DISCUSSION PAPER SERIES

No. 4214

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PUBLIC POLICY

Centre for Economic Policy Research

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Available online at: **www.cepr.org/pubs/dps/DP4214.asp**

ISSN 0265-8003

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Discussion Paper No. 4214
January 2004

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CEPR Discussion Paper No. 4214

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ABSTRACT

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This Paper exploits a unique micro-level dataset on primary health care facilities in Uganda to address the question: What motivates religious not-for-profit (RNFP) health care providers? We use two approaches to identify whether an altruistic (religious) effect exists in the data. First, exploiting the cross-section variation, we show that RNFP facilities hire qualified medical staff below the market wage; are more likely to provide pro-poor 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. RNFP 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 RNFP are driven (partly) by altruistic (religious) concerns and that these preferences matter quantitatively. Second, we exploit a near natural experiment in which the government initiated a program of financial aid for the RNFP sector, and show that financial aid leads to more laboratory testing of suspected malaria and intestinal worm cases, and hence higher quality of service, and to lower user charges. These findings suggest that working for God matters.

JEL Classification: H39, I11 and L31
Keywords: altruism, financial aid, natural experiment and religious not-for-profit health care providers

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*We are grateful for comments and suggestions by James Adams, Markus Goldstein, Daniele Guisti, Michael Kremer, Magnus Lindelöw, Peter Okwero, Per Pettersson-Lidbom, Tomas Philipson, Halsey Rogers, Rob Yates, and seminar participants at the World Bank and IIES, Stockholm University. We also thank Makerere Institute of Social Research for their assistance in survey implementation. Financial support from the Japanese Policy and Human Resources Development Fund (PHRD) grant is gratefully acknowledged. The findings, interpretations, and conclusions expressed in this Paper are those of the authors and do not necessarily represent the views of the World Bank, its Executive Directors, or the governments they represent.

Submitted 15 August 2003

1 Introduction

In many developing countries, particularly in Sub-Saharan Africa and Latin America, religiously based not-for-profit organizations play an important role in the provision of social services. The stated goal of these providers are typically altruistic in nature. However, in many poor countries there is limited or no regulation or monitoring of the not-for-profit sector, raising concern that the actual situation on the ground may be quite different from the stated objectives.

In this paper we exploit a unique data set on service delivery of government, private for-profit, and private not-for-profit (religious) providers of primary health care in Uganda. We use the data to distinguish between two alternative theories of the religious not-for-profit (RNFP) provider behavior: (i) workers and managers of RNFP health facilities are intrinsically motivated to serve poor people; and (ii) RNFP providers are captured by their managers and /or workers and behave like a for-profit actor, although it cannot directly appropriate profits. Thus, any surplus must be used to finance perks (wages and perquisites) for the management and/or staff.[1]

To guide the empirical work, we set up a simple model on service provision and solve the model under the two hypotheses laid out above. The model yields a joint set of predictions on price setting, wages, service mix and quality choice conditional on preferences. We also explore the effects of financial aid in this framework and show that the impact on price setting and quality choice crucially depends on the assumption of objectives.

We take two approaches to identify whether religious affiliation matters. The first builds on the presumption that we can identify the behavior of the RNFP providers by comparing their performance in various dimensions with private for-profit and government 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 (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 RNFP.

One concern with the cross-section approach is that there may be unob-

[1] Glaeser (2002) argues that weak board control may be just as important as differential tax privileges, donations, and nondistribution constraint in explaining the behavior of not-for-profit firms. Thus capture by managers is not specific to not-for-profits in 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 in spirit to the Pauly and Redisch (1973) view of hospitals as physicians' cooperatives.

served (by the econometrician) quality differences across owners. The second approach avoids this problem by exploiting a near natural policy experiment of public financial aid for the not-for-profit sector.[2] In fiscal year 1999/2000, the survey year, the government initiated a program in which every not-for-profit primary health unit was to receive an untied grant. As this was a new and unanticipated program and due to poor communication from 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 variation (across RNFPs) that we can exploit to identify the objectives of RNFP providers.

In the cross section, we find that religious not-for-profit facilities hire qualified medical staff below the market wage. Moreover, RNFP 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 the hypothesis that RNFP workers and managers have intrinsic motivations to serve poor people.[3] 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!

This paper is related to a large literature on the behavior of not-for-profit firms or organizations in the developed world, especially in the United States.[4] Our work differs in three dimensions. First, we explicitly consider religious not-for-profit providers, rather than the more comprehensive notion of not-for-profits. Second, we use quantitative survey data of different aspects of ser-

[2] 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.

[3] These intrinsic motivations may in turn be driven either by altruistic preferences and/or a religious call to serve people in need. See further discussion in section 8.

[4] 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, the empirical evidence is mixed (Malani, Philipson, and David 2002; McClellan and Staiger 2000; Philipson 2000; Rose-Ackerman 1996; Sloan and others 1998).

vice delivery from a poor developing country. Finally, as not-for-profit primary health care providers in Uganda are not regulated; have no obvious tax advantages over private for-profit firms and, until 1999/2000 (the fiscal year for which we have data), benefited only marginally from donations or other financial support, we circumvent an important identification problem that has rendered it difficult to test altruistic models using U.S. data.[5]

The rest of the paper is organized as follows. Section 2 describes the institutional setting of health care in Uganda, including ownership 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 well-functioning health services 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 health care the burden was taken up by the private for-profit sector and faith-based providers. The latter were able to mobilize external resources to provide limited services (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, the government implemented a major program of health infrastructure

[5]The problem is that the type of ownership may be endogenous. A non-altruistic entrepreneur may choose a not-for-profit status and locate in a poor neighborhood if she expects to benefit from, for example, charitable donations as a consequence of this ownership/location choice. Thus, although the ownership/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). Due to the absence of regulation and tax benefits, and minimal donations, such incentives do not play an important role in Uganda. Thus, prior to 1999/2000, there were no obvious advantages for a nonaltruistic entrepreneur to choose a not-for-profit status. Of course, the lack of regulation and monitoring still raises the concern 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. This is one of the hypothesis we test.

rehabilitation in the public sector in the 1990s. This coincided with political, administrative, and financial decentralization, which led to slow growth in 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 health infrastructure, which is reflected in the continued high demand for privately provided care (Hutchinson 2001). Some health indicators have improved, but others have not. Specifically, the infant mortality rate stagnated during the latter half of the 1990s at 88 deaths per 1,000 live births (Republic of Uganda 2002, Moeller 2002).

The modern health sector in Uganda has four types of facilities: hospitals, health centers, dispensaries, and aid posts. These facilities can be owned and operated by the government, private for-profit, or not-for-profit sector. The health facility survey we exploit in this paper has the dispensary (with or without a maternity unit) as the unit of observation. Dispensaries are the most common health facilities 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). A dispensary is suppose to have eight beds for inpatient care and to serve a population of 20,000. Dispensaries are usually not expected to have a medical doctor (although some do), and are managed either by a clinical officer or a comprehensive or registered nurse.

2.1 Ownership of health facilities

The *private not-for-profit* health sector in Uganda consists of religious and non-religious providers. The first ever census on the not-for-profit health care 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 local churches and missionaries have set up hospital and health centers throughout the country.[6] At their

[6]Since expatriates were not allowed to own fixed assets, missionaries established the units

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-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 manager 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.

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).

Private for-profit practice also began decades ago, first 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,[7] and little systematic information is available on these providers. Many medical professionals working in the public sector are believed also to have a private practice to earn extra income (McPake and others 1999), but factual evidence of the extent of this practice, particularly in the case of dispensaries, is limited.

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; setting staffing norms; supplying pharmaceuticals, vaccines, and equipment; and directing 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. Due to a variety of factors, such as difficulties in recruitment of qualified medical staff, and the availability of funding, the actual situation on the ground may vary considerably from the set

in the name of the local diocese or parish.

[7] 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.

standards.

Finally, while all health care providers are exempt from the value added tax, private for-profit providers 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), private for-profit dispensaries are de facto tax exempt. As mentioned earlier, religious not-for-profit providers are exempt from income tax.

2.2 Financial aid for nonprofits

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 service delivery 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 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 umbrella organization.

Over time, the importance of external donations declined. In our sample 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 1999/2000.[9]

In 1997 the government reinstated financial aid to hospitals. In fiscal year 1999/2000 a new program extended a similar subsidy to lower-level health units. The financial aid program prescribed that every not-for-profit unit was to receive a fixed-amount grant for the fiscal year. The amount of the grant varied according to the level of the health facility. 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). Administrative problems in getting the program for lower-level units off the ground are

[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.

[9] As stressed above, donations were more important in the 1970s and 1980s, as well as at the start-up phase of a new health facility, 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 had received financial support from private and/or donor sources.

discussed in section 7.

3 Conceptual framework

Next we lay out a simple framework to analyze the 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 that the not-for-profit provider acts exactly like a profit-maximizer. In the second version, we assume the constraint binds, in which case the not-for-profit provider maximizes perquisites instead. The third model assumes that the 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. 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 non-pecuniary gains of worker j 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

[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.

[11] The assumption of excess demand of workers by the public sector at (the administratively set) wage $\bar{w}$, is a good approximation of the health labor market for qualified staff in Uganda given the economywide shortage of qualified medical staff (Okello and others 1998).

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 non-pecuniary gains from 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 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.

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

$$P(x_s^*)x_s^* - \bar{w} - cx_s^* > 0. \tag{3}$$

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 non-pecuniary gains of working in a perquisites-maximizing not-for-profit facilities;

that is, $\delta_j = 0$. Its maximization problem is thus,

$$\max \alpha \sum^{S_i} \left[P(x_s)x_s - \bar{w} - cx_s \right] \ . \tag{4}$$

Clearly, the first-order condition of activity s, and the non-negative profit constraint are identical to (2) and (3). 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 $\sum^{S_i} \left[P(x_s)x_s - w - cx_s \right] \geq 0$.

Consider first the choice of workers. A manager for an altruistic facility will try to hire workers who have a bias toward working in a not-for-profit facility (i.e., workers with an intrinsic motivation to serve poor people). 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 $\underline{w} = u^{-1} \left[u(\bar{w}) - \delta \right]$. Note that $\underline{w} < \bar{w}$. Thus, the not-for-profit facility will exploit the workers' non-pecuniary benefits 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,

$$L = \sum^{S_i} x_s + \lambda \left(\sum^{S_i} \left[P(x_s)x_s - \underline{w} - cx_s \right] \right) \ , \tag{5}$$

where λ is the Lagrange multiplier. Maximizing the Lagrange function yields

the following first order conditions,

$$1 + \lambda \left[P(x_s) \left[1 - \frac{1}{\epsilon_s} \right] - c \right] \leq 0 \ \ \forall s \in S_i \tag{6}$$

and

$$\sum^{S_i} \left[P(x_s)x_s - \underline{w} - cx_s \right] = 0 \ . \tag{7}$$

Equation (6) implies that 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 (7), 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 further 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.

Finally, (6) and (7) imply that an altruistic provider may cross-subsidize services and therefore will tend to provide a broader range of 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 (3) does not hold, an altruistic provider may do so in order to increase the total number of patients treated. The lower wage cost will also make it more likely that altruistic unit provides a broader range of services.

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 non-pecuniary (effort) costs. Total cash profit is now $\pi = \sum^{S_i} \left[P(x_s, q)x_s - w_s - cx_s - C(q) \right]$, where $C_q(q) > 0$ and $C_{qq}(q) > 0$. The manager must also bear a non-pecuniary 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 (8),

$$-\gamma_q(q) + \sum^{S_i} P_q(x_s, q)x_s - C_q(q) \leq 0 \,. \tag{8}$$

The two first-order conditions (8) 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

$$-\gamma_q(q) + \alpha\left(\sum^{S_i} P_q(x_s, q)x_s - C_q(q)\right) \leq 0 \,. \tag{9}$$

Totally differentiating the first-order conditions (9) and (2), using the implicit function theorem (see appendix), it is easy 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 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 (6), (10) and (11).

$$-\gamma_q(q) - \lambda\left(\sum^{S_i} P_q(x_s, q)x_s - C_q(q)\right) \leq 0 \tag{10}$$

$$\sum^{S_i} [P(x_s, q)x_s - \underline{w} - cx_s] - C(q) \leq 0 \tag{11}$$

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.

[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.

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 ex post by 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 $C_{qq} > 0$. As in Glaeser and Shleifer (2001), the manager must bear a non-financial cost of $\beta(q^e - q)$ of shirking on quality.

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

$$-\alpha C_q(q)\left(\sum^{S_i} x_s\right) + \beta \leq 0 \ . \tag{12}$$

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 (12), with $\alpha = 1$.

Total differentiating (12) 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 Empirical 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,

$$y_{is} = \beta_0^y + \beta_{NP}^y NP_i + \beta_{FP}^y FP_i + \varepsilon_{is} \tag{13}$$

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 (13) 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 $\beta_{NP}^s > \beta_{FP}^s$, $\beta_{NP}^p < \beta_{FP}^p$, and $\beta_{NP}^w < \beta_{FP}^w$.

Endogenizing cost and allowing facilities to also choose quality make 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 $\beta_{NP}^s > \beta_{FP}^s$, $\beta_{NP}^p < \beta_{FP}^p$, $\beta_{NP}^w < \beta_{FP}^w$ and $\beta_{NP}^q \geq \beta_{FP}^q$. 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 (13), 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,

$$y_{is} = \beta_0^y + \beta_{NP}^y NP_i + \beta_{FP}^y FP_i + \boldsymbol{\beta}_3^{y\prime} \mathbf{X}_{is} + \varepsilon_{is} \tag{14}$$

where $\mathbf{X}_{is}$ 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 correlated with location that drives any observable differences in outcome, could present a difficult identification problem. However, in practice it is less of a concern. 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, would maximize profits. The reduced form approach of studying the relationship between ownership and outcomes is valid as long as we attempt to measure underlying objectives (preferences).

5 Data

Tools to collect data and analyze service provider behavior include 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 respects (Dehn, Reinikka, and Svensson 2003). First, unlike most other surveys, the

service provider is the key unit of analysis. In household surveys that include facility modules, the perspective is that of the household rather than the service provider (Lindelöw and Wagstaff 2003). Consequently, while finding proxies for service quality, they pay little attention to the question of why quality of services is the way it is. 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. Information supplied by informants is 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. 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, as much of public expenditure incidence analysis does, 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 to report) key data. These incentives derive from the fact that information provided by, for example, a health facility may partly determine its public funding. Also, in case resources (including staff time) are used for other purposes (for instance in the case of shirking or 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. First, data are collected using a multi-angular data collection strategy; that is, a combination of information from different sources. Specifically, data on the Ugandan health facilities were collected both at the district and health facility level, as well as from patients using an exit poll. Second, data sources that are least influenced by misreporting were identified. For this reason, the data are obtained directly from the records kept by facilities for their own needs (such as 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).

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 and the survey is provided in the appendix (see also Lindelöw, Reinikka, and Svensson 2003).

The sample is restricted to dispensaries and dispensaries with maternity units in order to ensure a degree of homogeneity across facilities. The sample includes facilities from the three 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 nonprofits 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.

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] 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

[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.

[15] In 1999/2000, the lunch allowance for public sector employees was supposed to be 66,000 shillings per month for health care professionals and 44,000 for support staff. In the following year, the lunch allowance was formally rolled up into public sector salaries and is no longer regarded as a separate item. The qualitative results are similar if we use the more narrow measure for salary, excluding lunch allowances.

remote 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 number of competitors 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.[16] 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 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. These two 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

[16] 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).

therefore not be able to accept a lower pay.

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, we can quantify how important this experience bias might be, since we have information on the salary scale for medical personnel in government health facilities.[17] 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 case 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 one-fifth of the difference in the observed wage differential between government (and for-profit) and not-for-profit providers.

The finding that government pays higher salaries is surprising, as the commonly held view in Uganda is that public sector pay is well below the private sector, including health care professionals. For example, a pay comparator study underpinning 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 start contrast to this, at least in the case of lower-level health facilities.

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. The results are illustrated in Figure 1. 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

[17] 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.

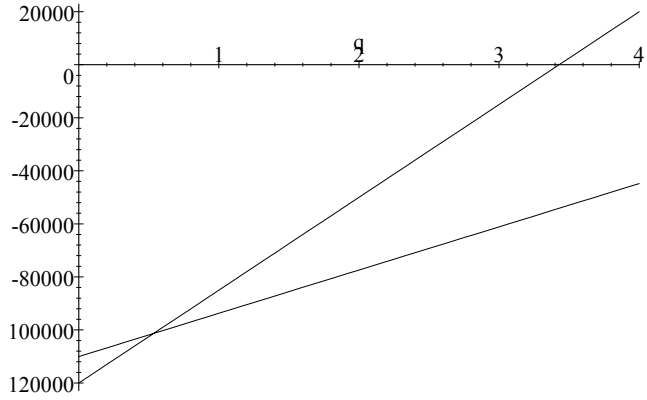

Figure 1: Salaries in relation to government units in for-profit (thin line) and not-for-profit (thick line) facilities conditional on qualification.

are paid significantly less than their for-profit counterparts. Hence, the religious premium in pay, shown in Figure 1 as the vertical difference between the two positively sloped line, falls largely on the most qualified medical staff.

6.2 Mix of 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).[18] All facilities are providing general outpatient services (OPD). From Table 3, it is possible to identify two broad sets of services. The first group includes in-patient care, medical care, laboratory services, and immunization.[19] 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.[20]

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

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

[20] Immunization is a special service from the individual facility perspective. The national

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 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 latter is more likely to do 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 in their profit potential, the extent to which they benefit the poor, and in their public good nature. In general, inpatient 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.

immunization program (UNEPI) sets countywide standards for immunization services and manages the program vertically 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.

6.3 Price setting

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 three 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), 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 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 equipment to measure blood pressure. 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 services being provided.

The last result on quality choices is based on information on why the patient had chosen to visit the facility where she was interviewed (from exit polls). 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. Not surprisingly, facilities without qualified staff are less likely to be visited for quality reasons.[21]

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 (14) is whether the selection-on-observables assumption is plausible. There might be unobserved variables that are related to both the dependent variable y and the ownership indicators. In particular, there may be unobserved (by the econometrician) quality differences across owners. 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 2.2, the financial aid program for dispensaries was initiated by the government of Uganda in 1999/2000 and prescribed that every

[21] Results are available upon request.

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), which 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 and lack of information. As the system of providing financial aid for not-for-profit units was new, this pattern was not surprising. The outcome for 1999/2000 was that some units did not receive their entitlement. Instead their first grant reached them the following fiscal year. Thus, de facto the grant program was phased in. It is this variation in receipts 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 (14). 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 the transfer and dependent variable y), we can check if the groups of grant recipients and nonrecipients differ on observables.

Tables 7a and 7b 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 (denoted *receipt of aid*).[22] 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). 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).[23]

[22] We allow a 10 % variation between entitled and received funds. That is, a facility is considered a recipient (dummy=1) if it received at least 90 % of its entitlement.

[23] Although the groups of facilities do not differ in observables, they may still differ in some

The reason we use the variation in grant receipts 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 be affected. Formally, with aid, the facility maximizes,

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

where a is aid or 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 number of people treated using both strategies.

While religious not-for-profit facilities receive financial aid from public sources, no for-profit facility did.[24] 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.

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 8, 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 tests, on average, 24 more patients out of every 100 suspected malaria case.

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 deliveries), we find no impact of financial aid. However, as depicted in Regression 3, financial aid is negatively correlated with OPD user charges.

unobserved dimension. However, this unobserved dimension must then be uncorrelated with the set of observable characteristics reported in Table 7.

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

A religious not-for-profit provider with the median grant receipt charge, on average, 900 Ush less for general OPD.

Calculating the foregone revenues of the price cut and the increased cost of testing for malaria and intestinal worms suggests that the cost for the median facility is approximately 2.3 million Ush, or 68 percent of the total grant.[25]

Finally, we analyze 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).

A concern with the regression results in Table 8 is that we explore both the variation created by the de facto phasing-in of the grant program (i.e. between recipients in 1999/2000 and recipients in the following year) as well as the variation in actual receipts across grant-receiving providers (although it seems plausible to assume that this second source of variation is also random). Table 9 depicts IV-regressions, using the binary *receipt of aid* variable discussed above as instrument. The coefficients in the laboratory testing regressions increase and are highly significant in both the testing for malaria and intestinal worms cases. The coefficient on user fees also remains significant. There is still no significant relationship between aid and remuneration.

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, as we have argued above, 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 (RNFP) health care providers. To identify these objectives 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 for-profit and government providers. The second approach relies on a near natural policy experiment of public financial aid for the not-for-profit sector. The findings from both approaches point in the same direction and suggest that RNFP workers and managers have intrinsic motivations to serve poor people.

[25] The calculation is based on the assumption that the price cut resulted in a 10 percent increase in the number of patients and that the grants were received with a three-month delay. Assuming no delay in grant receipts, the reduced charges and additional cost of testing account for 91 percent of the grant. Assuming six-month delay in grant receipts, the reduced charges and additional cost of testing account for 46 percent of the grant.

It is worth pointing out what we have not measured 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 are also altruistic and therefore they (partly) internalize the stated goals of the owner. 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 improving 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 a better environment). 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 objectives are not altruistic, 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 salary) and benefits (e.g., pensions) are 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 and the survey

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 not-for-profit 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 not-for-profit, and private for-profit facilities, but is known to be inaccurate with respect to the latter. 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.[26] 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.[27]

From the selected districts, a sample of government and private nonprofit 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.[28] The administrative records for facilities in the original sample were reviewed first at the district headquarters, where some facilities that did not meet the selection criteria and data collection requirements were dropped from the sample. These were replaced by facilities from the reserve list. Overall 30

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

[27] 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.

[28] 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.

facilities were replaced.

At the district level, the district director of health services was interviewed to obtain information on health infrastructure, staff, supervision arrangements, and finance. Data were also collected from the district records on each health unit included in the survey.

At the facility level, the manager in charge of the health unit was interviewed and data were collected from medical, patient, and financial records, stock cards, etc. An exit poll was carried out to interview about 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 an alternative source of health care. Survey instruments, data sheets, and the sampling note are available at www.publicspending.org (tools).

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 (9) and (2)),

$$F(p,q;\alpha) = \alpha\left(x + (p-c)\,X_p(p,q)\right) = 0 \tag{15}$$

$$G(p,q;\alpha) = \alpha\left(pX_q(p,q) - cX_q(p,q) - C_q\right) - \gamma_q = 0 \tag{16}$$

Total differentiate F and G to get

$$\begin{bmatrix} F_p & F_q \\ G_p & G_q \end{bmatrix} \begin{bmatrix} P_\alpha \\ Q_\alpha \end{bmatrix} = \begin{bmatrix} -F_\alpha \\ -G_\alpha \end{bmatrix}$$

where $F_x = dF/dx$. Thus,

$$P_\alpha = \frac{1}{\Delta} F_q G_\alpha > 0 \tag{17}$$

$$Q_\alpha = -\frac{1}{\Delta} F_p G_\alpha > 0 \tag{18}$$

since $F_q = \alpha\left(X_q + (p-c)X_{pq}\right) > 0$, $G_\alpha = \gamma_q/\alpha > 0$ (from (16)), and $\Delta > 0$, $F_p < 0$ (by the second order conditions), and where we have used the fact that $F_\alpha = 0$ (follows from (16)).

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.

$$F(\lambda, p, q; a) = a + pX(p,q) - w - cX(p,q) - C(q) = 0 \tag{19}$$

$$G(\lambda, p, q; a) = X_p(p,q) + \lambda \left(X(p,q) + (p-c)X_p(p,q) \right) = 0 \tag{20}$$

$$H(\lambda, p, q; a) = X_q(p,q) + \lambda \left((p-c)X_q(p,q) - C_q \right) = 0. \tag{21}$$

Total differentiate (19)-(21) to get

$$\begin{bmatrix} 0 & F_p & F_q \\ F_p & G_p & G_q \\ F_q & G_q & H_q \end{bmatrix} \begin{bmatrix} \lambda_a \\ P_a \\ Q_a \end{bmatrix} = \begin{bmatrix} -F_a \\ -G_a \\ -H_a \end{bmatrix} .$$

The second-order condition for a constrained optimum is

$$\Delta \equiv F_q \left[F_p G_q - F_q G_p \right] + F_p \left[G_q F_q - F_p H_q \right] > 0. \tag{22}$$

Since $F_q = -X_q/\lambda < 0$ (from (21)) and $F_p = -X_p/\lambda > 0$ (from (20)), a sufficient condition for an optimum is that the first term in brackets in (22) is negative and the second term is positive. Assume that is the case. By the implicit function theorem we have,

$$P_a = -\frac{1}{\Delta} \left[G_q F_q - F_p H_q \right] < 0 \tag{23}$$

$$Q_a = -\frac{1}{\Delta} \left[F_p G_q - F_q G_p \right] > 0 \tag{24}$$

where it follows from (22) that the term in brackets in (23) is positive while the term in brackets in (24) 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 officers	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
	29	35	22	22
	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
	4.1	4.4	3.9	3.8
Competition (number of other health care providers)	1.7	1.2	1.8	3.2
	1.0	1.0	1.0	2.0
	2.0	1.3	1.7	3.0
No. outpatients per month	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
Basic model	$\beta_{NP}^{s} = \beta_{FP}^{s}$	$\beta_{NP}^{s} > \beta_{FP}^{s}$
	$\beta_{NP}^{p} = \beta_{FP}^{p}$	$\beta_{NP}^{p} < \beta_{FP}^{p}$
	$\beta_{NP}^{w} = \beta_{FP}^{w}$	$\beta_{NP}^{w} < \beta_{FP}^{w}$
		$\beta_{NP}^{s} > \beta_{FP}^{s}$
Endogenous costs	$\beta_{NP}^{p} > \beta_{FP}^{p}$	$\beta_{NP}^{p} < \beta_{FP}^{p}$
	$\beta_{NP}^{w} = \beta_{FP}^{w}$	$\beta_{NP}^{w} < \beta_{FP}^{w}$
	$\beta_{NP}^{s} < \beta_{FP}^{s}$	$\beta_{NP}^{s} > \beta_{FP}^{s}$
	$\beta_{NP}^{p} < \beta_{FP}^{p}$	
Endogenous quality	$\beta_{NP}^{w} = \beta_{FP}^{w}$	$\beta_{NP}^{w} < \beta_{FP}^{w}$
	$\beta_{NP}^{q} < \beta_{FP}^{q}$	

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, with p-values in brackets.
LR is likelihood ratio test statistic for testing the null hypothesis that all district effects equal, with p-values in brackets.

Table 3a. Mix of services

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, with p-values in brackets.
LR is likelihood ratio test statistic for testing null hypothesis that all district effects equal, with p-values in brackets.

Table 3b. Mix of services

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 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 – laboratory testing

Regression	(1)	(2)	(3)	(4)
Dep. variable	Blood slides	Blood slides	Stool tests	Stool tests
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 – health infrastructure and equipment

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 7a. RNFP financial aid – recipients and nonrecipients

Regression	(1)	(2)	(3)	(4)	(5)	(6)
Dep. variable	Receipt of aid					
year facility established	–0.004					
	(.006)					
year establ. renovated		–.000				
		(.002)				
access to telephone			0.440			
			(.513)			
access to newspaper			0.081			
			(.193)			
access to radio			–.118			
			(.164)			
distance to subcounty HQ				0.002		
				(.022)		
distance to subcounty HQ				–.000		
				(.003)		
number of staff					0.024	
					(.017)	
qualified staff						0.122
						(.155)
Observations	39	41	41	40	41	41
R2	0.01	0.01	0.03	0.00	0.02	0.02

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

Table 7b. RNFP financial aid - recipients and nonrecipients

Regression	(7)	(8)	(9)	(10)
Dep. variable		Receipt of aid		
refrigerator	–.156			
	(.158)			
blood pressure equipment		0.157		
		(.217)		
microscope			0.015	
			(.158)	
protective clothes				–.201
				(.151)
Observations	41	41	41	41
R2	0.02	0.01	0.00	0.04

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

Table 8. Financial aid to RNFP dispensaries

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)
Controls	Yes	Yes	Yes	Yes	Yes
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.

Table 9. Financial aid: IV-regressions

Regression	(1)	(2)	(3)
Dep. variable	Blood slides	Stool tests	OPD charges
NFP	–24.2	–16.4	–73
	(11.6)	(10.2)	(382)
GOV	–25.1***	–15.6***	–1,974***
	(7.12)	(5.9)	(226)
NFP*AID	1.0E-5***	8.0E-6**	–2.3E-4*
	(3.9E-6)	(3.8E-6)	(1.3E-4)
District effects	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Facilities	150	144	127
Observations	150	144	127

Notes: See notes to table 3. 2SLS regression with *receipt of aid* as instrument.