Working for God?

Evidence from a change in financing of not-for-profit health care providers in Uganda

Preliminary and incomplete draft: May 2006

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What motivates religious not-for-profit health care providers? This paper uses a change in financing of not-for-profit health care providers in Uganda to test two theories of organizational behavior. We show that financial aid leads to more laboratory testing, lower user charges, and increased utilization. These findings are consistent with the view that religious not-for-profit providers are intrinsically motivated to serve (poor) people and that these preferences matter quantitatively.

We 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.

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1 Introduction

What motivates religious not-for-profit health care providers? In many developing countries, particularly in Sub-Saharan Africa and Latin America, religious not-for-profit organizations play an important role in the provision of social services. The stated goal of these providers is 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 may be quite different from the stated objectives.

In this paper we exploit a unique data set on service delivery of not-for-profit (religious) providers of primary health care in Uganda. We use the data to distinguish between two alternative theories of religious not-for-profit (RNFP) provider behavior:

> (i) workers and managers of RNFP health facilities are intrinsically motivated to serve (poor) people;
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> (ii) RNFP providers are captured by their managers and/or workers and behave like for-profit actors, although they may not directly appropriate profits. Any surplus is thus 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. The model predicts that the effects of financial aid on price setting and quality choice depend on the assumption of the provider's objectives. Specifically, an "altruistic" RNFP facility that cares about the number of (poor) people treated would reduce user-fees and increase the quality of care in response to untied financial aid. However, such aid would not affect a perquisite-maximizing not-for-profit provider's price or quality choice.

Most of the existing empirical literature on organizational behavior of the not-for-profit sector relies on comparing not-for-profit organizations in various dimensions with other provides (private for-profit and/or government providers), controlling for other confounding observable characteristics. A concern with such an approach is that there may be unobserved (by the econometrician) quality differences across owners. In this paper, on the contrary, we use a change in financing of the not-for-profit health care providers

[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 Ugandan primary health care (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.

to distinguish between these theories.[2] In fiscal year 1999/2000, the government of Uganda 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 communications from the government's part, some facilities did not receive their grant until the following year. This de facto phasing-in of the aid program provides a source of variation that we can exploit to identify the objectives of RNFP providers.

The concern with this approach is that there might be differences across early and late recipients that in turn are correlated with outcomes. On observable characteristics, however, that seems not to be the case. The group of early recipients are statistically indistinguishable from the late recipients. The groups may still differ in unobservables ways from each other. To account for this, we use a difference-in-difference approach, exploiting that fact that in fiscal year 2000/2001 and forward, all surveyed health units received the grant.

We find that financial aid leads to more testing of suspected malaria cases, lower prices and increased utilization. Aid has no effect on remuneration. The estimated effects are quantitatively important. These findings are consistent with the view that religious not-for-profit providers are intrinsically motivated to serve (poor) people; i.e., working for God seems to matter!

This paper is related to a large literature on the behavior of not-for-profit firms in the developed world, especially in the United States.[3] Our work differs in several 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 service delivery from a poor developing country. Third, as not-for-profit health care providers in Uganda are not regulated; have no obvious tax advantages over

[2] Duggan (2000) also studies the diffential response of not-for-profit versus for-profit 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] 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, the empirical evidence is mixed (Malani, Philipson, and David 2002; McClellan and Staiger 2000; Philipson 2000; Rose-Ackerman 1996; Sloan and others 1998).

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.[4] Finally, we exploit a change in the financial incentives extended to the RNFP facilities to identify the objectives of religious providers.

The rest of the paper is organized as follows. Section 2 describes the institutional setting of health care in Uganda. Sections 3 presents a simple model of behavior of the religious not-for-profit health facility. In section 4 we discuss identification. Section 5 briefly describes the survey data. Some descriptive statistics are discussed in section 6. Section 7 presents the evidence and section 8 concludes.

2 Institutional setting

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 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 pub-

[4]The problem is that the type of ownership may be endogenous. A nonaltruistic entrepreneur may choose a not-for-profit status and locate in a poor neighborhood if she expects to benefit, for example, from 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. Due to the absence of regulation and tax benefits, and minimal donations, such incentives do not play an important role in Uganda. Prior to 1999/2000, there were no obvious advantages for a nonaltruistic entrepreneur to choose the not-for-profit status. Of course, the lack of regulation and monitoring still raises the concern that preferences of the owner (say, a Catholic parish) and the manager may differ. In particular, the facility may be captured by the manager whose objectives are different from those of the owner. This is one of the hypothesis we test.

lic 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.

The private not-for-profit health sector consists of religious and nonreligious providers. The 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 individuals (8 percent). The census also shows that most not-for-profit health facilities (82 percent) are coordinated by one of three national umbrella organizations

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.[5] In the

[5]Today all types of health-care providers can purchase drugs from the joint medical

early 1970s, the Uganda Muslim Supreme Council also established a similar umbrella organization.

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. At their departure, missionaries handed over the management to the local church (diocese or parish). In the last three decades, as new parishes were established, they routinely set up their own social services, particularly health care. Typically, parishioners contributed to the investment cost, sometimes aided by donations from the medical 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 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 prices of services provided by the facility.

It is worth noting that the institutional structure of the not-for-profit sector is considerably different from that of government. Importantly, the medical bureaux operated by various religious denominations do not have administrative authority over the individual units or owners.

The importance of external donations have been declining. 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.[6]

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).

3 Conceptual framework

store and hence take advantage of its bulk purchase prices.

[6] 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.

In this section we develop a simple model of not-for-profit behavior. The model is solved under two alternative assumptions of the preferences of the not-for-profit unit. The first set up assumes the religious not-for-profit facility is captured by a nonaltruistic manager(s) (or that the owner has no altruistic concerns). The manager may face a nondistribution constraint, in which case profits must be spent on perquisites. The second set up instead assumes that the religious not-for-profit facilities maximize the total health impact of its activities, here conceptualized as the number of patients treated.[7]

3.1 Basics

Consider the following simplified version of the model in Reinikka and Svensson (2004b). A manager for a not-for-profit facility (NFP) j faces the problem of determining the price and quality of a given health service. The inverse-demand function is $p = P(x, q)$ where p is the price, q is effort (quality), $P_x < 0$, $P_q > 0$ and $P_{xq} > 0$. Marginal cost is $c(q)$, where $c_q > 0$ and $c_{qq} > 0$. Let ϵ denote the elasticity of demand with respect to price. The facility is assumed to be a local monopolist.

3.2 The rent/profit maximizing not-for-profit facility

Total cash profits of facility j is $\pi = P(x, q)x - c(q)x$. 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 $\alpha \leq 1$ is a constant. If $\alpha = 1$, the manager's problem is identical to that of a profit-maximizing firm.

The manager's problem is to maximize

$$\max_{x,q} \alpha \left[P(x, q)x - c(q)x\right] \ . \tag{1}$$

3.3 The altruistic not-for-profit facility

Consider next an altruistic not-for-profit facility that maximize the total health impact of its activities. 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 x, subject to the constraint that $P(x, q)x - c(q)x \geq 0$.

3.4 The effects of financial aid

[7] 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.

Consider the case of untied financial support a. The total cash profits of facility i is then $\pi = P(x,q)x - c(q)x + a$. Since untied aid does not affect the marginal cost or revenue schedules, for a rent/profit maximizing provider price setting and quality choice would be unaffected. That is, a rent/profit maximizing provider will set the same price and quality with and without untied aid. Aid will only lead to increased rents, taking the form of higher profits or more perks, depending on if the nondistribution constraint binds or not.

The altruistic not-for-profit facility's maximization program would however be affected. Formally, with aid, the facility maximizes

$$\max_{x,q} L = x + \lambda \left(a + P(x,q)x - c(q)x \right) \ .$$

Solving the problem we can show (see appendix) that for an altruistic provider, aid will lead to lower prices 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.

To sum up, an altruistic provider will respond to the inflow of untied aid by lowering prices and increasing quality. As a result, more patients will be treated. The price and quality choices of a rent/profit maximizing provider are unaffected by the inflow of untied aid. This result forms the basis for the empirical test of the NFP sector.

4 Identification

The administrative design of the financial aid program involved three main actors, the NFP facility, the district health administration, and the Ministry of Finance (MoF). The financial aid program was under the authority of the MoF. Based on the register of NFP facilities and requests made by the district health administrations, the MoF was assigned to determine and approve the list of facilities entitled to funds. Once approved, funds were transferred to the local governments (districts), which in turn distributed the funds to the units concerned once the NFP facility's request for financial support and its workplan had been approved.

In theory, all NFP facilities should have received the funds in 1999/2000. In practice, however, there was variation in receipts. This was in spite of the fact that the umbrella organizations for not-for-profit health providers spent time and effort monitoring the program. In our sample of facilities, 37 percent of the NFP facilities 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 that we exploit to estimate the behavior of the NFP facilities.

Anecdotal evidence suggest that the reason why not all facilities received aid in 1999/2000 had to do with delays and administrative bottlenecks at both the MoF and the district health administrations. If these delays and administrative problems are idiosyncratic to the facilities, we could treat the incidence of aid receipt as random and link receipt of aid to outcomes. Likewise, if the delays are driven by observed features such as the distance to sub-county or district headquarters, we could simply run cross-section regressions with receipt of aid as explanatory variable.

However, it is plausible that the incidence of receipts is correlated with unobserved factors that may have an independent effect on outcomes. This would be the case if well-connected units (for example units that the health administration staff use and that may receive other types of support or are supervised more closely) or well-managed units (for example units with managers that can articulate its case to district officials) are more likely to be treated expeditiously.[8] Cross-sectional estimates will then produce biased conclusions about the effects of the aid transfer. A bias would also occur if the district administrations or the MoF made an effort to first provide aid to the facilities in most need.[9]

Our approach to deal with this omitted variables problem is to exploit the time dimension and the fact that in the following fiscal year all sampled facilities received the grant. If well-connected units, well-managed units, or units in most need of support were also well-connected or poor in the year following the intervention (financial aid), we can estimate the causal effects of aid through a difference-in-difference approach. Thus, we estimate

$$y_{jdt} = \alpha_d + \beta_1 \lambda_t + \beta_2 treatment_{jd} + \beta_3 treatment_{jd} \lambda_t + x_{jdt}\beta_3 + \mu_{jdt} \quad , \quad (2)$$

where α_d is fixed district effects, λ_t is a time dummy for the fiscal year 1999/2000 and $treatment$ indicates whether the facility is a treatment facility

[8] This is consistent with the finding in Reinikka and Svensson (2004a). They study the disbursements of grants across schools in Uganda and show that there are important school-specific effects that explain why some schools manage to claim their entitlments while other do not. They also show that schools in better-off communities are more likely to be able to claim funds from the center.

[9] This is consistent with the argument in Rosenzweig and Wolpin (1986). They show that if the allocation of public resources across localities (e.g., health units) is systematically related to factors determining the outcome, and these factors are unobserved by the researchers but known to the local provider, simple cross-sectional estimates will produce misleading conclusions about the program effectiveness.

(i.e., start receiving the grant in 1999/2000), and x is a vector of control variables that vary over time and across facilities.

A concern with the financial aid experiment is that RNFP facilities may be credit constrained. If that is the case, financial assistance, by relaxing a binding credit constraint, may result in changed behavior also for a rent or profit maximizing provider. We do not believe this is a serious concern. Foremost, as discussed below, we find no evidence of increased investment in the group of early recipients. Second, the financial aid program was designed to support not-for-profit providers' current expenditures (not for capital investment). Third, while access to credit may be a problem for these provider, it is unclear why a relaxed credit constraint and thus increased possibilities to invest, would result in lower prices and higher quality. Finally, to the extent that construction and/or procurement of capital goods take time, this would then to work against finding an effect. For example, if investments decisions in year t change the stock of capital in $t+1$ and provided that the choice of prices and quality is a function of the capital stock, then since we compare outcomes in t and $t+2$ and all facilities received aid in either t or $t+1$, then both in t and in $t+2$ the group of facilities are similar.

5 Data

The data that we use in this paper consists of two rounds of survey data from 155 randomly selected primary health care facilities drawn from 10 randomly chosen districts in Uganda (see appendix and Lindelöw, Reinikka, and Svensson, 2003, for details). The sample is restricted to dispensaries and dispensaries with maternity units in order to ensure a degree of homogeneity across facilities. It includes facilities from the three main ownership categories: government, private not-for-profit, and private for-profit. In our sample all nonprofits have religious affiliations.[10] The sample was designed so that the proportion of facilities drawn from different regions and ownership categories broadly mirrors the population of facilities. 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 Descriptive statistics

To be written. Discuss the cross section variation across ownership groups. Key findings: religious not-for-profit facilities hire qualified medical staff below the market wage. Moreover, RNFP are more likely to provide pro-poor

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

services and services with a public good element, and charge strictly lower prices for services than for-profit units.

7 Evidence

As discussed above, a concern with the financial aid experiment is that RNFP facilities may be credit constrained. We do not have data on investments. However, we have data on equipment (number of) and the working area (in square meters) of the facility at the end of the fiscal year 1999/2000. If financial assistance relaxed a binding credit constraint and thereby increased investment, presumably the group of early recipients would differ in available infrastructure at the end of the year. In Table 1 we report average values for a set of important inputs for both types of facilities (columns 2 and 3). The fourth column reports the F-statistic of the null hypothesis that the average values are equal. We cannot reject the joint hypothesis that the early and late grant recipients have, on average, the same number of examination beds, sterilization equipment, refrigeration equipment, blood pressure equipment, microscopes, sets of protective clothing, weighting scales, and working area. Looking at the individual inputs, only the number of weighting scales is significantly different between the two groups. These findings are difficult to reconcile with a credit constraint story.

Table 2 reports average values for a set of observable characteristics for both types of facilities. Row 2 shows that early grant recipients (treatment group) and late recipients (control group) do not differ significantly in age; i.e., the year the facility was established. The treatment and control groups are similar with respect to access to communication infrastructure (rows 3-5); i.e., a late recipient is as likely as an early recipient to have access to telephone, newspapers, and radio at the facility. The two group of facilities are also indistinguishable with respect to source of water supply (if the main source is piped water, borehole, or protected spring) and electricity.[11] We also do not find any significant differences in distance to district or health sub-district headquarters (rows 7-8); the estimated catchment population of the facility (row 9); and the number of staff and qualified staff in total (rows 9-10).[12] Thus, there is no (observable) evidence suggesting that the treatment and control groups differ on observable characteristics. However, the two groups of facilities may still differ in some unobserved dimension as

[11] All 44 facilities were either connected to the grid or had their own generator.

[12] 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).

discussed above. We turn next to this question.

In order to assess the effects of financial aid one must identify which potential variables might be affected by the inflow of money in a short time interval (no longer than a year). We look at three sets of variables that the facilities can easily adjust in the short run: testing procedures (quality), prices, and staff remuneration.

One important component in prescribing the correct treatment for malaria and intestinal worm cases is laboratory testing. We have information on the number of malaria blood slides carried out (for every 100 outpatient), and the number of stool tests undertaken (for every 100 outpatient).[13]

Table 3 reports the estimates from a simple difference-in-difference model with no time-varying controls on the number of malaria blood slides. The first column reports the percentage of patients tested in 2000, the second column reports the percentage of patients tested in 2003, and the third column reports the difference between them. The rows give averages (and standard errors) for the treatment group, the control group, and the differences between them. In 2003, when all facilities received the grant, there is no statistical difference in treatment practise across the two groups. In 2000, however, the year in which only the treatment group benefited from financial assistance, the treatment group on average tested almost 16 more patients out of 100 outpatient compared to the control group. The difference-in-differences estimate is 12.9 and is significant at the 5 percent level. The effect is quantitatively important. As reported in Table 3, the group of providers that did not receive aid in time tested on average 6.2 percent of the patients visiting the clinics.

Table 4 depicts the adjusted difference-in-difference estimates. In column 1, we report the simple difference-in-difference specification. In column 2, we add a set of time-varying controls, and in column 3 we allow for district fixed effects. The treatment effect (β_3) ranges from 12.9-14.0 and is significantly different from zero at the 5 percent level in all three specifications.

The adjusted difference-in-difference estimates on the number of stool-tests for every 100 suspected intestinal worm cases are reported in Table 5. The treatment effect (β_3) is positive but imprecisely estimated.

In the model, a provider with preferences defined over the number of (poor) people treated would cut prices in response to untied financial assistance. We turn next to assessing this prediction. Table 6 reports the findings on user-fee of general outpatient service (OPD). The treatment effect (β_3)

[13]Data on number of patients were collected from daily patient records. That is, enumerators calculated the number of patients visiting the clinic for a set of months. Number of malaria test are collected from daily laboratory records.

ranges from -576 to -610 and is significantly different from zero at the 5 percent level in all three specifications. That is, the group of early recipients charge on average 600 Ush less per visit. Again this is a large effect considering that the late-recipients in 2000 charged on average 2,385 Ush per visit (with a one-standard deviation equal to 438 Ush).

The price cut also resulted in an increase in patient numbers. Table 7 reports the findings on the log of number of outpatients per month. The treatment effect (β_3) ranges from an increase of 20 to 27 percent and again is fairly precisely estimated.

An altruistic provider will respond to the inflow of untied aid by lowering prices and increasing quality while a rent-maximizing facility with a binding nondistribution constraint would spend aid on perquisites and wages. The last set of regressions look at this prediction. The dependent variable in Table 8 is the full-time equivalent salary plus lunch allowances per month. Because staff composition may differ across units, we estimate four regressions, one for the average salary of all staff (column 1); one for the average salary of highly qualified staff (column 2); one for the average salary of qualified staff (column 3); and one for nursing aides (column 4).[14] We find no robust evidence of a relationship between grant receipt and staff remuneration.

Are the effects reported in table 3 - 8 quantitatively important? While it is difficult to provide a firm answer, a back-of-the-envelope calculation shows that the sum of the foregone revenues of the price cut and the increased cost of testing for malaria and intestinal worms account for approximately 62 percent of the grant for the median facility.[15]

9 Conclusion

What motivates religious not-for-profit health care providers? This paper uses a change in financing of not-for-profit health care providers in Uganda to test two theories of organizational behavior. We show that financial aid leads more laboratory testing, lower user charges and increased utilization, but we find no correlation between aid and remuneration. These findings are consistent with the view that religious not-for-profit providers are intrinsically motivated to serve (poor) people.

[14] *High qualified staff* include medical doctor, and clinical officer (A level and three years of medical training). *Qualified staff* include 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).

[15] The calculation is based on the assumption that the grant was received with no delay and a cost (including wage costs) of one dollar per test.

Since all the not-for-profit providers in our sample have religious affiliations, it is possible that the objective to serve (poor) people is driven by some deeper motivation to convert people. Distinguishing between these two objectives would require data also on nonreligious not-for-profit providers and a theory of conversion. We believe that this is an important area for future research.

A Appendix

A.1 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. Therefore, data 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) 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, 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 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.

A.2 Sample

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 captured regional differences. Finally, the sample included facilities from the main ownership categories: government, private not-for-profit and private for-profit providers.

These three considerations lead to 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 regarding 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.[16] From the remaining districts, 10 districts, stratified according to geographical location, 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.[17]

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.[18] The administrative records for facilities in the original sample were reviewed first at the district headquarters. Some facilities that did not meet the selection criteria and data collection requirements were dropped from the sample at that stage. These were replaced by facilities from the reserve list. Overall 30 facilities were replaced.

The second round of data collection was carried out in 2004. Data was collected for 2003, although for some variables we also collected information for 2001 and 2002.

A.3 Survey

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

[17] 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.

[18] 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.

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 of the health unit was interviewed and data were collected from medical, patient, and financial records, stock cards, etc. An exit poll interviewed about 10 patients in each facility. The exit poll covered cost of treatment, drugs received, perceived quality of services, and reasons for selecting this facility instead of an alternative.

A.5 Effects of financial aid

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.

$$F(\lambda, p, q; a) = a + pX(p,q) - w - cX(p,q) - C(q) = 0 \tag{3}$$

$$G(\lambda, p, q; a) = X_p(p,q) + \lambda \left(X(p,q) + (p-c)X_p(p,q) \right) = 0 \tag{4}$$

$$H(\lambda, p, q; a) = X_q(p,q) + \lambda \left((p-c)X_q(p,q) - C_q \right) = 0. \tag{5}$$

Total differentiate (3)-(5) 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

$$\Delta \equiv F_q \left[F_p G_q - F_q G_p \right] + F_p \left[G_q F_q - F_p H_q \right] > 0. \tag{6}$$

Since $F_q = -X_q/\lambda < 0$ (from (5)) and $F_p = -X_p/\lambda > 0$ (from (4)), a sufficient condition for an optimum is that the first term in brackets in (6) is negative and the second term is positive. Assume that is the case. By the implicit function theorem we have,

$$P_a = -\frac{1}{\Delta} \left[G_q F_q - F_p H_q \right] < 0 \tag{7}$$

$$Q_a = -\frac{1}{\Delta} \left[F_p G_q - F_q G_p \right] > 0 \tag{8}$$

where it follows from (6) that the term in brackets in (7) is positive while the term in brackets in (8) is negative.

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Table 1. Infrastructure (investment) of early and late grant recipients at the end of 2000

Variable	Early recipient	Late recipient	Difference
Examination beds	1.54	1.73	0.27 [.61]
Sterilization equipment	2.77	2.44	0.34 [.56]
Refrigeration equipment	0.65	0.78	0.53 [.47]
Blood pressure equipment	1.31	1.22	0.09 [.77]
Microscopes	0.81	0.67	0.40 [.53]
Sets of protective clothing	1.50	1.17	0.24 [.63]
Weighting scales	2.54	1.61	4.14 [.05]
Working area (square meters)	314	273	0.35 [.56]

Notes: (i) Mean values in columns (2) and (3). (ii) F-statistic of the null hypothesis that the average values are equal with P-values in brackets in column (4). Number of observations is 44.

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Table 2. Characteristics of early and late grant recipients

Variable	Early recipient	Late recipient	Difference
Established (year)	1978	1982	0.71 [.40]
Access to telephone	0.04	0.06	0.07 [.79]
Access to newspaper	0.23	0.22	0.00 [.95]
Access to radio	0.58	0.61	0.05 [.83]
Access to safe water supply	0.69	0.78	0.38 [.54]
Distance to district HQ (km)	27.3	29.6	0.09 [.77]
Distance to health sub-district HQ (km)	12.2	9.3	0.92 [.34]
Estimated catchment population	27,230	20,503	0.44 [.51]
Number of staff in total	8	7.1	0.43 [.51]
Number of qualified staff	2.5	2.3	0.13 [.72]

Notes: (i) Mean values in columns (2) and (3). (ii) F-statistic of the null hypothesis that the average values are equal with P-values in brackets in column (4). Number of observations is 44.

Table 3. Difference-in-difference estimates of early and late grant receipt on number of blood slides for every 100 outpatient

Group	Year		
No. observations: 81	2000	2003	2000-2003 difference
Early grant recipient	21.7**	18.0*	3.7
	(3.91)	(5.89)	(2.98)
Late grant recipient	6.2*	15.3*	-9.2
	(1.31)	(6.54)	(5.85)
Early-late difference	15.6**	2.7	12.9**
	(2.83)	(2.80)	(3.36)

Standard errors clustered by districts in parenthesis. * (**) [***] denotes significance at the 10 (5) [1] percent level.

Table 4. Adjusted difference-in-difference estimates of early and late grant receipt on number of blood slides for every 100 outpatient

Regression	(1)	(2)	(3)
Constant	15.3	20.9*	
	(6.54)	(6.96)	
Treatment year (2000)	-9.2	-10.5	-10.8
	(5.85)	(5.54)	(5.78)
Early grant recipient	2.7	1.7	3.6
	(2.80)	(1.91)	(3.18)
Early grant recipient*2000	12.9**	13.7**	14.0**
	(3.36)	(3.24)	(3.66)
Controls	No	Yes	Yes
District fixed effects	No	No	Yes
R^2	0.07	0.10	0.35
Facilities	81	81	81

Standard errors clustered by districts in parenthesis. * (**) [***] denotes significance at the 10 (5) [1] percent level. Time varying controls are the number of dispensaries and health centers in the facility's catchment area; weighting scales; and number of staff.

Table 5. Adjusted difference-in-difference estimates of early and late grant receipt on number of stool tests undertaken for every 100 outpatient

Regression	(1)	(2)	(3)
Constant	6.6**	9.6**	
	(1.47)	(2.80)	
Treatment year (2000)	4.0	3.5*	3.3*
	(1.77)	(1.41)	(1.26)
Early grant recipient	0.6	-0.1	-1.72
	(4.58)	(5.15)	(5.77)
Early grant recipient*2000	4.8	5.4	6.3
	(6.06)	(5.79)	(5.66)
Controls	No	Yes	Yes
District fixed effects	No	No	Yes
R^2	0.14	0.18	0.35
Facilities	69	69	69

Standard errors clustered by districts in parenthesis. * (**) [***] denotes significance at the 10 (5) [1] percent level. Time varying controls are the number of dispensaries and health centers in the facility's catchment area; weighting scales; and number of staff.

Table 6. Adjusted difference-in-difference estimates of early and late grant receipt on user-fee of general outpatient service

Regression	(1)	(2)	(3)
Constant	1072*	929***	
	(381)	(90)	
Treatment year (2000)	1084	1113	1157
	(643)	(592)	(627)
Early grant recipient	-146	-120	42
	(329)	(243)	(411)
Early grant recipient*2000	-576**	-595**	-610**
	(149)	(127)	(190)
Controls	No	Yes	Yes
District fixed effects	No	No	Yes
R^2	0.12	0.13	0.30
Facilities	84	82	82

Standard errors clustered by districts in parenthesis. * (**) [***] denotes significance at the 10 (5) [1] percent level. Time varying controls are the number of dispensaries and health centers in the facility's catchment area; weighting scales; and number of staff.

Table 7. Adjusted difference-in-difference estimates of early and late grant receipt on utilization (log of outpatients per month)

Regression	(1)	(2)	(3)
Constant	6.0***	6.0***	
	(.29)	(.29)	
Treatment year (2000)	-0.66**	-0.68**	-0.66**
	(.14)	(.15)	(.18)
Early grant recipient	0.29	0.33	0.08
	(.20)	(.14)	(.08)
Early grant recipient*2000	0.27***	0.22***	0.20**
	(.02)	(.01)	(.04)
Controls	No	Yes	Yes
District fixed effects	No	No	Yes
R^2	0.11	0.15	0.38
Facilities	84	82	82

Standard errors clustered by districts in parenthesis. * (**) [***] denotes significance at the 10 (5) [1] percent level. Time varying controls are the number of dispensaries and health centers in the facility's catchment area; weighting scales; and number of staff.

Table 8. Adjusted difference-in-difference estimates of early and late grant receipt on remuneration

Regression	(1)	(2)	(3)	(4)
Dep. variable	All	Highly qualified	Qualified	Nursing aides
Constant	104,279***	211,208***	149,429***	70,009***
	(5,179)	(25,226)	(17,518)	(9,535)
Treatment year (2000)	-41,660	1,874	-46,949**	-18,015
	(11,536)	(113,858)	(9,559)	(10,656)
Early grant recipient	676	40,229	11,928	-8,759
	(12,541)	(12,541)	(9,229)	(9,894)
Early grant recipient*2000	6,360	-48,337	-15,906	9,526
	(10,615)	(145,040)	(17,000)	(16,121)
Controls	Yes	Yes	Yes	Yes
R^2	0.19	0.14	0.21	0.05
Facilities	75	53	69	70

Standard errors clustered by districts in parenthesis. * (**) [***] denotes significance at the 10 (5) [1] percent level. Time varying controls are the number of dispensaries and health centers in the facility's catchment area; weighting scales; and number of staff.