-profit and not-for profit providers may locate in different areas and thus face different demand.

We consider two strategies to identify a causal relationship in the data: controlling for other confounding observables (discussed below) and exploiting a near natural experiment of financial aid to not-for-profits from government (discussed in section 7).

In the cross-section analysis, identification is based on the assumption that we can control for variables that are confounded with ownership and the dependent variable. Thus, we will estimate an equation of the following form,

$$y_{is} = \beta^y_0 + \beta^y_{NP} NP_i + \beta^y_{FP} FP_i + \beta^{y\prime}_3 \mathbb{X}_{is} + \varepsilon_{is} \tag{17}$$

where $\mathbb{X}_{is}$ is a vector of other controls. Below we discuss the controls we use.

In the baseline regression, we proxy for the degree of competition by including as a control the "number of competitors", i.e., number of dispensaries and health centers in the facility's catchment area. In the model, each facility acts like a local monopolist. In reality, patients have some choice about where to seek health service (although the data suggest that proximity is the most important factor overall for selecting a given facility), so the market structure may be important.

Not-for-profit facilities receive (limited) in-kind support (medicine and staff) that may shift the marginal cost curve and thus influence y. We explicitly control for this by including a measure of the value of free drugs received and a variable capturing the full-time equivalent number of staff working in the facility for free.

Because each facility's location, in principle, is endogenous, determining whether it is ownership per se or location or some other factor that is correlated

with location that drives any observable differences in outcome could present a difficult identification problem. However, in practice it is less of a problem. First, as discussed above, most not-for-profit facilities were established many years ago. Given the large social and economic changes in Uganda during the last few decades, the local situation may have changed dramatically for many facilities. Second, empirically, we can (to some extent) control for location by including controls such as distance to closest subcounty headquarters and district-specific effects. Thus, we identify the ownership effects from the within-district variation. Finally, and most importantly, it is possible to reinterpret the model, letting the choice of services to provide and the prices of these services, really be a choice of where to locate. If not-for-profit facilities are driven by altruistic concerns, they would tend to locate in poor areas where they would not be able to charge high prices. If not-for-profit facilities are not driven by altruistic concerns, they would instead tend to locate in areas where they, just like for-profit facilities, could maximize profits. This reduced form approach is valid as long as we attempt to measure underlying objectives (preferences).

5 Data

A number of tools exist to collect and analyze service provider behavior, including facility modules in household surveys and empirical studies to estimate facility (in particular hospital) cost functions. The approach used here, a quantitative service delivery survey (QSDS), is distinct from these other tools in a number of key respects. First, unlike most other survey-based research tools, the service provider is the key unit of analysis (as opposed to, say, the firm or the household). As mentioned above, it is not unusual for household surveys to include facility modules. The perspective in these surveys, however, is that of the household rather than the service provider. Consequently, while finding proxies for quality, they pay little attention to, say, the question of why quality of and access to services are the way they are. This is reflected in the type of data collected, which is mainly on simple access indicators and the range of services offered. In other words, these surveys largely ignore provider behavior and the processes and complexities through which public spending is transformed into services. In most cases, facility information is collected as a part of community questionnaires, which rely on the knowledge of one or more informed individuals (Frankenberg 2000). Information supplied by informants is therefore not only heavily dependent on the perception of a few individuals but also not detailed enough to form a basis for analysis of service delivery, such as operational efficiency, utilization, and other performance indicators.

To the extent that the information is based on perceptions, there may be additional problems due to the subjective nature of the data and its sensitivity to respondents' expectations.

Second, the QSDS does not rely on budgeted costs, but collects detailed data on actual spending and services provided at the facility level.

Finally, the QSDS explicitly recognizes that agents in the service delivery system may have strong incentives to misreport (or not report) key data. These incentives derive from the fact that information provided by, for example, a health facility partly determine its entitlement of public support or funding. Also, in case resources (including staff time) are used for other purposes (for instance in the case of shirking and corruption), the agent involved in the activity will most likely not report it truthfully. Moreover, certain types of information, such as official charges, may only partly capture what is intended to be measured (e.g., the users' costs of the service). The QSDS deals with these data issues in two ways: (i) by using a multi-angular data collection strategy; that is, a combination of information from different sources; and (ii) by careful consideration of which sources and respondents have incentives to misreport, and identification of data sources that are least influenced by these incentives.

The survey data that we use in this paper consists of 155 randomly selected primary health care facilities drawn from 10 randomly chosen districts in all four regions of Uganda. A detailed description of the sample design is provided in the appendix. The sample is restricted to dispensaries and dispensaries with maternity units (health center III level facilities) in order to ensure a degree of homogeneity across facilities. The sample includes facilities from the main ownership categories: government, private not-for-profit, and private for-profit. As described earlier, the private not-for-profit health facilities in Uganda are mostly operated by religious organizations, and in our sample all non-profits have religious affiliations.[13] The sample was designed so that the proportion of facilities drawn from different regions and ownership categories broadly mirrors the population of facilities. However, as noted earlier, no census of private for-profit health facilities is available in Uganda, and it is hence difficult to assess the extent to which the sample is representative in this regard.[14] Of the 155 facilities, 81 (52%) are government owned, 44 (29%) are owned by not-for-profit providers, and 30 (19%) are privately owned.

The survey applied a data triangulation method, that is, data on the health

[13] Two of the 44 not-for-profit providers did not have a religious affiliation. These facilities, however, drop out of most regressions due to lack of data.

[14] A sample of government and private not-for-profit facilities was drawn randomly from the health facility register kept by the Ministry of Health For-profits were identified on the basis of information obtained from the sampled government facilities Survey instruments and a sampling note are available at www.publicspending.org (tools).

facilities were collected both at the district and health facility level, as well as from patients using an exit poll. At the district level, the district director of health services was interviewed to obtain data on health infrastructure, staff, supervision arrangements, and finance. Also at the district level, data were collected from the district records on each health unit included in the survey. These data cover staffing, salaries, vaccine supply, immunization, and drug supply to the facilities for fiscal year 1999/2000. In addition, data on the number of outpatients, inpatients, and deliveries were collected for 1999/2000 (for a detailed discussion of the data see Lindelöw, Reinikka, and Svensson 2003).

At the facility level, a broad range of information relating to the facility and its activities was collected in the survey, including (i) characteristics of the facility (location, type, level, ownership, catchment area, organization, and services); (ii) inputs (staff, drugs, salaries, vaccines, medical and nonmedical consumables, and capital inputs); (iii) outputs (facility utilization, mix of services, and quality); (iv) financing (user charges, cost of service category, expenditures, financial and other support); and (v) institutional support (supervision, reporting, performance assessment, and procurement) for fiscal year 1999/2000. Also at the facility level, an exit poll was carried out to interview 10 patients in each facility. The latter interview covered cost of treatment, drugs received, perceived quality of services, and reasons for selecting for this facility instead of alternative sources of health care.

The data collected from both the facility and district level reveals fairly poor consistency. While there is no clear pattern overall across variables, at least for outpatient numbers, there appear to be a tendency for (government) facilities to over-report output statistics to the districts relative to the data recorded in patient registers. In some cases the over-reporting is considerable (see Lindelöw, Reinikka, and Svensson 2003). In the empirical analysis, we therefore use data obtained directly from the records kept by facilities for their own needs (i.e, patient registers, medical records) rather than administrative records submitted to local government. The former, often available in a highly disaggregated format, was considered to suffer least from any incentive problems in record-keeping (see Table A.1 for summary statistics).

6 Empirical results

6.1 Staff remuneration

We start by looking at the simple relationship between staff remuneration and ownership (Table 2). We have data for about 900 employees in a total of 130

facilities. We have information on position, skill level, and pay but no other employee characteristics.

Regression 1 reports a basic wage regression, with dummy variables for not-for-profit and private for-profit facilities. The dependent variable is the full-time equivalent salary plus lunch allowances per month.[15],[16] As evident, the religious not-for-profit facilities pay significantly less than both the private for-profit ones (F-test) and the government operated units (t-test). The private for-profit facilities also pay significantly less than government facilities. On average, religious not-for-profits pay roughly 65,000 Ush per employee less per month than the government operated facilities and 17,000 Ush less than for-profit facilities. These are large differences, considering that the average (unconditional) full-time equivalent salary plus allowances per month is 109,000 Ush. In Regression 1, the district effects are also highly significant (LR-test). Facilities in more rural areas, i.e., where the distance to the closest subcounty center is greater, the pay on average is less, but the effect is not significant. The market proxy also enters insignificantly.

One explanation for the difference in remuneration is that staff composition differs across ownership. If the average skill (education) level is correlated with ownership, and better-educated workers are paid more, the average effect captured in Regression 1 may simply be a composition effect. To control for this, Regressions 2-6 report the findings from subsamples of the staff. Regression 2 considers only qualified staff.[17] The pattern is similar. Government facilities pay the most, and the religious not for-profits pay the least.

Regression 3 shows wage-setting conditional on ownership for the highest qualified staff, i.e., staff with a least A-level with subsequent medical training. For this group of workers, on average the religious not-for-profit providers pay 60,000 Ush per employee less per month than the government-operated facilities

[15] In the public sector, lunch allowance was supposed to be paid at a rate of 66,000 shillings per month for health care professionals and 44,000 for support staff in 1999/2000 (a conditional grant to districts). It was initially intended as an incentive for staff to undertake work in the community so that they would literally have money to pay for their lunch. In practice it became a salary supplement and was a mechanism for increasing health workers' pay. Lunch allowance was not paid to not-for-profit staff which became a point of contention for them (although some not-for-profits pay their own lunch allowances). In the following year, lunch allowance was formally rolled up into public sector salaries and is no longer regarded as a separate item.

[16] The qualitative results are similar if we use the more narrow measure for salary excluding lunch allowances.

[17] Qualified staff include medical doctor, clinical officer (A level and three years of medical training), comprehensive nurse (A level and three years of medical training), registered nurse (A level and two-and-half years of medical training), laboratory assistant (O level and three years of medical training), and enrolled nurse and midwife (O level and two-and-half years of medical training).

and 56,000 Ush less than for-profit facilities. There is no significant difference in remuneration between for-profit and government providers. The average (unconditional) full-time equivalent salary plus allowances per month for the highest qualified staff is 212,000 Ush. Thus, on average, the highest qualified staff are paid 28 percent less than both for-profit and government staff in the same category.

Regression 4 reports the results for the largest group among the qualified staff, that is, enrolled nurses. While we still observe a large difference between private and government staff (enrolled nurses employed by private providers receive 65 percent lower wages than average), there is no significant difference in remuneration between for-profit and not-for-profit providers.

The same pattern holds for unqualified staff. Regression 5 depicts the relationship between wages and ownership for nursing aides (the largest group of workers in the unqualified group). Private for-profit dispensaries pay 41,000 Ush less per month (compared with the government facilities), while the not-for-profit providers on average pay 49,000 less. The coefficient estimates are not significantly different at the 10-percent level.

The preliminary analysis thus suggests that there exist a religious premium but only for qualified staff, which makes it possible for religious not-for-profit facilities to hire qualified workers below market wage. This premium does not show up in the sample of unqualified or less-qualified staff. One explanation for this is simply that unqualified staff are paid a very low salary. They may therefore not be able to accept a lower wage.

One concern with these results is that we are missing not only the usual (in a wage regression) unobservables, but also some standard observables in determining wages, such as experience. Unfortunately, information on experience was not collected in the survey. A priori, it is not clear how this omitted variable bias would influence the results. If health staff in the public sector have longer tenure and thus are more experienced than their counterparts elsewhere, we would overestimate the religious (altruistic) wage premium. Conversely, if the not-for-profit providers' staff is more experienced, the reverse would be true. Fortunately, what we can do is to quantify how important this experience bias might be, since we have information on the salary scale for medical personnel in government health facilities.[18] For a qualified nurse; i.e., a nurse with at least A level with three years of medical training, the *maximum* returns to experience is 12,000 Ush. Thus, in the extreme where qualified staff in not-for-profit facilities have little experience and qualified staff in government and private for-profit units are highly experienced, this would explain roughly

[18]Salary schedule B for medical personnel specifies salaries for 10 categories of staff, with a range of salaries for each category depending on the experience of the respective staff member

one-fifth of the difference in the observed wage differential between government (and for-profit) and not-for-profit providers.

Regression 6 pools the staff similarly to Regression 2, but adds information on the level of medical training. The variable *qualification* takes the value 0 for enrolled nurses and midwives, 1 for laboratory assistant, 2 for registered and comprehensive nurses, 3 for clinical officers, and 4 for medical doctors (see footnote 8 for details of medical training in Uganda). We allow the ownership effect to be conditional on staff qualifications by interacting *qualification* with the ownership dummies. As before, government pay is higher than that of both types of private providers. Not surprisingly, more qualified staff are generally better rewarded (positive coefficient of *qualification*). However, there are differences in the marginal return to medical training depending on the ownership of the dispensary they work in. More specifically, the marginal return to medical training is lowest in the government service (i.e., wages are the most compressed in the government sector) and highest in the private for-profit sector. Highly qualified not-for-profit staff are paid significantly less than their for-profit counterparts. Hence, the religious premium in pay falls largely on the most qualified medical staff. These effects are illustrated in Figure 1.

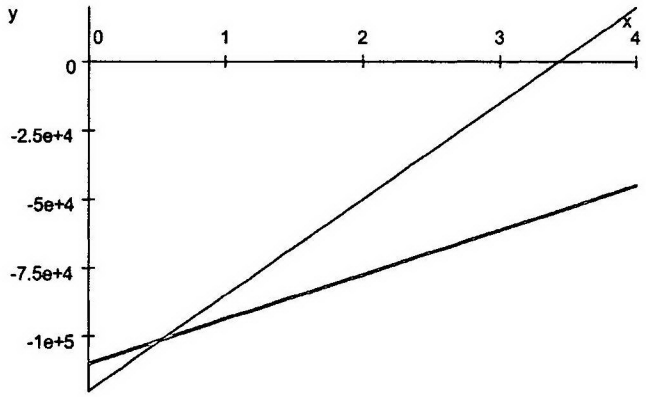

Figure 1: Salaries in relation to government units in for-profit (thin line) and not-for-profit (thick line) facilities conditional on qualification.

6.2 Mix of services

Is there any evidence that the religious not-for-profit facilities are different from the other providers in their choice of health services? This is what the altruistic model suggests. Or, are the private facilities providing roughly the same type of services, which is what the perquisites-maximizing model predicts. Before presenting the results, it is worth asking: Why would the offered set of services differ across ownership types? Our starting point is that the different types of facilities have different objectives that will show up in different choice of services. An alternative (complementary) explanation is that demand differs, and if location is endogenous, this might lead to systematic service differences. To some extent, we control for this by including proxies of location and market structure in the regressions. Moreover, even if these variables do not fully control for differences in demand, this may not be too problematic, since we can reinterpret the model in such a way that the choice of service mix is in practice a choice of where to locate. For example, if a facility locates in a poor area, this implies provision of pro-poor services.

Tables 3a and 3b report a series of regression, where the dependent variable is a 0,1 indicator if a given service is being provided (1), or not (0).[19] All facilities are providing general out-patient services (OPD). From Table 3, it is possible to identify two broad sets of services. The first group includes in-patients care, medical care, laboratory services, and immunization.[20] The religious not-for-profit and the private for-profit providers are as likely to provide these services. For medical care, all three facility types are similar, while government facilities are significantly less likely to provide laboratory services.

Our empirical evidence shows that government units are the most likely ones to carry out immunizations, followed by the religious not-for-profit facilities. However, this effect is solely driven by differences in vaccine supply.[21] Controlling for the free supply of vaccines in Regression 5, we find no significant difference between the three types of facilities. This is also consistent with the principles of the national (vertical) immunization program.

For the second set of services, the two private sector providers differ. This

[19] We focus on the most common health services. A handful of facilities also provide mental care, eye care, and dental care.

[20] The term "medical care" refers to (non-surgical) curative care

[21] Immunization is a special service from the individual facility perspective The national immunization program (UNEPI) sets countywide standards for immunization services and manages the program mainly by providing supplies to health facilities. In fact UNEPI is a monopoly supplier of vaccines in Uganda (both regular supplies and for immunization days). The program sets its targets for immunization based on population and provides vaccines to meet those targets directly to the facilities Not-for-profit dispensaries also receive their vaccines from UNEPI as do some private for-profit providers.

set includes outreach, health education, training of nurses and community health workers, antenatal care, and family planning. All these services, except family planning, are more likely to be provided by the not-for-profit than the for-profit facilities. Not-for-profit facilities are less likely to provide family planning. Comparing the not-for-profit and government facilities, the later is more likely to carry out outreach (almost all did, 77 out of 80), although the religious not-for-profit and government facilities are similar in number of staff days per month for outreach (Regression 7). The religious not-for-profit facilities are more likely to run training programs for community health workers, while government clinics are more likely to provide antenatal care, but the effect is small.

How do we interpret these results? Clearly, the services depicted in Table 3 differ both in their profit potential, the extent to which they benefit the poor, and in their public good nature. In general, in-patient care, medical care, antenatal care, and laboratory testing are services that are demanded by a broad spectrum of the population and are not typically public goods. Most of these services are just as likely to be provided by for-profit facilities as the religious not-for-profit ones, antenatal care being an exception.

It could be argued that outreach is a service that in general has a bias toward the poor. Fewer not-for-profits provide this service compared to government but those that do provide more of it. Health education and training of community health workers have a public good element. Therefore it may be difficult to make a positive profit from these three services. The perquisites-maximizing model predicts that such services would not be provided neither by for-profit nor by not-for-profit facilities. The data does not support this prediction. In fact, the pro-poor services (outreach) and those with a public good element are significantly more likely to be provided by the religious not-for-profit facilities than the for-profit ones.

As can be seen from Table 3, family planning in an exception. A probable explanation for this is that the not-for-profit facilities have religious motivations for not providing this type of service, particularly as the Catholic Church is important as a health care provider.

It is worth noting that one service, laboratory testing, is the only one that both private providers are significantly more likely to provide. To the extent that testing is an important quality component, this is in line with findings on the quality of care reported below.

6.3 Price setting

Table 4 reports on the relationship between user-fees and ownership. Again, it is useful to ask: Why would prices differ across ownership types? In our model, facilities act as local monopolists, setting prices to maximize their objective function. If these objectives differ across ownership, we should also observe differences in user-fees across types.

Another explanation is that what we treat as homogeneous goods (e.g., minor surgery) are actually differentiated goods with respect to quality. The implications of this is analyzed formally in section 3.3.

Another obvious explanation is differences in demand and marginal costs across units. Wealthier areas may be willing to pay more for health services. It may therefore be more profitable to locate in such an area, which may have differential impact on the locality choice of the providers. As discussed above, we can reinterpret the model so that the choice of prices in practice is a choice of where to locate. Thus, for evaluating the behavior of not-for-profit facilities, this may pose less of a problem. In addition, we control for location and degree of competition.

Table 4 shows that there are large differences across types of facilities. For general OPD, the government facilities charge almost 2,000 Ush less per first visit compared to private for-profit providers. The median payment in a government facility is 500 Ush. The religious not-for-profit facilities charge significantly more than the government facilities, but significantly less (roughly 600 Ush) than the for-profit facilities. A similar pattern matches user fees for the other services, as can be seen from Regressions 2-5. Private providers charge more for minor surgery, antenatal care, medical care, and delivery-related services. With the exception of antenatal care, the for-profit facilities charge more than the religious not-for-profit, ranging from around 600 Ush for minor surgery to 5,000 Ush for delivery.

The baseline model suggests that a perquisites-maximizing not-for-profit facility will set the same prices as a for-profit facility, while the altruistic model suggests that the not-for-profit will set prices at which the marginal return is strictly lower than the marginal cost. In other words, an altruistic not-for-profit facility will charge strictly lower prices than a for-profit unit. The findings on user-fee charges are consistent with the altruistic model.

6.4 Quality

In the model, a for-profit facility would choose to exert higher effort (ex ante) to increase quality than a perquisites maximizing not-for-profit facility. Without

further restrictions, we cannot say if an altruistic clinic would choose to exert more or less effort than a for-profit one. We can, however, draw the conclusion that if quality of services is the same or higher in the not-for-profit sector than in the for-profit sector, this is inconsistent with the perquisites-maximizing model.

Measuring quality is difficult. We provide four complementary measures. The first measure is based on observed treatment practice. The second measure is based on observed supply (that is, availability of health infrastructure). The third captures prescription practices, while the last one is a qualitative indicator derived from the exit poll data.

One important component in prescribing the correct treatment for malaria and intestinal worm cases is laboratory testing. We have information on these two types of test. The number of malaria blood slides carried out (for every 100 suspected malaria patients), and the number of stool tests undertaken (for every 100 suspected intestinal worm cases). Table 5 reports the findings with respect to testing. In line with the finding on laboratory services, we find that the private providers are significantly more likely to test patients for malaria and intestinal worms. The effect is large. For example, on average, the private providers test 25 more patients of every 100 suspected malaria patients. It is interesting to note that this is not due to differences in health equipment and staff (regressions 2 and 4). Adding these additional controls do not change the results regarding ownership. Having highly qualified staff and a microscope increase the frequency of testing, however.

Table 6 reports the result on health infrastructure. Government facilities are more likely than private for-profit facilities to have sterilization and refrigeration equipment, and more likely than not-for-profit facilities to have a blood pressure machine. It is interesting to note that private for-profit facilities are as likely to have *observable* health equipment (inputs); that is, equipment that is being used in the actual treatment process (such as protective clothes, blood pressure equipment), while they are less likely to have equipment that is more difficult to observe (like sterilization equipment and refrigerators). One explanation for this is that the private for-profit clinics are more responsive to profits, and thus have stronger incentives to cut costs and pursue nonverifiable quality reductions on the service(s) being provided.

Table 7 depicts the findings on another treatment variable, the prescription of antibiotics. The extent to which antibiotics are prescribed is generally very high. In fact, almost half of the patients report receiving an antibiotic. In some cases, they receive several types at the same time. Government facilities are significantly more likely to provide antibiotics than private providers. Regression 2 indicates that the effect is particularly strong in government facilities

without qualified (medical) staff. One explanation for this finding, which is consistent with the altruistic hypothesis, is that antibiotics is a substitute for effort.[22]

The last finding on quality comes from exit polls on why the patient had chosen to visit the facility where she was interviewed. Patients reported that proximity and good treatment and/or good staff were the most important factors for selecting the facility. Proximity is the most important factor overall; this is particularly true for government facilities. In contrast, patients are significantly more likely to report good treatment and/or good staff as a reason for visiting private facilities (Table 7, Regression 3). Not surprisingly, facilities without qualified staff are less likely to be visited for quality reasons (Regression 4).

The results on quality indicate that for observable outcomes, private providers appear to provide better quality care. We cannot distinguish between the private for-profit and the not-for-profit providers. These findings are inconsistent with the perquisites-maximizing hypothesis.

7 The effects of financial aid

A key question in a cross-section framework such as (17) is whether the selection-on-observables assumption is plausible. Specifically, there might be unobserved variables that are related to both y and the ownership indicators. Our second approach avoids this problem by exploiting a near natural experiment of government financial aid for the not-for-profit sector.

As discussed in section 2.3, the financial aid program for dispensaries was initiated by the government of Uganda in the financial year 1999/2000 and prescribed that each not-for-profit unit was to receive a fixed-amount grant for the fiscal year. The program was implemented by the local governments (districts). Specifically, the Ministry of Finance transferred the funds meant for lower-level units operated by not-for-profits to the local governments (districts), who in turn distributed the funds to the units concerned once they had submitted a workplan. In theory, all not-for-profit facilities should have received the funds in 1999/2000. In practice, however, there was variation in receipts due to a number of idiosyncratic factors, including not-for-profit dispensaries not submitting the necessary documentation in time, uncertainty about what the grants could be used for (it was meant to be an untied grant), and generally poor communications. As the system of providing financial aid for not-for-profit

[22] In addition, the cost of prescribing drugs is much lower in government facilities, since they receive most of their drugs for free.

units was new, this pattern was not surprising. The outcome for the fiscal year 1999/2000 was that some units did not receive their entitlement. Instead their first grant reached them the following financial year. Thus, de facto the grant program was phased in. It is this variation in receipt over time that we exploit.

A possible objection to this approach is that the de facto phasing-in was not random, or more specifically that the incidence of receipts could be correlated with the error term in equation (17). In that case, correlation between transfers and outcomes may be spurious. Although we cannot empirically fully reject this alternative hypothesis (since there might be unobserved factors influencing both transfer and y), we can check if the groups of grant recipients and nonrecipients differ on observables.

Tables 8a and 8b report a set of regressions using observable facility characteristics as dependent variables. The regressor is a dummy variable taking the value 1 if the facility received the entitled grant, and 0 otherwise. Regressions 1 and 2 show that grant recipients and nonrecipients do not differ significantly in age, measured either as the year the facility was established (Regression 1), when the facility has been renovated last (year), or whether the facility had been renovated (Regression 2).[23] The recipients and nonrecipients do not differ in access to communication infrastructure (Regression 3), that is, a nonrecipient is as likely as a grant recipient to have access to telephone, newspapers, and radio at the facility. We also do not find any difference in distance to district or subcounty headquarters (Regression 4), size of the facility (Regression 5), whether or not the facility was staffed with at least one qualified nurse or a doctor (Regression 6), or in access to health infrastructure (Regression 7-10). Thus, there is no (observable) evidence suggesting that the grant recipients and nonrecipients differ on observable characteristics (apart from receiving the transfer or not).[24]

The reason we use the variation in grant receipt to identify the effects of ownership is that a profit or a perquisites-maximizing not-for-profit provider's behavior would not be affected by the inflow of aid. Untied aid does not affect the marginal cost or revenue schedules. Thus, it would set the same prices and provide the same services as without aid.

The altruistic not-for-profit facility's maximization program would however

[23] The variable established/renovated depicts for each facility the year the facility was last renovated, or if no renovation has occurred, the year the facility was established.

[24] Although the groups of facilities do not differ in observables, they may still differ in some unobserved dimension. However, this unobserved dimension must then be uncorrelated with the set of observable characteristics reported in Table 7.

be affected. Formally, with aid, the facility maximizes,

$$L = \sum^{S_i} x_s + \lambda \left(a + \sum^{S_i} [P(x_s, q)x_s - w_s - cx_s - C(q)] \right)$$

where a is financial support. As shown in the appendix, for an altruistic provider, aid will lead to lower prices (and possibly more services) and to higher quality care. These results are intuitive. The altruistic provider cares about the number of (poor) people treated and this number can be increased by either lowering prices or increasing the quality of care. Both strategies are costly. Aid relaxes the provider's budget constraint and at the margin it is optimal to increase the the number of people treated using both strategies.

It is worth noting that government units also receive financial aid, primarily from public sources, although not from the same financial aid program. The allocation criteria and disbursement mechanism for aid to the government units are not clear. On the one hand, some local governments may use financial aid to improve service delivery. On the other hand, as most government programs executed at the local (district and subcountry) level, it is likely that well-organized facilities in more affluent (and politically powerful) areas are likely to capture a larger share of this funding (for capture of education grants see Reinikka and Svensson 2002).

While most government and religious not-for-profit facilities receive financial aid from public sources, no for-profit facility did.[25] Conditional on receiving financial assistance, the median receipt for not-for-profit dispensaries (with maternity unit) was 3.2 million Ugandan shillings (Ush), which is close to the amount allocated and disbursed by the central government (3.4 million Ush). Roughly 25 percent of the not-for-profit facilities did not receive financial aid. Sixty-seven percent of the government facilities received public financial support. Conditional on receiving financial aid, the mean receipt in the government sector was 0.6 million Ush.

When evaluating the effects of financial aid, it is important to identify which potential variables might be affected by the inflow in a short time interval. We look at three sets of variables that facilities can easily adjust in the short run: testing procedures, prices, and staff remuneration.

In Table 9, Regressions 1 and 2, report the correlation between financial aid and laboratory testing. Financial aid is positively correlated with testing for malaria and intestinal worms. The estimated effects are large. A not-for-profit provider with the median grant receipt test on average 24 more patients out

[25] Dropping two suspected misrecorded observations, we have data from 152 of the 155 sample facilities.

of every 100 suspected malaria case. The relationship, however, only holds for religious not-for-profit facilities.

When we test the relationship between user fees and financial aid for the specific services we have information on (minor surgery, antenatal care, medical care, and delivery services), we find no impact of financial aid. However, as depicted in Regression 3, financial aid is negatively correlated with OPD user charges. This conditional finding again only holds for religious not-for-profit facilities. A not-for-profit provider with the median grant receipt charge, on average, 900 Ush less for general OPD. As the median number of outpatients treated for this subsample of facilities was 230 patients per month, the upper bound on the foregone revenues of this price cut is 2.4 million Ush, or three-quarters of the total grant.[26]

Finally, we analyzed the relationship between salaries and financial aid. There is no robust relationship in any staff category (we report the results for qualified staff and nursing aides only).

To summarize, we find evidence that financial aid leads to more testing of suspected malaria and intestinal worm cases and lower prices for OPD services, but only in religious not-for-profit facilities. Since the variation in financial assistance is, we argue, to a large extent exogenous, these findings provide strong evidence in support of the altruistic hypothesis.

8 Concluding remarks

In this paper we exploit a unique micro-level data set on primary health care facilities in Uganda to explore the motivation of religious not-for-profit health care providers. We develop a simple model to guide the empirical work. To identify whether working for a (religious) not-for-profit has an effect, we use two strategies. The first builds on the assumption that we can identify the behavior of the not-for-profit providers by comparing their performance in various dimensions with government and for-profit providers. The second approach relies on a near natural policy experiment of public financial aid for the not-for-profit sector.

In the cross section, we find that religious not-for-profit facilities hire qualified medical staff below the market wage. They pay significantly less than both the private for-profit sector and the government. The finding that the govern-

[26] That is 900*230*12 = 2.4 million Ush. This is the upper bound since the price cut most likely increased the number of patients treated In addition, we do not have information on when during the year the price cut occurred. For example, if the price cut occurred in the middle of the year, the foregone revenues should be half as large.

ment pays the highest salaries is quite surprising, as the commonly held view in Uganda is that public sector pay is well below the private sector, including the health care profession. For example, a major pay comparator study, which underpins the government pay reform, puts the pay of a clinical officer and an enrolled nurse employed by government at 20-40 percent of that in the private sector (Republic of Uganda 1999). Our findings are in stark contrast to this commonly held view, at least in the case of lower-level health care units.

Moreover, religious not-for-profit facilities are more likely to provide pro-poor services and services with a public good element, and charge lower prices for services than for-profit units. Private not-for-profit and for-profit facilities both provide better quality care than their government counterparts, although government facilities have better equipment.

Finally, the quasi-experiment reveals that financial aid leads to more testing of suspected malaria and intestinal worm cases, and hence to better quality of care, and lower prices in religious-not-for-profit facilities. Moreover, the estimated effects are substantial.

These findings are consistent with the existence of a premium in working in a religious not-for-profit facility and that religious not-for-profits are driven (partly) by altruistic concerns.

It is worth pointing out what we have not measured and other possible explanations for the pattern we observe. First, we interpret the evidence above in favor of the altruistic model. However, as argued by Glaeser (2002), it may still be the case that the not-for-profit providers are captured by their workers/managers, but that their preferences themselves are also altruistic and therefore they (partly) internalize the stated goals of the provider. There is some qualitative evidence to support this interpretation, as many practitioners in the field report that the working environment in religious not-for-profit facilities are considerably better (i.e., revenues are spent on perks that improve the working environment for the staff). This in turn could also help explain why salaries in not-for-profits are lower (i.e., compensated by perks). On the other hand, there are reports that labor practices in religious not-for-profits are not always ideal— dismissing single pregnant workers, compulsory religious activities—and that these policies can be resented by the workers.

Second, since all the not-for-profits in our sample have religious affiliations, it is possible that the objective is not pure altruism, but to convert people. The provision of services and the service delivery choices may therefore be guided by this goal. Distinguishing between these two objectives would require data on nonreligious not-for-profit providers and a model of a health provider maximizing the number of people converted (for example by maximizing public relations). Clearly, this is an important area for future research.

Third, it is possible to think of alternative explanations for each individual finding reported above. For example, the religious wage premium may be due to rigidities in the labor market combined with recent increases in the pay for government employees. On the other hand, paid training (where a per diem typically makes up a significant part of the monthly wage) is more prevalent in the public sector, which suggest that what we pick up is a lower bound. Also, this effect cannot explain the wage differential between private for-profit and not-for-profit providers. If the type of workers (within a category of workers, say, nurses) differs across ownership types, this may also explain the wage differential. In particular, if workers in the not-for-profit sector are less competent health care providers, this may explain why they are paid significantly less. However, this interpretation is difficult to reconcile with the fact that not-for-profit facilities provide better quality care than their government counterparts.

An alternative explanation for the financial aid findings is that better-run, well-organized, not-for-profit providers managed to get the financial aid sooner than poorly functioning ones. But if these well-organized units also pay higher wages, we should observe a positive relationship between monthly salaries and aid. We do not. In addition, on observables, the early and late aid recipients look similar. We believe the strength of the argument put forward in the paper lies in the fact that we find consistent evidence across different aspects of service delivery (price and wage setting, service mix, and quality choices) and across empirical techniques. We cannot think of one particular alternative explanation that would explain all these facts.

9 Appendix

9.1 Sample design

The sample design was governed by three principles. First, attention was restricted to dispensaries and dispensaries with maternity units (i.e., health center III) to ensure a degree of homogeneity across sampled facilities. Second, subject to security constraints, the sample was meant to capture regional differences. Finally, the sample had to include facilities from the main ownership categories: government, private nonprofit (churches, NGOs), and private for-profit providers. These three considerations lead us to choose a stratified random sample. The sample was based on the Ministry of Health (MOH) facility register for 1999. The register includes government, private non-profit, and private for-profit facilities, but is known to be inaccurate with respect to the latter two. A total of 155 health facilities were surveyed. On the basis of existing information, it was decided that the sample would include 81 government facilities, 44 private non-for-profit facilities, and 30 private for-profit facilities. The exit poll of clients covered 1,617 individuals. The field work was carried out during October to December 2000. For summary statistics see Table A.1.

As a first step in the sampling process, 8 districts (out of 45) had to be dropped from the sample frame due to security concerns.[27] From the remaining districts, 10 districts, stratified according to geographical location with the size distribution determined by population shares, were randomly sampled in proportion to district population size. Thus, three districts were chosen from the Eastern and Central regions, and two from the Western and Northern regions.[28]

From the selected districts, a sample of government and private non-profit facilities was drawn randomly from the MOH register. A reserve list of replacement facilities was also drawn from the sample frame. Due to the unreliability of the register for private for-profit facilities, it was decided that for-profit facilities would be identified on the basis of information from the government facilities sampled.[29] The administrative records for facilities in the original sample were reviewed first at the district headquarters, where some facilities that did not meet selection criteria and data collection requirements were dropped from

[27] The eight districts were Bundibugyo, Gulu, Kabarole, Kasese, Kibaale, Kitgum, Kotido, and Moroto

[28] The study districts were Mpigi, Mukono and Masaka in the Central region; Mbale, Iganga and Soroti in the East; Arua and Apac in the North; and Mbarara and Bushenyi in the West

[29] Specifically, the x private facilities in region y would be determined by the in-charge in the first x randomly drawn government facilities in region y, where each in-charge would be asked to identify the closest private dispensary or dispensary with maternity unit.

the sample. These were replaced by facilities from the reserve list. Overall 30 facilities were replaced.

9.2 Proof of claim in section 3.5

The claim in section 3.5 is that a for-profit facility provides higher quality care and charges higher prices than a perquisites-maximizing facility. Without loss of generality, consider the case of one service. We then want to show that $P_\alpha \equiv dp/d\alpha > 0$ and $Q_\alpha \equiv dq/d\alpha > 0$. It is analytically more convenient to let the facility choose quantity and quality instead of price and quality (both approaches are equivalent). Thus, demand is $x = X(p,q)$. To prove the claim let $F(p,q;\alpha)$ and $G(p,q;\alpha)$ denote the first-order conditions for optimal price and quality (corresponding to (12) and (2)),

$$F(q,x;\alpha) = \alpha\left(x + (p-c)\,X_p(p,q)\right) = 0 \tag{18}$$

$$G(q,x;\alpha) = \alpha\left(pX_q(p,q) - cX_q(p,q) - C_q\right) - \gamma_q = 0 \tag{19}$$

Total differentiate F and G yields,

$$F_pP_\alpha + F_qQ_\alpha + F_\alpha = 0 \tag{20}$$

$$G_pP_\alpha + G_qQ_\alpha + G_\alpha = 0 \tag{21}$$

where $F_x = dF/dx$. Thus,

$$P_\alpha = \frac{1}{\Delta}F_qG_\alpha > 0 \tag{22}$$

$$Q_\alpha = -\frac{1}{\Delta}F_pG_\alpha > 0 \tag{23}$$

since $F_q = \alpha\left(X_q + (p-c)X_{pq}\right) > 0$, $G_x = \gamma_q/\alpha > 0$ (from (19)) and, by the second order conditions, $\Delta > 0$, $F_p < 0$.

9.3 Proof of claim in section 7

The claim in section 7 is that aid to an altruistic not-for-profit provider leads to higher-quality care and lower prices. Without loss of generality, consider the case of one service and assume $\gamma(q) = 0\ \forall q$. We want to show that $P_a < 0$ and $Q_a > 0$. The facility's problem can be restated as maximizing the Lagrange function,

$$L = X(p,q) + \lambda\left(a + pX(p,q) - w - cX(p,q) - C(q)\right).$$

Let $F(\lambda, p, q; a)$, $G(\lambda, p, q; a)$ and $H(\lambda, p, q; a)$ denote the first-order conditions for λ, p and q, respectively.

$$F(\lambda, p, q; a) = a + pX(p, q) - w - cX(p, q) - C(q) = 0 \tag{24}$$

$$G(\lambda, p, q; a) = X_p(p, q) + \lambda \left(X(p, q) + (p - c)X_p(p, q)\right) = 0 \tag{25}$$

$$H(\lambda, p, q; a) = X_q(p, q) + \lambda \left((p - c)X_q(p, q) - C_q\right) = 0. \tag{26}$$

The second-order condition for a constrained optimum is

$$\Delta \equiv F_q \left[F_p G_q - F_q G_p\right] + F_p \left[G_q F_q - F_p H_q\right] > 0. \tag{27}$$

Since $F_q = -X_q/\lambda < 0$ (from (26)) and $F_p = -X_p/\lambda > 0$ (from (25)), a sufficient condition for an optimum is that the first term in brackets in (27) is negative and the second term is positive. By the implicit function theorem we have,

$$P_a = -\frac{1}{\Delta}\left[G_q F_q - F_p H_q\right] < 0 \tag{28}$$

$$Q_a = -\frac{1}{\Delta}\left[F_p G_q - F_q G_p\right] > 0 \tag{29}$$

where it follows from (27) that the term in brackets in (28) is positive while the term in brackets in (29) is negative.

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Table A.1 Summary statistics

Sample variable	All	Government	Not-for-profit	For-profit
No. staff	7.0	7.8	7.6	4.0
	7.0	7.0	6.0	3.0
	3.8	3.2	4.6	2.7
No. doctors, clinical officer	0.6	0.7	0.3	0.7
	0	1.0	0	0
	0.69	0.55	0.6	1.0
No. nurses	1.7	2.0	1.7	1.1
	1.0	2.0	1.0	1.0
	1.6	1.5	1.9	1.0
Established or last renovated	1993	1993	1992	1993
	1996	1995	1998	1998
	12	8.9	10.7	20.2
Distance to District HQ (km)	32	36	28	26.0
	29	35	22	22.0
	22.5	21.6	25.5	18.6
Distance to subcounty HQ (km)	3.9	3.8	4.5	3.5
	3.0	2.0	3.0	3.0
Competition (number of other health-care providers)	4.1	4.4	3.9	3.8
	1.7	1.2	1.8	3.2
	1.0	1.0	1.0	2.0
No. outpatients per month	2.0	1.3	1.7	3.0
	419	500	346	270
	358	474	252	204
Sample size	296	284	283	279
	155	81	44	30

Note: Mean, median, and standard deviation reported in subsequent rows for each variable. Sample size is maximum number of observations. Because of missing data, not all variables have maximum number of observations.

Table 1. Testable implications

Model specification	Perquisites maximizing	Altruistic
	$\beta^{s}_{NP} = \beta^{s}_{FP}$	$\beta^{s}_{NP} > \beta^{s}_{FP}$
Basic model	$\beta^{p}_{NP} = \beta^{p}_{FP}$	$\beta^{p}_{NP} < \beta^{p}_{FP}$
	$\beta^{w}_{NP} = \beta^{w}_{FP}$	$\beta^{w}_{NP} < \beta^{w}_{FP}$
		$\beta^{s}_{NP} > \beta^{s}_{FP}$
Endogenous costs	$\beta^{p}_{NP} > \beta^{p}_{FP}$	$\beta^{p}_{NP} < \beta^{p}_{FP}$
	$\beta^{w}_{NP} = \beta^{w}_{FP}$	$\beta^{w}_{NP} < \beta^{w}_{FP}$
	$\beta^{s}_{NP} < \beta^{s}_{FP}$	$\beta^{s}_{NP} > \beta^{s}_{FP}$
Endogenous quality	$\beta^{p}_{NP} < \beta^{p}_{FP}$	
	$\beta^{w}_{NP} = \beta^{w}_{FP}$	$\beta^{w}_{NP} < \beta^{s}_{FP}$
	$\beta^{q}_{NP} < \beta^{q}_{FP}$	

Table 2. Remuneration

Regression	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Full	Qualified staff	High qualified staff	Enrolled nurses	Nursing aides	Qualified staff
Dep. variable	Full-time equiv. Salary + lunch allowances per staff and month					
NFP	–65,046***	–95,493***	–59,914***	–102,213***	–48,792***	–109,647***
	(5,709)	(8,467)	(24,326)	(6,178)	(3,780)	(8,700)
FP	–47,949***	–60,191***	–3,471	–105,919***	–40,883***	–120,762***
	(9,182)	(12,943)	(28,457)	(10,749)	(6,580)	(15,001)
distance	–808	1183	2,021	1,506**	–1,788*	1,677**
	(563)	(831)	(2,190)	(621)	(1,063)	(737)
competition	1,495	–653	512	–2,582	–219	–964
	(1,727)	(2,879)	(6,347)	(2,301)	(394)	(2,527)
qualification						13,334***
						(4,054)
qualification* NFP						16,248**
						(6,295)
qualification* FP						34,785***
						(6,666)
F (*NFP=FP*)	3.16*	6.81***	3.19**	0.11	1.28	
	[.076]	(.009)	(.078)	(.740)	(.259)	
District effects	Yes	Yes	Yes	Yes	Yes	Yes
LR	98.2	31.2	13.5	32.6	128.9	40.1
	(.000)	[.000]	(.142)	(.000)	(.000)	(.000)
Facilities	138	116	70	100	117	116
Observations	848	288	84	204	259	288
Adj. R2	0.74	0.90	0.88	0.95	0.93	0.93

Notes: OLS regressions with standard errors clustered by facility in parenthesis.
(**) [***] denotes significance at the 1 (5) [10] percent level.
F is F-test statistic for testing the null hypothesis that NFP=FP.
LR is likelihood ratio test statistic for testing the null hypothesis that all district effects equal.

Table 3a. Service provision

Regression	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. variable	In-patients care	Medical care	Lab. services	Immuni-zation	Immuni-zation	Outreach	Staff days per month for outreach
NFP	0.262***	0.068	0.387***	–0.167***	–0.001	–0.126**	–1.111
	(.081)	(.044)	(.085)	(.057)	(.033)	(.062)	(1.260)
PP	0.104	0.018	0.378***	–0.687***	–0.029	–0.823***	–5.830***
	(.111)	(.065)	(.101)	(.091)	(.028)	(.066)	(.936)
Distance	–0.005	0.001	–0.015*	0.005	–0.003	–0.001	0.035
	(.009)	(.004)	(.009)	(.006)	(.002)	(.006)	(0.178)
competition	0.001	0.010	–0.005	0.005	0.025	0.006	0.043
	(0.021)	(.008)	(.017)	(.020)	(.017)	(.020)	(.199)
free supply of vaccinations					0.968***		16.5
					(.033)		(.000)
F (*NFP=PP*)	1.86	0.76	0.01	26.6	1.15	67.5	
	(.175)	(.386)	(.938)	(.000)	(.285)	(.000)	
District effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LR	29.1	11.8	23.4	34.4	11.0	23.0	18.3
	(.001)	(.225)	(.005)	(.000)	(.273)	(.006)	(.031)
Facilities	152	154	153	151	151	153	151
Adj. R2	0.71	0.94	0.52	0.90	0.99	0.90	0.41

Notes: OLS regressions with robust standard errors in parentheses.
* (**) [***] denotes significance at the 10 (5) [1] percent level.
F is F-test statistic for testing the null hypothesis that NFP=PP.
LR is likelihood ratio test statistic for testing null hypothesis that all district effects equal.

Table 3b. Service provision

Regression	(8)	(9)	(10)	(11)	(12)
Dep. variable	Health education	Training of nurses	Training of health workers	Antenatal care	Family planning
NFP	–0.037	–0.002	0.116	–0.096*	–0.360***
	(.024)	(.080)	(.083)	(.054)	(.079)
PP	–0.256***	–0.238***	–0.196***	–0.284***	–0.049
	(.078)	(.090)	(.059)	(.073)	(.074)
Distance	0.007	–0.006	–0.003	0.003	0.007
	(.003)	(.008)	(.007)	(.004)	(.012)
competition	0.019	0.030	–0.009	0.016	0.001
	(.009)	(.021)	(.018)	(.008)	(.012)
F (*NFP=PP*)	7.9	5.1	12.5	4.9	9.6
	(.006)	(.024)	(.000)	(.028)	(.002)
District effects	Yes	Yes	Yes	Yes	Yes
LR	20.0	48.8	24.3	28.9	13.9
	(.018)	(.000)	(.004)	(.001)	(.126)
Facilities	153	154	152	152	152
Adj. R2	0.96	0.47	0.31	0.93	0.88

See notes to table 3a.

Table 4. User fee charges

Regression	(1)	(2)	(3)	(4)	(5)
Dep. variable	OPD	Minor surgery	Antenatal care	Medical care	Delivery
NFP	1,309***	950***	388***	2,106***	3,587***
	(184)	(290)	(87)	(355)	(734)
FP	1,930***	1,598***	471***	3,103***	8,566***
	(223)	(351)	(123)	(460)	(983)
distance	0.25	–61.1**	9.02	–7.05	–44.3
	(43.6)	(29.2)	(8.66)	(37.1)	(74.9)
competition	–12.8	109.0	10.0	–58.5	–345**
	(19.1)	(97.5)	(20.2)	(76.0)	(155)
F (*NFP=FP*)	6.73**	2.78*	0.38	4.28	20.3
	(.011)	(.100)	(.539)	(.042)	(.000)
District effects	Yes	Yes	Yes	Yes	Yes
LR	39.8	32.6	22.9	24.6	42.6
	(.000)	(.000)	(.006)	(.003)	(.000)
Facilities	130	80	99	94	87
Adj. R2	0.79	0.70	0.83	0.70	0.83

Notes: See notes to table 3.

Table 5. Quality - testing

Regression	(1)	(2)	(3)	(4)
Dep. variable	Blood slides	Blood slides	Stool tests made	Stool tests made
NFP	25.5***	27.7***	19.0***	20.9***
	(5.71)	(5.30)	(4.74)	(4.73)
FP	25.2***	28.4***	15.9***	18.9***
	(6.50)	(6.21)	(5.30)	(5.32)
distance		0.13		–0.18
		(.540)		(0.45)
competition		–0.20		–0.40
		(1.23)		(1.04)
microscope		22.8***		16.4***
		(5.13)		(4.50)
high qualified		20.1***		13.7***
staff		(5.25)		(4.59)
F (*NFP=FP*)	0.00	0.01	0.27	0.13
	(.958)	(.917)	(.605)	(.723)
District effects	Yes	Yes	Yes	Yes
LR	28.5	10.5	37.1	29.5
	(.000)	(.314)	(.000)	(.000)
Facilities	155	153	149	149
Adj. R2	0.42	0.57	0.39	0.51

Notes: See notes to table 3.

Table 6. Quality – access to health infrastructure provision

Regression	(1)	(2)	(3)	(4)	(5)
Dep. variable	Sterilization equipment	Refrigerator	Blood pressure equipment	Microscope	Protective clothes
NFP	0.004	–0.241***	–0.044	0.147	0.019
	(.012)	(.080)	(.065)	(.089)	(.086)
FP	–0.170**	–0.719***	0.112**	0.011	–0.043
	(.069)	(.084)	(.045)	(.111)	(.108)
distance	–0.004	0.008	–0.005	–0.016	0.004
	(.004)	(.006)	(.013)	(.010)	(.009)
competition	0.005	–0.026*	–0.008	0.019	0.026
	(.007)	(.015)	(.013)	(.021)	(.029)
F (*NFP=FP*)	6.25	21.8	6.4	1.41	0.32
	(.013)	(.000)	(.012)	(.236)	(.571)
District effects	Yes	Yes	Yes	Yes	Yes
LR	13.0	7.7	6.7	35.8	42.1
	(.162)	(.564)	(.666)	(.000)	(.000)
Facilities	154	154	154	153	154
Adj. R2	0.97	0.80	0.91	0.58	0.54

Notes: See notes to table 3.

Table 7. Exit poll

Regression	(1)	(2)	(3)	(4)
Dep. variable	Antibiotics	Antibiotics	Good treatment	Good treatment
GOV	0.065*	0.021	–0.122**	–0.144***
	(.037)	(.046)	(.047)	(.050)
FP	0.012	–0.007	0.079	0.073
	(.043)	(.057)	(.058)	(.059)
GOV*		0.109		
unqualified		(.079)		
FP*		0.035		
unqualified		(.092)		
unqualified		–0.041		–0.083**
		(.057)		(.042)
District effects	Yes	Yes	Yes	Yes
LR	20.8	19.7	128.8	133.1
	(.013)	(.020)	(.000)	(.000)
LR1		8.2		
		(.017)		
Facilities	155	155	155	155
Patients	1516	1516	1156	1156
Adj. R2	0.47	0.47	0.51	0.52

Notes: See notes to table 2. LR1 is likelihood ratio test statistic for testing the null hypothesis that (GOV + GOV*unqualified) is zero.

Table 8a. NFP financial aid - recipients and nonrecipients

Regression	(1)	(2)	(3)	(4)	(5)	(6)
Dep. variable			Receipt of aid			
year facility established	0.002					
	(.006)					
year establ. renovated		−.000				
		(.003)				
access to telephone			0.129			
			(.381)			
access to newspaper			−.017			
			(.192)			
access to radio			−.121			
			(.164)			
distance to subcounty HQ				−.015		
				(.020)		
distance to subcounty HQ				0.002		
				(.003)		
number of staff					0.009	
					(.017)	
qualified staff						−.019
						(.154)
Observations	42	44	44	43	44	44
R2	0.00	0.03	0.02	0.03	0.01	0.00

Notes: OLS regressions with standard errors in parenthesis, constant not reported.

Table 8b. NFP financial aid - recipients and nonrecipients

Regression	(7)	(8)	(9)	(10)
Dep. variable		Receipt of aid		
refrigerator	0.048			
	(.161)			
blood pressure equipment		-.079		
		(.222)		
microscope			0.255	
			(.152)	
protective clothes				0.000
				(.034)
Observations	44	44	44	44
R2	0.00	0.00	0.06	0.00

Notes: OLS regressions with standard errors in parenthesis, constant not reported.

Table 9. Financial aid

Regression	(1)	(2)	(3)	(4)	(5)
Dep. variable	Blood slides	Stool tests	OPD charges	Qualified staff	Nursing aides
NFP	–17.8	–12.7	–93	–32,316*	–1,602
	(10.8)	(9.8)	(528)	(18,523)	(10,378)
GOV	–25.0***	–15.5**	–1,972***	61,256***	42,713*
	(7.10)	(6.0)	(262)	(13,573)	(6,800)
NFP*AID	7.5E-6**	6.5E-6**	–3.1E-4**	–0.003	–0.002
	(3.4E-6)	(3.2E-6)	(1.5E-4)	(.005)	(.003)
GOV*AID	1.3E-6	–5.0E-6	1.6E-4	0.002	–0.005
	(6.7E-6)	(5.6E-6)	(9.2E-5)	(.008)	(.004)
District effects	Yes	Yes	Yes	Yes	Yes
LR	31.2	39.6	37.2	24.8	113.3
	(.000)	(.000)	(.000)	(.003)	(.000)
Facilities	150	144	127	113	114
Observations	150	144	127	278	253
Adj. R2	0.43	0.40	0.82	0.90	0.93

Notes: See notes to table 3.

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