THE POWER OF INFORMATION: EVIDENCE FROM A NEWSPAPER CAMPAIGN TO REDUCE CAPTURE OF PUBLIC FUNDS[*]

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In the late 1990s the Ugandan government initiated a newspaper campaign to boost the ability of schools and parents to monitor local officials' handling of a large school grant program. The results were striking: diversion of funds was reduced from 80 percent in 1995 to less than 20 percent in 2001. We exploit this policy experiment to study the effects of improved access to public information as a tool to reduce capture and corruption. Distance to the nearest newspaper outlet is used as an instrument of exposure to the campaign. Proximity to a newspaper outlet is positively correlated with head teachers' knowledge of the rules governing the grant program and the timing of releases of funds from the center, but uncorrelated with test scores of general ability. A strong (reduced-form) relationship is found between proximity to a newspaper outlet and a reduction in the diversion of school funds. This pattern contrasts sharply with the outcomes in the five-year period before the campaign. Instrumenting for head teachers' knowledge about the grant program finds that public access to information is a powerful deterrent to the diversion of grant funds at the local level.

1 Introduction

Most anticorruption programs rely on legal and financial institutions—judiciary, police, financial auditors—to enforce and strenghten accountability in the public sector. In this top-down approach some government agencies are assigned to monitor and control others. Typically, such programs attempt to root out corruption in service delivery through training or increased budgetary allocations. In many poor countries, however, legal and financial institutions are weak and often among the most corrupt, so more resources may not be the right solution. Not surprisingly, there are few recent examples of successful efforts to combat corruption and diversion of funds in public programs.[1]

A complementary approach takes the users of public services as a starting point. Rather than focusing on service providers' accountability to policymakers alone, the idea is to engage citizens at the bottom of the public service delivery chain by providing easy access to information on the workings of public programs intended for their benefit. This empowers citizens to demand certain standards, to monitor service quality, and to challenge abuses by officials with whom they interact. Improving public information is a crucial part of this bottom-up strategy. But while buzzwords like "information," "knowledge," and "empowerment" now pepper the policy debate, there is little quantitative evidence on the impact of policy measures aimed at achieving them (Banerjee and He 2003). This article attempts to provide some.

We examine an unusual policy experiment. Uganda created a public information campaign to reduce the diversion of public funds by providing parents and schools with information to monitor local officials' handling of a large school grant program. In the mid-1990s a public expenditure tracking survey revealed that schools received only 20 cents on average of every dollar

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[1] The legal approach runs into problems because many countries, especially where corruption is systemic, lack the trustworthy (benevolent) legal machinery (judges, court personnel, police) needed to investigate and enforce the rules. Similarly, an efficient financial system relies on a functioning enforcement mechanism and the ability to delegate reviews to trustworthy auditors. Moreover, while well-functioning legal and financial systems can curtail obvious cases of mismanagement, they only partially constrain the discretionary powers of public sector managers and employees. The complexity of the tasks performed by a typical public sector unit and its informational advantage relative to the users of public services make it nearly impossible to design legal and accounting measures to address all types of misuse and thus to curtail less obvious cases of mismanagement (such as shirking, budget prioritization in favor of staff, political considerations). Finally, audit reports and legal procedures are often difficult for nonspecialists to interpret and therefore go unnoticed unless the commissioning agency acts on them.

allocated to them by the central government (Reinikka and Svensson 2004). As the evidence of local officials' diversion of funds intended for schools became known, the central government began to publish newspaper accounts of monthly transfers of these capitation grants to local governments (districts). We use a repeat expenditure tracking survey to study the effects of improved access to public information as a tool to reduce diversion and corruption.

The raw data suggest a large improvement. In 2001 schools received an average of 80 percent of their annual entitlements.

We first examine outcomes across schools with and without access to newspapers. Intuitively, schools with access to newspapers would be more extensively exposed to the information campaign. The difference-in-differences estimates show that while the degree of diversion was similar in the two groups in the mid-1990s, by 2001 local diversion was significantly less in the schools more extensively exposed to the newspaper campaign.

Access to newspapers, however, identifies a causal effect of improved access to information only under certain conditions. Specifically, newspaper access is partly endogenous. Moreover, even a head teacher without access to newspapers may be well-informed about the grant program if parents in the community have access to newspapers. We deal with these concerns in a two-step procedure. Data from a simple knowledge test administered to head teachers are used to measure knowledge of the program, and distance to the nearest newspaper outlet is used to instrument for exposure (knowledge) to the information campaign.

The results are consistent with the hypothesis that improved access to information significantly reduces local capture. Head teachers in schools closer to a newspaper outlet know more about the rules governing the grant program and the timing of release of funds by the central government. In a second test of local and general knowledge administered to head teachers, distance to the nearest newspaper outlet has no effect, suggesting that it is information on the grant program (disseminated through newspapers) rather than some unobserved characteristic (such as ability) correlated with distance that accounts for the observed effects. A strong (reduced-form) relationship is found between proximity to a newspaper outlet and reduction in capture since the newspaper campaign started. This pattern contrasts sharply with the outcomes in the five-year period before the campaign. Instrumenting for head teachers' knowledge about the grant program shows that public access to information is a powerful deterrent to diversion of funds at the local level.

This article brings together two strands of research. First, there is a small but growing literature on the role of mass media in shaping public policy. Strömberg (2003, 2004) considers how the press influences redistributive programs in a model of electoral policies, where the role of the media is to

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raise voter awareness and thereby increase the sensitivity of turnout to favors granted. Besley and Burgess (2002) focus on the media's role in increasing political accountability, also in a model of electoral policies. The focus here is on how implementation of existing policies is affected by getting more information to beneficiaries. We also use micro data from schools rather than disaggregated national accounts data.

Second, this work links to the empirical literature on corruption. With few exceptions, this literature has three common features. It is based on cross-country analyses. It exploits data on corruption derived from perception indices, typically constructed from foreign experts' assessments of overall corruption in a country. And it explains corruption as a function of the country's politico-institutional environment.[2] The research on corruption and the media exemplifies this approach (Brunetti and Weder 2003 and Ahrend 2002).[3] While the literature provides important insights, it has drawbacks, including concerns about perception bias and causation.[4] The work here complements the cross-country approach, providing quantitative, micro-level evidence from a policy experiment on the effects of increased public access to information as a tool to combat diversion and corruption.

The next section describes the situation before the campaign and briefly discusses findings from the earlier study on local capture. Section 3 lays out the key components of the public information campaign. Section 4 describes the survey data used in the empirical analysis and the method used to quantify capture. Section 5 presents the empirical evidence and section 6

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[2]See Svensson (2003) for a discussion. For the effects of corruption on investment and growth, see Mauro (1995). On the determinants of corruption, see Ades and Di Tella (1997, 1999), Persson, Tabellini, and Trebbi (2001), Svensson (2000), and Treisman (2000). A common theme in this literature is the use of subjective measures of corruption in a cross-country setting. Di Tella and Schargrodsky (2003), Reinikka and Svensson (2004), and Svensson (2003) are exceptions. They use quantitative micro-level data on corruption. Hellman and others (2000) and Hellman, Jones, and Kaufmann (2000) also use firm-level data. The data are numerical but ordinal (based on multicategory responses to questions on corruption). In line with the cross-country literature, they explain corruption as a function of the country's politico-institutional environment.

[3]See also Djankov and others (2003), who gather new data on media ownership and show that state ownership is correlated with both less media freedom and more corruption.

[4]Brunetti and Weder (2003) and Ahrend (2002) use a corruption perception index compiled by the International Country Risk Guide (ICRG). Perception biases may occur if, for example, improved protection of journalists reporting on corruption is perceived as lowering the cost of doing business due to corruption. In this case, there would be a direct link between freedom of media and the risk rating score published by ICRG. Establishing a correlation between freedom of the media and corruption does not provide strong evidence of a causal link since both measures are highly correlated with several other institutional characteristics that may explain the level of corruption in a country.

concludes.

2   The situation before the newspaper campaign

In an ideal setting the public accounting system would provide timely information about actual spending on various budget items and programs, and budget reports would accurately reflect what the intended users receive. This is not often the case in low-income countries. Typically, the accounting system functions poorly, institutions of accountability are weak, and there are few incentives to maintain adequate records at different levels of government. Consequently, little is known about the efficiency of transforming budget allocations into services.

To compensate for these gaps, a new survey tool - a public expenditure tracking survey - was designed to gauge how well public resources were reaching the intended facilities.[5] In 1996 the survey was administered to 250 government primary schools, 18 district governments, and 3 central government ministries in Uganda, covering the period 1991–95. At the time of the survey some 8,500 government primary schools were supposed to be receiving a large proportion of their funding as capitation grants from the central government, to be administered by local governments. In addition to measuring the difference between intended resources (from the central government) and resources received (by the school), the survey collected quantitative data on service delivery on the frontline—at the schools.

Focusing on the capitation grant program had two advantages. First, like most public programs at the time, the capitation grant was a national program that used district offices as distribution channels. This gave local officials and politicians the opportunity to divert the funds. Second, unlike other government programs, which were primarily in-kind (for instance, drug kits provided to health clinics), the capitation grant was a rare infusion of liquid funds into local administrative and political systems, which made diversion easier.

Detailed records were available at both the central level and at the schools in 1996. At the district level book-keeping information was available on receipt of the capitation grant from the central government at the offices

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[5]For a conceptual discussion on the survey and the related Quantitative Service Delivery Survey (QSDS), and discussion of ongoing survey work, see Dehn, Reinikka, and Svensson (2003) and Reinikka and Svensson (2003).

of the chief administrative officer and the regional audit representative, but there were no records of disbursements to individual schools (Reinikka and Svensson 2004).

The pre-campaign survey found that on average only 24 percent of the capitation grant from the central government was reaching the schools in the mid-1990s (table 1). Thus, nearly 80 cents of every dollar spent on nonwage education items by the central government was being diverted by local government officials. Most schools received nothing. Poor students suffered disproportionately because schools serving poor students received less than schools in other areas (Reinikka and Svensson 2004).

Where did the money go? As discussed in Reinikka and Svensson (2004), there was no evidence of increased spending in other sectors. There was indirect evidence of theft, from numerous newspaper articles about indictments of district education officers after the survey findings went public. But anecdotal evidence suggests that most of the funds were used for patronage politics and funding of political activities. Case study evidence of district political financing and corruption in Uganda also points in the same direction. Thomas (1998, 1999) argues that power in district governments is concentrated among a small elite, connected by common schooling, marriage, friendships, ethnicities, and religion. Sustaining this power balance is costly. Public funds are fueling a system of patronage politics, in which patrons give clients material rewards for their political loyalty and services (see also Bayart 1993). The patronage system takes different forms. Politicians divert public resources to finance their own campaigns and those of friends and family or to finance local and private causes, including distribution of private goods such as salt, sugar, and beer to overcome voter dissatisfaction. Political parties, or in Uganda, the National Resistance Movement, must also supply patronage goods to its members.[6] In rural areas an effective political organization depends on a personal presence in the area, which means a well-staffed institutional hierarchy all the way down to the village level. This model requires substantial resources, and diversion of public resources is often the only source of funding available. This diversion of funds was facilitated by the ignorance about the capitation grant in most schools.

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[6]The National Resistance Movement is not formally a party, although it operates like one and its institutional structure is similar to other dominant party structures in other parts of Sub-Saharan Africa, with a national executive committee, a secretariat, and district, division, subcounty, town, parish, and village movement committees.

3   Information campaign and voice

As the extent of district government diversion of funds became known in 1996, the central government reacted swiftly. Rather than taking the standard approach of yet another reform project to improve the financial management system, the government decided to engage the citizenry. Led by the Ministries of Local Government and Finance, the central government began to publish data in the national newspapers on the monthly transfers of capitation grants to districts. The main newspapers used were the *The New Vision* (and its local language editions) and *The Monitor*. In 1997 the Ministry of Education proposed extending the information campaign to all school communities. Primary schools (and district administration headquarters) were required to post notices on actual receipts of funds for all to see. In this two-part campaign, information on entitlements transferred by the central government was made available through newspapers, while information on what each school actually received was posted at schools to inform parents.

How would improved access to information help? The government hoped that by giving users access to information on the grant program, head teachers and parents could monitor the local administration and voice complaints if funds did not reach the schools. In addition, by publicly informing beneficiaries of their entitlements, the central government signaled strengthened oversight (to voters and local officials) and the priority it accorded to education (Stasavage 2003).

Hirschman (1970) identifies a set of conditions under which voice is the preferred mode of action for dissatisfied customers among available choices (voice, exit, and loyalty). Individuals must be able to compare outcomes. In the case of the school grant program this implies that they must be aware of the amount of their entitlement and how much the school actually receives. Second, the expected return to voice must be higher than to the alternatives - to exit or not to act (loyalty). The relative returns depend on both the availability of an exit option and on the community's ability to take collective action. The propensity to resort to the voice option also depends on the readiness of a population to complain and on the existence of institutions and mechanism to transmit complaints cheaply and effectively.

These conditions suggest that the information campaign could be highly successful in reducing fund diversion. First, schools being exposed to the newspaper campaign should be aware if funds are being diverted, so that they can make an informed choice about whether to protest. Second, most households in Uganda, particularly in rural areas where most of the schools in the sample are located, have no easily available alternative to the local public

school. While private schools exist, they are located in larger urban centers. This lack of an exit option increases the likelihood of voice as the response of choice to dysfunctional services (Hirschman 1970). Third, the collective action problem is likely to be a less important constraint in primary education than in other social sectors. Parents and school staff interact every day, and all schools have the institutions to handle collective decisionmaking in the form of school management committees, consisting of parents and the head teacher.

The survey data indicate that the voice mechanism is indeed at play. Half the schools reported that they did not receive the full amount of the capitation grant in 2001. Of these schools, 47 percent complained or protested to some formal or informal authority that could transmit the complaints onwards or act on them. These included central government officials and politicians, school inspectors, village or other local officials, village elders, and tribal leaders. Even the threat of voice may discourage the local political elite from diverting resources intended for the schools. Thus, in equilibrium, the incidence of voice and local diversion of funds may not be correlated.

4 Data

A public expenditure tracking survey was carried out in 2002 to assess the effects of improved access to public information. The survey replicated the 1996 survey, measuring the difference between the capitation grants disbursed by the central government and the resources actually received by the schools. In addition, it collected data on access to information and the means to acquire information on the grant program and other variables that may influence the bargaining position of individual schools.

The 1996 sample consisted of 250 schools, randomly drawn from 18 districts.[7] To ensure that the sample had broad regional coverage (Northwest, North, Northeast, East, Central, Southwest and West) and that it was representative of the population of schools in the selected districts, schools were selected using a stratified random sample (see Reinikka 2001 for details). For each region two or three districts were drawn with a probability proportional to the number of schools in the district, and in each district 10–20 schools were visited, depending on the number of schools in the districts.[8]

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[7]The selected districts were : Arua, Moyo (Northwest); Apac, Gulu (North); Soroti, Moroto, Kapchorwa (Northeast); Jinja, Kamuli, Pallisa (East); Kampala, Mukono, Mubende (Central); Bushenyi, Kabale (Southwest); and Kabarole, Hoima, Bundibugyo (West).

[8]For both surveys (1996 and 2002) enumerators were trained and closely supervised

Not all schools in the original sample could be resurveyed in 2002 because of security concerns. Two districts (Moroto and Bundibugyo) were dropped, reducing the sample by 20 schools. One district (Gulu) experienced a major insurgency during the data collection phase, and an additional 11 schools had to be dropped. And one school in the original sample had closed, resulting in a final sample of 218 schools.[9]

The 2002 survey collected detailed information on receipt of funds and school enrollment and administered a knowledge test to head teachers.[10]

The school-specific measure of grant diversion is grants received (by school j in year t) as a share of grants disbursed by the central government to that school. A school's entitlement is based on the number of students in grades P1–P3 and P4–P7. In 1995 the grant formula allocated 2,500 Ugandan shillings (USh) a year for each student in grades P1–P3 and 4,000 USh for each student in grades P4–P7. In 2001 the amounts were 5,000 USh for grades P1–P3 and 8,100 USh for grades P4–P7.[11]

Records from the Ministry of Finance indicate that this rule was followed unless districts did not submit the required quarterly documentation, in which case funds could be delayed or withheld in the following months. These records show that in fiscal 2000/01, 93 percent of the approved funds were released, although some districts received significantly less (for example, the central government withheld 49 percent of the funds to Kyenjojo and 25 percent to Kayunga, both newly established districts). The actual amounts disbursed by the central government were confirmed by the public expenditure tracking survey at the district level. To adjust for the withholding effect in deriving the diversion measure, a school's entitlement was scaled down by the share of funds actually released by the center to the district.

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by a local research team and survey experts from the World Bank to ensure quality and uniformity of data collection and standards for assessing record-keeping at the schools.

[9] An additional complication was that since the 1996 survey, four districts had been split, thus yielding a sample of 22 districts. The new districts are Adjumani, previously part of Moyo, Kyenjojo, previously part of Kabarole, Kayunga, previously part of Mukono, and Katakwi, previously part of Soroti.

[10] The 2002 survey also formed the basis for a related research project. An additional 170 schools from 9 of the original 18 districts were surveyed. The sampling frame for these additional schools was based on the 2001 school census, and the sampling procedure was similar to that of the 1996 survey. Specifically, a stratified random sample was chosen where each district was weighted according to size (number of schools). Thereafter, one district was randomly chosen from each region. Two additional districts were then selected from the two largest regions. The nine selected districts were Apac, Arua, Bushenyi, Kabale, Hoima, Kamuli, Pallisa, Mukono, and Soroti. The number of schools to be sampled from each of these 9 districts was proportional to the number of schools in the district.

[11] The grant has maintained its real value in U.S. dollar terms (the P1 to P3 entitlement for 1995 and 2001 was 2.9 U.S. dollars per student in 2001 prices).

As with the 1996 survey data, the grant data collected at the school level appears to adequately reflect what schools actually received. The data were collected directly from the school records, and in most cases the enumerators could double-check the information using copies of checks received. School records were kept for internal use only. They were not submitted to district or central authorities and were not used as a basis for funding. The risk that head teachers might have underreported the school income in order to divert funds for themselves was perceived as less serious, since each check had to be signed by at least two people (the head teacher and the chairperson of the school management committee).

School enrollment data were collected from school and district records. The numbers were very similar (the simple correlation is 0.97). The average of these two numbers was used to calculate each school's aggregate entitlement for the year (table 1).

Summary statistics indicate that the situation has improved dramatically since the mid-1990s (tables 1 and 2). Schools, which had received only 24 percent on average of the total yearly grant from the central government in 1995, received more than 80 percent in 2001. More striking, while the median school received nothing in the mid-1990s, it received 82 percent of its entitlement in 2001. Thus the extent of diversion fell dramatically. However, diversion is still a problem for many schools. On average, 20 percent of school entitlements do not reach the schools, and about 30 percent of schools receive less than two-thirds of their entitlements.

5 The effects of improved access to information

Two complementary approaches are used to estimate the effects of improved access to information on district diversion of school grants. The estimation has to deal with the impossibility of observing the same school when it is informed of its entitlements and when it is not. This problem is compounded by the fact that the information campaign is nonexclusive, so that all schools in the 2001 sample could be viewed as treatment schools, although to varying degrees.

The first estimation approach exploits the differences in access to newspapers across schools. The second measures exposure to the information campaign directly by testing head teachers' knowledge of the grant program

and then instruments for it using distance to the nearest newspaper outlet as the instrument.

5.1 Variation in access to newspapers

The newspaper campaign on transfers of education funds to the districts that was begun in late 1996. Newspapers have also carried stories on misuse of the capitation grant funds and on school entitlements and responsibilities under the universal primary education program. Thus, it seems intuitive that schools with access to newspapers were more extensively exposed to information on the capitation grant program. Hence, they form the treatment group. Schools without access to newspapers constitute the control group. Access to newspaper is defined as having a head teacher who reports having access to a newspaper at least once a week.

The difference-in-differences specification compares the change (before and after the newspaper campaign started) in the share of the entitlement reaching the schools in the treatment group with the change in the control group

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\begin{aligned}
DD \;=\; & E\left[s_{j1}|\; t=2001,\; m=1\right] - E\left[s_{j1}|\; t=1995, m=1\right] - \qquad (1) \\
& E\left[s_{j0}|\; t=2001, m=0\right] - E\left[s_{j0}|\; t=1995, m=0\right]
\end{aligned}
$$

where $m=1$ denotes the treatment group, $m=0$ denotes the control group, t is the time period, and s_{j1} and s_{j0} are funding to school j in the treatment group and the control group.

The difference-in-differences model makes the counterfactual assumption that with no newspaper campaign, funding to schools with access to newspapers would change at the same rate as funding to schools without access to newspapers. One concern with this methodology is that newspaper access is partly endogenous. Specifically, there may be some unobserved school characteristic correlated with both newspaper access and the efficiency with which the school can articulate its case to district officials. In practice, there are reasons to believe that this may not be a serious concern. First, head teachers do not necessarily buy their own newspaper.[12] Second, in a predominantly

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[12]Sharing newspapers is common in poor countries. On average, each copy of *The New Vision*, one of the main newspapers in Uganda, is read by 10 people, according the newspaper's market research. A school with access to a newspaper may not have it every day. For example, the median school had access to a newspaper three days a week.

rural country like Uganda that lacks adequate transport infrastructure, access to a newspaper is determined mainly by logistical factors outside the school's or community's control (see also Björkman 2003).

Although these logistic factors may also influence a school's ability to claim funds from the district, this would likely work against finding an effect in the data. For example, if high-ability head teachers are more likely to have access to newspapers and also more able to make a claim for the grant funds independent of the newspaper campaign, $E\left[s_{j1}\mid t=2001,\ m=1\right]$ and $E\left[s_{j1}\mid t=1995, m=1\right]$ would both increase, but the difference between them would fall.[13] Thus, the existence of fixed school-specific effects that are positively correlated with both the probability of having access to newspapers, $\Pr[m=1]$, and the probability of claiming the full grant share, s_{j1}, would result in a downward bias in the estimate of interest.[14]

Another potential problem with using access to newspapers as a measure of exposure to information is that a head teacher may be well-informed about the grant program even without having access to newspapers if parents in the community have access to them. This can be viewed as a measurement error problem. The variable of interest is exposure to information, or knowledge, about the grant program, but only the head teacher's access to newspapers is observed. Under plausible assumptions, this would result in an attenuation bias that pushes the estimate toward zero. These concerns are addressed in the next section.

The difference-in-differences estimates are reported in table 3, panel A. The first column reports funding in 1995, the second column reports funding in 2001, 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 1995 the treatment and the control groups suffered equally from local capture of capitation grant funds. This finding suggests that schools in the treatment group did not have any other specific characteristic (apart from access to newspapers) that increased their capability to claim funds in 1995. From 1995 to 2001 there is a large drop in diversion of funds in both groups, which is consistent with the summary statistics in table 1, but the reduction is significantly higher in the treatment group. The difference-in-differences estimate is 13.8 and is significant at the 5 percent level. Thus, schools with access to newspapers and therefore with more extensive exposure to public information about the

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[13]Since s_{jm} is the share (in percent) of the grants reaching the school, a fully funded school has $s_{jm}=100$.

[14]The approach applied here differs from the standard difference-in-differences model (see, for instance, Angrist and Krueger 1999), since the groups are defined according to ex post characteristics (access to newspapers).

grant program increased their funding on average by 13.8 percentage points more than schools that lacked access to newspapers.

The identifying assumption in the difference-in-differences model is that without the campaign the reduction in grant diversion would not have been systematically different in the group of schools with and without access to newspapers. But it is possible that the funding shares would have evolved differently across groups if the groups differed in other dimensions, for example, in income. This possibility is explored by adding *income* as an additional control.[15] Table 4, specification 1, depicts the regression version of the difference-in-differences method. In specification 2 *income* is added. The difference-in-differences estimate remains unchanged.

Another way to test the "parallel trend" assumption is to compare the change in outcomes before the campaign; i.e., during the period 1991-95. Panel B, table 3, presents this control experiment. Although the amount of spending reaching the schools improved over the period, the trends do not differ systematically across the two groups. The difference-in-differences estimate is even negative, although insignificantly different from zero. These results provide suggestive evidence that the results reported in panel A are not driven by some unobserved variables that cause funding to schools to evolve differently across treatment and control groups.

5.2   Measuring and instrumenting for exposure to the campaign

The maintained assumption in the previous section is that head teachers with access to newspapers have been more extensively exposed to the newspaper campaign and therefore have better information about the timing of disbursements and the workings of the grant program. This section presents a complementary two-step approach to estimate the effects of improved access to information. Specifically, data based on a simple knowledge test administered to head teachers is used to test whether access to newspapers translates into better knowledge of the grant program. The test also provides evidence on other types of knowledge (to control for ability). To address potential endogeneity problems, distance to the nearest newspaper

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[15]Following Reinikka and Svensson (2004) the mean consumption level across district-urban-rural locations is used as a measure of income (denoted *income*). The mean consumption level is derived from national household survey data. Note that the district-urban-rural location has no administrative or political boundaries. This will mitigate the danger of the variable picking up processes at the district level that could have a direct bearing on the degree of local fund diversion, rather than income per se.

outlet (*distance*) is used to instrument for exposure to information.[16]

For distance to the nearest newspaper outlet to serve as a legitimate instrument, it must affect a school's exposure to information about the grant program but have no direct effect on its ability to claim funds from the district. Distance to the nearest newspaper outlet captures the cost and ease of accessing a newspaper. This is particularly so for the sample, which consists predominately of rural schools. Presumably, *distance* is therefore correlated with the likelihood that both the head teacher and the parents in a community have access to newspapers.[17] We provide three pieces of evidence in favor of our identification strategy in tables 5 and 6.

Distance is highly correlated with access to newspapers (table 6, specification 1). Being located near a newspaper outlet has a strong and significant effect on the probability of the head teacher having access to a newspaper. The head teacher in a school near a newspaper outlet is 35 percentage points more likely to report access to a newspaper than the head teacher in a school one standard deviation further away from such an outlet. The result remains intact when *income* is added to the regression (see specification 2 in table 6).

Table 5 reports a set of regressions where the dependent variables, scores on knowledge tests administered to head teachers, are regressed on distance to the nearest newspaper outlet

$$q_j = \delta_0 x'_j + \delta_1 distance_j + \varepsilon_j \ . \tag{2}$$

The regressions show that head teachers serving in schools close to a newspaper outlet are better informed about the formula used for deriving the capitation grant (table 5, specification 1). They are also better informed about the timing of releases of funds by the central government (specification 2). When both of these are combined into an aggregate score (*info*), the results show that distance to the nearest newspaper outlet has a strong neg-

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[16]Geographical characteristics, including distance, have been used in other areas to identify causal effects; see for instance Card (1993) and McClellan, McNeil, and Newhouse (1994).

[17]Newspaper penetration is partly determined by logistical factors outside the school's or community's control. As with the newspaper regressions reported in table 4, it is possible that these logistical constraints are correlated with household or village characteristics that have a direct bearing on the school's ability to claim funds. However, in a sample of predominantly rural schools, this risk would appear to be minimal. Only a handful of rural villages in the sample have a newspaper outlet within one kilometer. The median distance is nine kilometers (table 2). Moreover, if these village characteristics are fixed, this will again tend to work against finding an effect.

ative effect on head teachers' knowledge about the grant program in general (specification 3).

One concern with these results is that head teachers serving in schools close to a newspaper outlet may be more knowledgeable in general. A way to test this is to compare their knowledge in other areas. On tests of knowledge about news events and people covered in newspapers at the time of the survey in 2002, head teachers serving in schools close to a newspaper outlet are, as would be expected, significantly more likely to score highly on this variable than head teachers serving in schools further away (see specification 4 in table 5).[18] But for head teachers' knowledge of local affairs[19] and knowledge of general (sociopolitical) issues typically not reported in newspapers, there is no significant difference between head teachers in schools close to a newspaper outlet and those in schools farther from an outlet (see specifications 5 and 6 in table 5).[20]

Though the tests do not provide a comprehensive assessment of head teachers' knowledge and abilities, the findings suggest that it is information on the grant program disseminated through newspapers and correlated with *distance* that accounts for the observed effects rather than some unobserved characteristic such as teachers' ability. Two additional tests support this claim.

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[18]Respondents were asked to identify Winnie Byanyima (outspoken Member of Parliament and the wife of a former presidential candidate), Thabo Mbeki (president of South Africa), Bono (rock singer who was touring Africa at the time of the survey), George W. Bush (president of the United States), and Charles Onyango-Obbo (outspoken editor of *The Monitor*). Respondents were also asked to name the minister of education (Hon. Makubuya), minister of finance (Hon. Ssendaula), and prime minister (Hon. Nsibambi). Head teachers with access to newspapers were significantly more likely to respond correctly to each question (except the question on President Bush, for which there was no significant difference). The variable "knowledge about recent news events" is the average score on these eight questions, where a correct answer is coded 1 and an incorrect answer is coded 0.

[19]Respondents were asked to name the district education officer, chief administrative officer in the district, Local Council 5 chairman, Local Council 3 chairman, and their representative in Parliament. Head teachers in schools close and farther way from newspaper outlets were equally as likely to repond correctly to these questions. The variable "knowledge about local affairs" is the average score on these five questions, where a correct answer is coded 1 and an incorrect answer is coded 0.

[20]Respondents were asked the following questions: what is the (a) largest newspaper by circulation in Uganda (*The New Vision*), (b) location of East African Parliament (Arusha, Tanzania), (c) MTN (cellular/mobile phone provider), (d) month when the government's budget is presented to Parliament (June), (e) number of districts in Uganda (56), and (f) number of members of Parliament (305). The variable "general political knowledge" is the average score on these six questions, where a correct answer is coded 1 and an incorrect answer is coded 0.

The relationship between knowledge about the grant program and proximity to a newspaper outlet remains intact when *income* is added as an explanatory variable (see specification 4 in table 6). Next, proximity to district headquarters and distance to the nearest bank branch are added as additional controls (see specification 5 in table 6). Distance to the nearest newspaper outlet may be a proxy for some other important geographical characteristic, such as remoteness. Distance to district headquarters proxies for distance to the district capital and distance to the nearest bank branch is a proxy for distance to the nearest urban center. The simple correlations between these three distance measures are between 0.51 and 0.57. As would be expected, δ_1 is less precisely estimated when these urbanization controls are included since newspaper outlets are likely to be available in both places. Most important, once proximity to a newspaper outlet is controlled for, distance to the district capital and the nearest urban center have no effect.[21]

Finally, specification 6 in table 6 shows that distance to the nearest newspaper outlet has an independent effect over and above increasing the likelihood that the head teacher has access to a newspaper. This result is consistent with the claim that a school (i.e., head teacher) may be well-informed about the grant program even without having newspapers, if parents in the community where the school is located have access to them. Controlling for distance, the coefficient on newspaper access is reduced by 35 percent.

Estimates of equation (2) are of intrinsic interest because they assess the impact of the newspaper campaign on knowledge about the grant program. But they also represent the first stage of a two-stage least squares procedure to estimate the impact of improved access to public information as a tool to reduce diversion of grant funds.

Table 7 presents reduced-form coefficients of distance to the nearest newspaper outlet on change in diversion of funds. Specifically, we estimate

$$s_{jt} = \beta_0 x_{jt} + \beta_1 distance_j + \beta_2 \sigma_t + \beta_3 \sigma_t distance_j + \mu_j + \varepsilon_{jt} , \qquad (3)$$

where σ_t is a dummy taking the value 0 in period $t-1$ and 1 in period t and where β_3 is the reduced-form estimate. The school-specific effects can be differenced away, so that

$$\Delta s_j = constant + \beta_0 \Delta x_j + \beta_3 distance_j + \Delta \varepsilon_j . \qquad (4)$$

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[21] The joint hypotheses that the coefficients on distance to district capital and distance to the nearest urban center are zero cannot be rejected (F-statistic is 1.56 with a p value of 0.212).

Two sets of regressions are reported in the upper and lower panels of Table 7. The campaign experiment estimates the effect over the information campaign period, with the treatment dummy variable σ_t taking the value 1 in the post-campaign year 2001 and 0 in the pre-campaign year 1995 (panel A). The control experiment estimates the effect during the five-year period prior to the campaign, with the treatment dummy variable taking the value 1 in 1995 and 0 in 1991 (panel B). For the campaign experiment there is a strong relationship between distance to the nearest newspaper outlet and reduction in grant fund diversion after the newspaper campaign started. In sharp contrast, in the control experiment being located near a newspaper outlet has no effect on a school's ability to claim funds from the center.

Table 8 specification 1 reports the estimates of the structural regression

$$\Delta s_{jk} = constant + \gamma_0 \Delta x_{jk} + \gamma_2 \widehat{info}_j + \eta_j , \qquad (5)$$

where the predicted school-specific outcomes, $\widehat{info}_j$, are attributed to $distance_j$ and hence reflect factors outside the school's (community's) control. All sample information (388 observations) reported in table 5 is used to derive the generated regressor $\widehat{info}_j$.

Schools that are more exposed to the newspaper campaign - therefore more informed - experience a significantly larger reduction in district government diversion of funds after the campaign starts.[22] Both ordinary least squares (OLS) standard errors and bootstrapped standard errors are reported in table 8. The OLS standard errors are biased because they ignore the uncertainty in the estimated effect of $distance_j$ on $info_j$ in the first-stage regression. In practice, this does not appear to be much of a problem since the two standard error estimates are close.

The quantitative effect of improved access to public information is large. The instrumental variable (IV) estimate implies that a 1 standard deviation increase in $info$ results in a 1.1 standard deviation increase in spending reaching the schools (a 44.2 percentage point increase in funding reaching the school between 1995 and 2001).

5.3 Robustness tests

Additional robustness tests were also run on the results reported above. First, all observations for each region in Uganda are dropped one at a time

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[22]The fit of the first-stage regression (equation 2, with $info$ as the dependent variable) is good. The t-test of the significance of $distance$ in the first-stage regression is 3.73.

to see whether the results are driven by any region-specific effects. The IV estimates of the effects of being better informed range from 52.3 (when schools in the northern region are dropped) to 70.1 (when schools in the central region are dropped) and are highly significant.

Next, all the schools that received more than 100 percent of their entitlements in a given year are dropped. This raises the IV estimate slightly and the difference-in-differences estimate somewhat more.[23]

Additional controls are added in all specifications, including a measure of the quality of the school leadership (measured as the share of qualified teachers) and school size. All results remain intact. Since both staff composition and school size may be endogenous and since a few observations drop out when these additional controls are included, they are left out of the base specifications.

Two other geographical characteristics are also added as additional controls in structural equation (5): proximity to district headquarters and distance to the nearest bank branch. This raises the standard errors (since the instrument is now less precisely estimated), but the estimate of γ_2 in equation (5) is virtually unchanged (62.5), and both variables enter insignificantly.[24]

The regressions are re-run with standard errors clustered by district. This raises the standard errors, but all results remain significant at conventional levels.

Finally, an additional instrument is added: average distance to the nearest newspaper outlet. This implies that the model is overidentified and that the validity of the instruments can be tested. There are several possible mechanism that would result in exposure to newspapers (or funding) being correlated across schools within the district. There might be externalities in learning about the grant program.[25] Specifically, teachers might learn from their peers. Local diversion may also be influenced by an exogenous (contextual) group effect, say if the local officials cannot determine whether a school is informed about its entitlement (has access to newspapers). In other words, knowledge about the grant program (q_j) is private information

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[23]This result is consistent with the claim that there are fixed school-specific effects that are positively correlated with both the probability that the head teacher has access to a newspaper and that s_{j1}, since schools with low diversion rates before the campaign also were more likely to have access to a newspaper (and exprienced small changes over the period due to the high intitial values of s_j).

[24]Distance to the district capital and distance to the nearest urban center are both individually and jointly insignificantly different from zero (the F-statistic on the joint hypotheses is 1.09 with a p value of 0.339).

[25]Several studies for developing countries have found that learning externalities are quantitatively important in the adoption of new technologies, for example. See, for instance, Foster and Rosenzweig (1995).

to school j. The local officials only know that q_j is distributed according to some distribution function $F(q_j)$. If $F(q_j) = F(q)$, all schools will receive the same amount. Funding to school j will increase as aggregate (or average) knowledge increases.[26] Diversion of funds for school j may also be influenced indirectly by the head teacher's knowledge about the program in a nearby school since the amount claimed by nearby schools may influence community j's decision whether to exit (move their children to a school with an informed head teacher and thus better funding) or voice a complaint.

Average distance to the nearest newspaper outlet in the district ($avdistance_{jk}$) is added to the first-stage regression (2) (see specification 2 in table 8).[27] Both proximity to a newspaper outlet and average distance to the nearest newspaper outlet in the district enter significantly, suggesting that school j's awareness of its entitlements is affected by the exposure of other schools in the district to the newspaper campaign.

Specification 3 in table 8 presents the IV estimate of the effects of improved public access to information. With both $distance_{jk}$ and $avdistance_{jk}$ as instruments, the predicted school-specific information about the grant program is more precisely estimated (the F-statistic of their joint significance in the first-stage regression is 15.9 and highly significant). This shows up in the structural equation since the standard errors of $info_j$ are smaller. The validity of the instruments (whether they are uncorrelated with the error process in equation 5) is tested, and the null hypothesis that the instruments satisfy the orthogonality conditions cannot be rejected.

6   Concluding remarks

Through the relatively inexpensive policy action of a mass information campaign, Uganda dramatically reduced district government diversion of public grant funds aimed at improving primary education under its universal education policy. Schools in poor communities, less able than others to claim their entitlement from district officials before the campaign but just as likely in 2001, benefited most.

The public information campaign was used to assess the effects of improved access to information as a tool for reducing the diversion of public

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[26]Reinikka and Svensson (2004) present a simple model that highlights these two types of group effects. They show that the two group mechanisms are complements and that it would be difficult to distinguish between them empirically.

[27]$Avdistance_{jk} = \frac{1}{N_k - 1} \sum_{n_i \neq n_j}^{N_k - 1} distance_i$, where N_k is the number of schools in district k, and $distance_j$ is the distance to the nearest newspaper outlet from school j.

funds. Proximity to a newspaper outlet is positively correlated with head teachers' knowledge of the rules governing the grant program and the timing of releases of funds from the center but is uncorrelated with test scores of head teachers' general ability. A strong (reduced-form) relationship exists between distance to the nearest newspaper outlet and reduction in grant fund diversion after the newspaper campaign began. The post-campaign reduction in diversion contrasts sharply with the pattern before the campaign. Instrumenting for head teachers' knowledge about the grant program shows that public access to information is a powerful deterrent to local diversion of grant funds.

Public expenditure tracking surveys elsewhere show that such diversion is not a problem specific to Uganda. Local diversion of funds in education programs appears to be a serious problem in many African countries where similar studies have been implemented, including Ghana, Tanzania, and Zambia (summarized in Reinikka and Svensson 2004). A common denominator in these education programs is that, at best, users have limited knowledge about the public funding to which they are entitled.

At present, several countries have capitation grant programs or are introducing them (for example, Cambodia, Kenya, and Tanzania). The results presented here suggest the value of making information widely available to beneficiaries (parents and teachers) about such entitlements and the workings of school-funding programs.

Appendix: Variable definitions and data description

σ_t = treatment dummy variable taking the value 1 in the post-campaign period 2001 (t) and 0 in the pre-campaign period 1995 ($t - 1$).

distance = distance to the nearest newspaper outlet in kilometers (log) (source: survey data).

income = mean consumption level in the district-urban-rural location constructed using data from the 1995 and 1999/2000 Uganda National Household Surveys (source: the 1995 and 1999/2000 Uganda National Household Surveys).

info = sum of the scores on tests of "knowledge about the formula for deriving the capitation grant" [0,1] and "knowledge about the timing of releases of funds by the central government" [0,1] (source: survey data).

newspaper = dummy variable taking a value of 1 if the school has access to a national newspaper, 0 otherwise (source: survey data).

school size = number of students in grades P1–P7 (source: survey data).

s_{jt} = capitation grant received as a share of what should have been received,

adjusted for funds withheld by the Ministry of Finance and for lower enrollment rates as reported by the central government (source: survey data, official statistics from Ministry of Finance).

share of qualified teachers = share of qualified teachers to total number of teachers (source: survey data).

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Table 1. Summary Statistics on School Characteristics, 1995 and 2001 Surveys

	Median	Mean	Standard deviation
1995			
School size (number of students)	449	531	375
Income (Ugandan shilling)	7,315	7,785	3,612
Ratio of qualified to total teachers	0.88	0.79	0.25
2001			
School size (number of students)	855	952	477
Income (Ugandan shilling)	9,001	10,322	5,078
Ratio of qualified to total teachers	1	0.91	0.17
Newspaper	1	0.63	0.44
Distance to newspaper outlet (kilometers)	9	15.3	33.3
Average distance to newspaper outlet (kilometers)	15.8	15.3	8.5

Table 2. Summary Information on Capitation Grants Received as Share of Entitled Grants, 1995 and 2001 Surveys (percent)

	Mean	Median	Standard deviation	Maximum	Minimum	Number of observations
All schools						
1995	23.9	0.0	35.1	109.8	0.0	229
2001	81.8	82.3	24.6	177.5	9.0	217

	1995	2001
Regions		
Central	24.3	92.8
North	26.7	102.4
Northwest	11.2	90.3
West	24.0	71.6
Southwest	21.1	83.3
East	20.1	62.4
Northeast	36.0	73.4

Table 3. Difference-in-Differences Estimates of the Effects on Fund Diversion of Having a Newspaper: Average Grants Received as Share of Entitled Grants (percent)

Group	Year		
Panel A: Campaign experiment (no. observations: 444)	1995	2001	2001-1995 difference
Access to newspapers	24.5*** (2.87)	83.7*** (1.94)	59.2*** (3.46)
No access to newspapers	29.6*** (5.40)	75.0*** (3.11)	45.4*** (6.22)
Access-no access difference	-5.12 (6.10)	8.68** (3.66)	13.8** (7.13)
Panel B: Control experiment (no. observations: 417)	1991	1995	1991-1995 difference
Access to newspapers	3.30** (1.30)	24.5*** (2.87)	21.2*** (3.14)
No access to newspapers	2.94 (1.93)	29.6*** (5.40)	26.7*** (5.73)
Access-no access difference	0.36 (2.32)	-5.12 (6.10)	-5.48 (6.61)

** Significant at the 5 percent level.
*** Significant at the 1 percent level.
Note: Numbers in parentheses are robust standard errors.

Table 4. Conditional Difference-in-Differences Estimates of the Effects on Fund Diversion of Having a Newspaper

	Specification	
	1	2
1995	29.6***	49.2***
	(5.4)	(7.3)
2001	75.0***	100.7***
	(3.1)	(7.5)
Newspaper	−5.12	−2.18
	(6.1)	(6.3)
Newspaper*2001	13.8**	14.0**
	(7.1)	(7.1)
Income as control	No	Yes
R^2	0.80	0.81
Number of schools	218	218
Number of observations	417	417

** Significant at the 5 percent level. *** Significant at the 1 percent level.
Note: Numbers in parentheses are robust standard errors. See appendix for definition of variables.

Table 5. Head Teacher Test Results

| Dependent variable | Specification | | | | | |
	1	2	3	4	5	6
	Knowledge about grant formula[a]	Knowledge about timing[b]	Information about grant program[c]	Knowledge about news events[d]	Knowledge about local affairs[e]	General political knowledge[f]
Distance to nearest newspaper outlet	−0.063*** (.021)	−0.040** (.020)	−0.103*** (.029)	−0.039*** (.010)	−0.001 (.004)	−0.013 (.010)
Range of scores	[0,1]	[0,1]	[0,1,2]	[0,1]	[0,1]	[0,1]
Average test score	0.65	0.24	0.89	0.65	0.75	0.57
Number of schools	388	388	388	388	388	388

** Significant at the 5 percent level. *** Significant at the 1 percent level.

a. A binary variable 1,0 indicating correct (=1) or incorrect (=0) knowledge about grant formula.

b. A binary variable 1,0 indicating correct (=1) or incorrect (=0) knowledge about timing of releases of the grant.

c. The sum [0,2] of "Knowledge about grant formula" and "Knowledge about timing."

d. Average score [0,1] on eight questions on recent news events, where correct answers are coded 1 and incorrect answers are coded 0.

e. Average score [0,1] on five questions on local affairs where correct answers are coded 1 and incorrect answers are coded 0.

f. Average score [0,1] on six questions on general political knowledge, where correct answers are coded 1 and incorrect answers are coded 0.

Note: Numbers in parentheses are robust standard errors. See text for details of the regression.

Table 6. Newspapers, Information, and Distance to the Nearest Newspaper Outlet

	Specification					
	1	2	3	4	5	6
Dependent variable	Newspaper	Newspaper	Info	Info	Info	Info
Distance to nearest newspaper outlet	−0.100*** (.018)	−0.098*** (.020)	−0.103*** (.029)	−0.111*** (.032)	−0.080** (.038)	−0.096*** (.033)
Distance to district headquarters					−0.065 (.060)	
Distance to nearest bank branch					0.021 (.060)	
Newspaper						0.148** (.075)
Income as control	No	Yes	No	Yes	Yes	Yes
Number of schools	388	388	388	388	388	388

** Significant at the 5 percent level. *** Significant at the 1 percent level.

Note: Numbers in parentheses are robust standard errors. See appendix for definition of variables.

Table 7. Reduced-Form Effects

	Specification	
	1	2
Panel A: Campaign experiment (1995–2001)		
Constant	66.4***	75.7***
	(5.31)	(7.74)
Distance to nearest newspaper outlet	−5.36**	−6.77**
	(2.32)	(2.62)
Income as control	No	Yes
Adjusted R^2	0.04	0.06
Number of schools	199	199
Panel B: Control experiment (1991–95)		
Constant	23.7***	18.6**
	(5.4)	(7.70)
Distance to nearest newspaper outlet	0.64	0.62
	(2.24)	(2.55)
Income as control	No	Yes
Adjusted R^2	0.01	0.01
Number of schools	147	147

** Significant at the 5 percent level.
*** Significant at the 1 percent level.
Note: Numbers in parentheses are robust standard errors. See appendix for definition of variables.

Table 8. Linking Distance, Information, and Capture

	Specification		
	1	2	3
	2nd stage[a]	1st stage	2nd stage
Dependent variable	Δs_j	$info_j$	Δs_j
Constant	2.30		0.03
	(21.1)		(15.7)
Info	65.9***		71.6***
	(23.5)		(18.0)
	[23.6]		[18.3]
Distance to nearest newspaper outlet		−0.060**	
		(.034)	
Distance to nearest newspaper outlet (average)		−0.308***	
		(.070)	
Controls, including income	Yes	Yes	Yes
F-test of instruments[b]	11.8		15.9
	{.000}		{.000}
Hansen J-statistic[c]			0.004
			{0.947}
Number of schools	199	388	199

* Significant at the 5 percent level. *** Significant at the 1 percent level.

Note: Numbers in parentheses are OLS standard errors; numbers in brackets are bootstrapped standard errors. See appendix for definition of variables.

a. First-stage regression is reported in table 7, column 2.

b. The test statistic on the F-test of the joint significance of the instruments in the first-stage regression, with p-values in braces.

c. The test statistic on the overidentification test of the instruments, with p-values in braces.