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Media and Corruption: Evidence from Madagascar

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Abstract: This paper investigates the role of the media in reducing corruption. We analyze data on personal capture of public education expenditures by local officials in Madagascar. We find that corruption can be successfully constrained through a combination of media programs and monitoring. More transparent funding mechanisms and access to mass media reduce capture. However, the impact of the media is conditional on the characteristics of the population. With high illiteracy in poor regions, the effectiveness of newspaper and poster campaigns is limited, and radio programs are more important to reduce capture.

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1. Introduction

Corruption and poverty are strongly related. Corruption reduces growth (Mauro, 1995; Shleifer and Vishny, 1993) while corruption itself reduces with income and education (Glaeser, La Porta, Lopez-de-Silanes and Shleifer, 2004; Glaeser and Saks, 2004). Recently, the importance of limiting corruption to reduce poverty has been emphasized; for example to improve the efficiency of public service delivery programs.[1] In a well-documented study, Reinikka and Svensson (2004a) find that in the early 1990s in Uganda only 13 percent of non-wage public expenditures on primary education actually reached the primary schools. The bulk of the public grants was captured by local government officials and politicians who were supposed to disburse the funds to the local schools. Similar analyses for other African countries, including Tanzania, Ghana, and Zambia, confirm that local capture is a serious problem in educational programs as between 50% and 75% of non-wage funds were diverted (Reinikka and Svensson, 2004a).

These findings suggest that anticorruption programs should be a crucial part of poverty reduction strategies as to increase the efficiency of public spending on services for the poor. Fighting corruption of local officials and politicians can be done in a variety of ways (e.g. Klitgaard and Baser, 1998; Stapenhurst and Kpundeh, 1999). However, some of the more standard approaches may not be effective. Some argue that the reliance on legal institutions, such as the policy and the judiciary, may be ineffective, as these institutions themselves tend

[1] The 2004 World Development Report emphasizes the importance of "making services work for poor people" in achieving the Millennium Development Goals. Developing countries typically spend little of their government budgets on education, health and infrastructure services that poor people need. Furthermore, even when public spending is earmarked for poor people, for example by allocating funds for the poor's primary education and health care, the money does not always reach the frontline service providers.

to be corrupt in countries characterized by extensive capture of public funds (e.g. Klitgaard and Baser, 1998; Ahrend, 2002). An alternative approach, analyzed by Reinikka and Svensson (2004a,b), is to rely on monitoring by the beneficiaries of the services. Increasing the information flow on the disbursement of public funds to the intended beneficiaries is expected to empower citizens at the bottom of the service delivery chain in their interactions with local officials and politicians and, thereby, to increase pressure on them to pass on the funds.

The media can play an important role in this process as a channel of information. Reinikka and Svensson (2004b) find that in Uganda a newspaper campaign to boost citizens' awareness of public spending on educational programs had a dramatic effect in reducing local capture, and that proximity to newspaper outlets was positively related to schools' reception of public funds, consistent with a positive impact of the media.

In this paper we analyze the impact of the media on local capture of public expenditures on education in Madagascar. Our analysis is based on data collected in a budget tracking survey in 2002-2003. The survey measured the extent to which public spending on education reached the local schools. We first compare cash flows from the central government to 24 decentralized district facility levels and from these district levels to 185 public primary schools. In addition, we assess capture of in-kind programs from district to school level. This unique dataset allows us to study the level and determinants of local capture.

Our study contributes to the literature in the following ways. First, the analysis shows that corruption in public programs can be successfully contained. We find that a large share of the funds arrived at the school level in the 2002-2003 program in Madagascar. While there was a significant delay, 98% of the total budget allocated by the central government arrived at district level and 90% of the total sum of intended grants mentioned by all district officers

arrived at school level. Still, in one fifth of the schools the amount received did not correspond with the amount declared as sent by the district facility. Capture of in-kind programs was higher as 41% of the schools reported to have received less material than allocated at the district level. Anecdotal evidence suggests that the diverted funds were used for purposes unrelated to education or for private gain of local district officials.

Second, we show that the media can have an important impact on corruption, but that impact of the media is conditional upon characteristics of the population. There is a rapidly growing literature on the role of mass media in economic development. Besley and Burgess (2001, 2002) show that a more informed electorate strengthens incentives for a government to be responsive. In their analysis, newspaper circulation plays a substantial role in increasing political accountability. Strömberg (2004a,b) shows how radio access influences redistributive programs. Djankov *et al.* (2003) conclude that government ownership of the media is generally associated with less press freedom, fewer political and economic rights and inferior social outcomes in the areas of education and health. Drèze and Sen (1990) state that India, which has a free media, has avoided famines more successfully than China, which lacks free media. Mazharul and Saidul (2000) show that radio and television are two important mass media for disseminating family planning information in Bangladesh. Stapenhurst (2000) and Ahrend (2002) find evidence that a lack of press freedom leads to higher levels of corruption. Reinikka and Svensson (2004b) use proximity to a newspaper outlet as an instrument for the exposure to a public information campaign, and find that public access to information is a powerful deterrent of local capture. Our analysis confirms the impact of mass media on reducing corruption. However, we find that the impact is conditional on characteristics of the population. When many poor are illiterate, the impact of newspaper and poster campaigns is limited, and radios are a more important media tool. Moreover, we find

that the impact of local radio access on reducing capture is more important when illiteracy is more widespread.

Third, we analyze how the nature of public funding and the type of program is affecting local capture. We find that the more transparent funding mechanisms – in the sense of easiest to monitor – are associated with lower capture.

Fourth, while Reinikka and Svensson (2004a,b) focus their attention on the role of monitoring by the beneficiaries (i.e. monitoring "from below"), we also analyze the importance of monitoring "from above", i.e. by the central agencies, which are implementing the public policy. We find that monitoring from above – which is measured by distance from the centre – also has a strong impact on capture. Our findings also provide evidence of the importance of "remoteness" or geographical isolation in development, an issue emphasized in contributions by e.g. Krugman (1991) and Gallup *et al.* (1998).[2]

Finally, our findings taken together have implications for the debate on decentralization of public service delivery in developing countries (see Bardhan and Mookherjee, 1999, 2000a,b; Faguet, 2000; Fisman and Gatti, 2002; King and Özler, 2002). In Madagascar, public services are heavily concentrated at the central level with about 88% of expenditures executed at that level (World Bank, 2004). However, the sector of education is more decentralized than others, with 55% of recurrent expenditures allocated to the provincial and district levels. Besides, the government – with the support of the World Bank and other donors – increasingly relies on decentralized interventions and entities to improve educational services. A key institutional player in this respect is the district facility level. Our findings indicate important constraints on decentralization of public service delivery, in particular in the most remote areas.

[2] They show that geographical isolation implies large welfare costs. Krugman (1991) addresses the relationship between geography and international trade. Gallup *et al.* (1998) investigate the ways in which location may have a direct impact on growth. Fafchamps and Shilpi (2003) find that geographical isolation significantly reduces subjective welfare. Fafchamps and Moser (2003) and Fafchamps and Minten (2004) show that remoteness is positively correlated with crime in Madagascar.

The paper is organized as follows. The policy framework is described in Section 2. Section 3 provides information on the monitoring policy in the education sector of Madagascar and focuses in particular on the role of the mass media as a monitoring tool. Section 4 describes the methodology used to measure capture and its determinants. The conceptual and empirical models are depicted in Section 5 and 6 respectively. Section 7 presents the econometric estimation results and Section 8 concludes the paper.

2. The Policy Framework

Madagascar has low school enrolment rates, even by African standards (Glick *et al*., 2000; Razafindravonona *et al*., 2001; Larson *et al*., 2005). According to a recent World Bank (2002) study, only 60% of the urban children completed primary school. In rural areas, where most people live, the rate is even lower as only 12% of children in rural areas completed primary school.[3]

In the aftermath of a political crisis in 2002, the new government, in collaboration with the donor community, decided to introduce a significant public investment program in education to increase enrolment in schooling. The new government decided to use part of the Heavily Indebted Poor Countries (HIPC) Initiative funds to pay the tuition fee of all students in public primary schools. For every registered student, schools would receive 15,000 Francs Malagasy (FMg) in the capital city, Antananarivo, and 10,000 FMg in the rest of the country.[4]

This program importantly changed the financing of public education in Madagascar. The financing traditionally had three components. First, the government pays the salaries of most teachers, which makes up a large share of the total expenditures. Second, the

[3] In 2002, education, like all public services, was further negatively affected by a dispute on the outcome of presidential elections in December 2001, which threw Madagascar into a political and economic crisis. General strikes and roadblocks hit the economy and halted social service delivery in the country. The crisis was resolved in the summer of 2002, but the impact was severe. Regarding education, a significant number of parents were unable to pay for schooling and health costs after the political crisis (Cornell University, 2003).
[4] In 2002, 15,000 FMg amounted to approximately 2 USD and 10,000 FMg to 1,5 USD.

government finances school equipment via district-level institutions (*CISCO – Circonscription Scoliare*) and provides a credit line to the district education offices for school equipment, which is distributed in-kind to the schools.[5] The CISCOs in principle do not pay salaries, but they are able to hire some teachers on their credit line for school equipment if they want to allocate extra teachers to some schools. Third, all additional expenditures of the schools were covered by tuition fees paid by the parents of the students. The tuition fees were set and collected by parents-teachers associations (FRAM[6]), which therefore paid almost all the non-salary school expenses. In addition, the FRAM also hires extra teachers if necessary. During the school year 2001/2002, 11% of the total number of teachers was hired by the FRAM as contractual workers with no social schemes (Francken, 2003).

The objective of the new government policy was to replace most of the tuition fees by government grants. The HIPC payments were introduced as a per student grant and were allocated only to public schools. Later, an additional budget ("CRESED", financed by a World Bank education project) was introduced, which was organized similarly but which provided funding to both public and private schools.[7] Officially, the implementation of the HIPC program started in August 2002, at the beginning of the school year 2002-2003. Cash funds were transferred from the central government to the districts (CISCOs) and district officials were to transfer the payments to the public primary schools.[8]

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[5] The CISCOs decide on the use and allocation of the funds and transfers of in-kind equipment and material to the schools in their district. Two-thirds of the CISCO budget is allocated to the procurement of services (mainly current maintenance), while the purchase of goods is assigned in equal parts to administrative and school supplies respectively (World Bank, 2004).

[6] FRAM = 'Fikambanan'ny Ray-Amandrenin'ny Mpianatra'

[7] After the implementation of both programs, parent contributions fell on average to around 20% of non-salary expenditures, while the HIPC government payments make up around 30% and CRESED payments around 40%. The remaining part of the budget mainly comes from community-based initiatives, often supported by non-governmental donor organizations (World Bank, 2004).

[8] In theory, the education administration at district level is supported by local agents of the 'Zones Administratives Pédagogiques' (ZAP), who cover almost all primary schools within one Commune. The agents should distribute the cash funds and in-kind contributions to the schools of their Commune. Although, in practice, their function is mainly administrative and the schools acquire the grants and contributions directly from the CISCOs.

The analysis here concentrates on local capture (a) of the HIPC payments and (b) of the CISCO in-kind distribution during the academic year 2002-2003. The HIPC payments were an entirely new policy and the surveys used in this paper were implemented to measure to what extent funds arrived to the intended beneficiaries. The CRESED payments were implemented later -- too late to be captured by the survey. The survey also measured the distribution and capture of the existing CISCO in-kind equipment funding system.

3. Monitoring and the Media

In order to ensure that the HIPC funds would actually arrive at the school level and to prevent capture of the funds along the chain, the central government, with strong pressure from the donors, put several accompanying measures in place. First, it sent letters to the district facilities and the schools explaining the new policy and required the CISCOs and the schools to post in a public place the amount of money received. However, although posting of the amount of grants received was a necessary condition to receive funds, our survey showed that only 29% of the schools actually did so.[9]

Second, monitoring from the central level was reinforced.[10] One part of the monitoring was audits and controls at the district level. Based on our interviews and anecdotal evidence it appears that the monitoring and inspections, and their effect, varied strongly across districts. In general, inspections and monitoring were imperfect and even in case of problems sanctions were rare.[11] This left the opportunity for capture at the district level without being detected and sentenced.

[9] Data on posting at CISCO level are not available.
[10] This also reflected the new emphasis by donors and the new government on good governance. For example, an important part of the Poverty Reduction Strategy Paper (PRSP) of Madagascar deals with issues related to good governance.
[11] During the school year 2002-2003, 68% of the visited public primary schools did not receive any inspection of any kind. Moreover, in case of problems, sanctions were rare (Francken, 2003).

Third, transfer of the payments to the schools was conditional upon submission of a budget plan from the schools. A newly created institution, the *Fiarahana ombon'antoka ho Fampandrosoana ny Sekolo* (FAF), which was made up of parents of current and former students, of the director of the school, and of other people of the region, needed to present a work plan in which it explained the use of the funds. Further, before getting the grants, the schools had to provide the number of children at their schools as the payments were to be allocated as per student grants. When the student numbers were aggregated at the central level, the program turned out to be under-funded, and the amount of funds was adjusted, albeit limited. This, however, created some uncertainty on how much schools were to receive.

Fourth, since the mail distribution system is slow in Madagascar, the policy was also announced and explained via the mass media. The mass media campaign was to stimulate monitoring from the intended recipients of the education funds, i.e. the local schools and parents. The media campaign included newspapers, radios, and TV. The information on the abolishment of the public school tuition fee was reported widely in newspapers and broadcasted on national and local radios and TV. Nevertheless, there was still significant confusion and erroneous expectations. In approximately half of the schools, the staff thought the money was going to be allocated directly to the parents instead of the schools. They expected that the parents were going to be paid to send their children to school. Especially remote schools were informed quite late on the new policy and the information they received was often incomplete.

Finally, after the elections, the new government replaced many district officials as part of the transformation of the bureaucracy. While the objective of the replacement of officials was not specifically linked to the education programs, it may well be that these changes had an impact (see further).

4. Measuring Capture and Its Determinants

Our analysis quantifies several types of capture in the supply chain of the education sector of Madagascar. First, we look at discrepancies between the HIPC funds recorded as sent by the central government and as received by the district facility levels. Second, we investigate differences between HIPC grants at the district levels and the schools. Finally, we try to match the in-kind contributions purchased by the district officers, on their credit line for school equipment, and received by the schools. In addition, we calculate indicators of a series of explanatory variables.

4.1. Data

We use three different sets of data sources. First, during the last semester of 2001, the ILO program of Cornell University in collaboration with the National Agricultural Research Centre of Madagascar (FOFIFA), conducted a countrywide commune survey, which included 1385 communes, i.e. 99% of all communes in Madagascar. The goal of the survey was to collect detailed information at the communal level on various demographic, social and economic issues, including access to public goods and services.

Second, to evaluate the socio-economic situation after the 2002 crisis, the National Statistical Institute (INSTAT) in cooperation with FOFIFA and the Cornell ILO program, organized a survey in 150 communes[12] at the end of 2002. The major purpose of the survey was to evaluate the impact of the crisis on economic activities and social service delivery. The stratified sampling frame was designed to be representative at the national and provincial level. Districts were divided in six strata depending on the distance to the capital of the province (close, medium, far) and on the availability of a tarred road. In each stratum, one

[12] Out of 1391 Communes in total, i.e. more than 10% of the Communes.

district was selected for every province. In each district (36 out of 111 in total), four communes were selected randomly.

In each commune, two public primary schools were surveyed: one in the centre of the commune and one remote school that was at least 3 km away from the centre. Given the size of the population in cities, these were treated differently. In Antananarivo, the nation's capital, 12 public primary schools were surveyed. In each provincial capital, six public primary schools were visited. The survey covered 326 schools in total, of which 85% were in rural areas; 15% were in urban areas.

Third, to collect specific information on the money flows of the public education programs, we organized a budget tracking survey at government, district facility, and school level in April/May 2003. The purpose of the survey was to provide nationally representative data on budget allocations and leakages in the education sector of Madagascar, more specifically in the context of the new educational policy. To ensure compatibility, the surveys on government, district and school level were held at the same time. In this new survey, more than half of the schools included in the post-crisis survey were revisited. The survey was conducted in the whole of Madagascar. In each province, four districts and 13 communes were surveyed - see Annex I for a map with details. In total, 24 districts (more than 20% of the total) and 185 public primary schools were surveyed, of which 73% were located in rural areas. After data checking and testing, we ended up with reliable data on 176 schools.

4.2. Measuring capture

Following Reinikka and Svensson (2004a), we calculated the following indicator of capture, c^i;

$$c^i = 1 - \frac{\text{funds received by agent}_i}{\text{funds from agent}_{i-1}\text{ intended for agent}_i} \qquad (4.2.1)$$

where $agent_{i-1}$ is the organization higher up the chain (e.g. district level) from $agent_i$ (e.g. school level). An indicator of 1 indicates full capture; 0 means no leakage. Using this indicator, we calculated capture at each district and at each school.

As it was difficult to verify the exact amount of funds that left and arrived at district and at school level, we tried to collect as much physical evidence as possible (bank statements, signed receipts etc.) to quantify the gaps between district facility levels and schools. In the case where this was not possible, our enumerators based themselves on the amounts reported as sent and received at both levels.

Theoretically, the intended cash funds from the centre/district facility level should be the product of the number of students in the public primary school and the HIPC contribution per student. However, in reality this was often not the case, as the records of the number of students at the central level were not updated. Before the crisis, children did have to possess a birth certificate before to be accepted in public schools. This condition was annulated in a significant number of schools post-crisis or alternatively, communes made sure that enough copies were available to ascertain that more children could go to school. Consequently, the real growth in enrolment at the school level was considerably different from the central government statistics. Therefore, we measured the amount of intended funds for $school_i$ by the amount recorded as sent to $school_i$ in the district's accounts.

We assume that the accounting at school level is mostly accurate, as the schools have no clear incentives to misreport their resources. The schools are subject to the supervision of the parents-teachers association and the accounting is not the basis for any type of funding and it is not submitted to any district or central authority.[13] Our interviews and anecdotal evidence indicate that there is very little incentive and possibility for potentially corrupt

[13] The situation in Madagascar is similar to the situation in Uganda as described in Reinikka & Svensson (2004a).

school directors to embezzle part of the school funds. In contrast, our interviews confirmed that significant capture existed at the district level.

We also calculated capture indices for in-kind funding by CISCOs. As it was impossible to value the in-kind contributions correctly and consistently in monetary terms, we constructed a qualitative capture indication as a 0-1 variable indicating 1 when there was a significant discrepancy between the CISCO and the school, i.e. if the district officer recorded to have sent more material than the public primary school noted as received; and 0 otherwise.

4.3. Results

In general, there was no capture at the central level and relatively little at the district level of the HIPC funds – at least compared to other Sub-Saharan African countries as e.g. those cases reviewed in Reinikka and Svensson (2004a). However, there was significant variation at the district level and capture was significantly higher in some districts. In addition, capture of in-kind contributions was larger than of HIPC funds.[14]

By April 2003, the divergence between the HIPC cash grants recorded as sent by the central authorities and as received by the district facility levels was very low: 98% of the funds arrived at district level. Based on our interviews, it appears that (a) this small gap mainly reflects minor accounting errors at the government or district level, rather than capture, and (b) that monitoring played an important role. Capture of funds at the central level was very difficult as the Ministry of Education was subject to relatively detailed inspections and pre-audit procedures.[15]

[14] Furthermore, in most places it took considerable time for the funds to arrive. The Cornell ILO survey at the end of 2002, three months after the start of the new policy, found that only 40% of the public schools had received the funds; 60% had not yet received anything.

[15] During the school year 2002-2003, the World Bank – together with the rest of the donor community – organized four audits at the Ministry of Education. The results are described in the 'Aide-Mémoires' (World Bank, 2003).

The degree of capture of HIPC cash funds at the district level is summarized in Table 1. Overall, 20% of the public primary schools visited (i.e. 36 schools) recorded to have received less than the district officer noted as sent. For these schools the average difference amounts to 35% of the intended HIPC contribution. The data show strong provincial differences. Toliara, in contrast to Antananarivo, seems to be the worst performer as on average 15% of the cash grants meant for the public primary schools disappeared.

Table 1 also shows leakage of HIPC cash funds measured as a dummy variable. The variable equals one if there is an inconsistency between the district and school records concerning the distribution of HIPC grants; and zero otherwise. Although the province of Fianarantsoa does not show a high degree of capture, still 37% of the schools received less than they should have received.

Compared to the leakage of cash funds, the capture of in-kind contributions between districts and schools is higher as 41% of the schools reported to have received less material than the district facility noted as sent (Table 2). Similar to the cash grant data, there are strong regional differences. All communes of Fianarantsoa show leakage of in-kind contributions. On the other hand, no communes of the province of Toamasina record capture.

The regional variations in these findings suggest that the variations in capture are not random but reflect structural differences of the schools, the local communities, and the districts. This is consistent with anecdotal evidence based on our personal interviews. In the next sections we first develop a conceptual model of capture and afterwards test the hypotheses to explain the variation in capture in Madagascar.

5. Theory and Hypotheses

Consider a service delivery chain made up of consecutive agents, with agent 0 at the central level (starting point), and agent I at the local school (end point). Take agent i at some

point in the service delivery chain (and $0 \leq i \leq I$). Agent i is monitored from above by agent i-1, and from below by agent i+1. We assume that agent i is an expected rent (π^i) maximizer. S/he will try to extract as much of the public funds as possible for private gains, taking into account possible penalties if s/he gets caught. Formally, agent i maximizes:

$$\underset{c^i}{\text{Max}}\ \pi^i(c^i) = c^i\ (1-\alpha^i\ ) - \alpha^i q^i \tag{5.1}$$

where c^i represents capture, measured as a share ($0 \leq c^i \leq 1$) of the total funds s/he handles[16], α^i is the probability of getting caught, and q^i is the effective penalty agent i has to pay if s/he gets caught. We assume that the risk of getting caught is a positive and convex function of the degree of capture, so:

$$\alpha^i = \alpha^i\ (c^i\ ) \qquad \text{with} \quad \partial\alpha^i / \partial c^i > 0 \quad \text{and} \quad \partial^2\alpha^i / \partial c^{i2} > 0 \tag{5.2}$$

Maximizing (5.1) and taking into account (5.2) yields the following Kuhn-Tucker conditions:

$$\begin{aligned} \partial\pi^i(c^{i*})/\partial c^i &= (1-\alpha^i) - \alpha^i_c.(c^{i*} + q^i) \quad < 0 \qquad \text{and} \quad c^i = 0 \\ \partial\pi^i(c^{i*})/\partial c^i &= (1-\alpha^i) - \alpha^i_c.(c^{i*} + q^i) \quad = 0 \qquad \text{and} \quad 0 < c^i < 1 \\ \partial\pi^i(c^{i*})/\partial c^i &= (1-\alpha^i) - \alpha^i_c.(c^{i*} + q^i) \quad > 0 \qquad \text{and} \quad c^i = 1 \end{aligned} \tag{5.3}$$

With $0 < c^{i*} < 1$ (i.e. with an interior solution), at the optimal level of capture, the marginal benefits of increasing capture $(1-\alpha^i\ )$, equal the marginal costs for agent i, $\alpha^i_c.(c^{i*} + q^i)$.

However, the risk of getting caught is not only dependent on the degree of capture, but also on a set of exogenous variables which influence the cost of information, monitoring, etc., and hence the likelihood for agent i of getting caught. We define z^i as a vector of these exogenous variables (and we will discuss the variables in more detail later). Consequently, we can write that:

[16] To start, we ignore variations in the funds handled by agents. This assumption is not crucial for our results and can be easily changed. We started with this assumption since our main focus is on the monitoring and information issue. Besides, in the empirical analysis we focus on cross-district variations in funds and capture – which eliminate the main source of fund size variations between stages in the chain. Furthermore, we control for variations in school (and thus funding) size through control variables in the empirical analysis.

$$\alpha^i = \alpha^i(c^i, z^i) \tag{5.4}$$

With an interior solution, we can then derive the impact of z^i on the optimal level of capture c^{i*}:

$$\frac{\partial c^{i*}}{\partial z^i} = -\frac{\alpha_z^i \alpha_c^i + (1-\alpha^i)\alpha_{cz}^i}{2\alpha_c^{i2} + (1-\alpha^i)\alpha_{cc}^i} \tag{5.5}$$

where subscripts represent first derivatives and double subscripts represent second derivatives. We assume that the exogenous variables, affecting the cost of information, monitoring, etc. affect α^i directly (hence $\alpha_z^i \neq 0$), but do not affect the marginal effect of capture on the probability of getting caught $(\partial\alpha_c^i / \partial z^i = \alpha_{cz}^i = 0)$.[17] Under these assumptions, it follows that the sign of $\partial c^{i*} / \partial z^i$ is determined by the sign of α_z^i: with $\alpha_z^i > 0$, $\partial c^{i*} / \partial z^i < 0$, and vice versa. We will now discuss the effect of the z-variables more specifically.

First, define m_j^i as the <u>direct monitoring cost</u> of agent i by agent j. This cost includes the cost for agent j to inspect agent i (e.g. travel cost, opportunity cost of time etc.). With higher monitoring costs for agent j, the likelihood for agent i of getting caught decreases. Hence $\partial\alpha^i/\partial m_{i-1}^i < 0$ and $\partial\alpha^i/\partial m_{i+1}^i < 0$, and consequently, as we derived earlier, the signs of these terms determine the sign of $\partial c^{i*}/\partial m_j^i$. Hence our first set of hypotheses is that the optimal level of capture increases with the monitoring costs of the agents above and below in the service delivery chain: $\partial c^{i*}/\partial m_{i-1}^i > 0$ and $\partial c^{i*}/\partial m_{i+1}^i > 0$.

Second, define k_{i+1}^i as the <u>cost</u> for agent i+1 <u>to obtain information</u> on the services and funds which should be delivered by agent i. With higher information costs for agent i+1, the

[17] There is no evidence strongly suggesting otherwise; and even a less constraining assumption (e.g. like α_{cz}^i being small compared to α_z^i) would be sufficient.

likelihood for agent i of getting caught decreases. Hence $\partial\alpha^i/\partial k^i_{i+1} < 0$, and our second hypothesis is that the optimal level of capture increases with the information costs of the agent below in the service delivery chain, so $\partial c^{i*}/\partial k^i_{i+1} > 0$.

Third, define v^i as the <u>quality and effectiveness of the local justice system</u> in which agent i operates. As we will document later, this varies considerably between different regions in Madagascar. With a more effective local justice system the likelihood for agent i of getting caught if s/he captures public funds, will increase and thus $\partial\alpha^i/\partial v^i > 0$. Consequently, our third hypothesis is that the optimal level of capture will decrease with the quality of the local justice system ($\partial c^{i*}/\partial v^i < 0$).

Fourth, our other hypotheses have to do with the impact of <u>human and social capital</u>. The impact of these capital variables will differ along the service delivery chain. Define h^i as the human capital and s^i as the social capital of agent i. Human capital is typically positively related to entrepreneurship and skills in various activities. Therefore we can expect that an agent i with more human capital will be more able to avoid detection in capturing funds, e.g. by using more sophisticated methods. This would imply that $\partial\alpha^i/\partial h^i < 0$, and hence that $\partial c^{i*}/\partial h^i > 0$: the level of capture will increase with the human capital of agent i.

For similar reasons, the effect of more human capital of agents at different levels in the chain will be the opposite. More human capital endowments of agents above and below in the service delivery chain will increase the effectiveness of their monitoring and the likelihood for agent i to be caught. This implies that $\partial\alpha^i/\partial h^{i-1} > 0$ and $\partial\alpha^i/\partial h^{i+1} > 0$ and hence that $\partial c^{i*}/\partial h^{i-1} < 0$ and $\partial c^{i*}/\partial h^{i+1} < 0$: the level of capture will decrease with higher human capital of the agents above and below in the service delivery chain.

Social capital will allow agents to use their social networks either to avoid being caught or to help monitoring and prevent capture. For example, if agent i belongs to a local elite s/he may receive protection and assistance from this network when attempting to divert funds. Consequently, the chances of getting caught will be lower ($\partial\alpha^i/\partial s^i < 0$) and the optimal level of capture of agent i will increase with his social capital ($\partial c^{i*}/\partial s^i > 0$). This hypothesis is consistent with findings that local elites divert services to themselves, at the expense of non-elites (e.g. Rubio, 1997; Bardhan and Mookherjee 1999, 2000a,b; Warren, 2004). On the other hand, the probability for agent i to be caught with capture will increase if agents above and below in the service delivery chain can rely on social networks to assist them in monitoring agent i. This implies that $\partial\alpha^i/\partial s^{i-1} > 0$ and $\partial\alpha^i/\partial s^{i+1} > 0$ and consequently that $\partial c^{i*}/\partial s^{i-1} < 0$ and $\partial c^{i*}/\partial s^{i+1} < 0$: the level of capture will decrease with the social capital of agent i-1 and agent i+1.

6. Empirical Model

The empirical estimation includes two models, which differ in the use of their dependent variables, i.e. leakage of cash funds and in-kind contributions. Both dependant variables are school-specific measures and the general model has the following structure,

$$c^i = f(m^i_j,\ k^i_{i+1},\ h^{ij}, s^{ij}, v^i, \lambda, \eta) + \varepsilon_{ij} \qquad (6.1)$$

where c^i represents capture as the dependant variable, and ε_{ij} is an error term. Furthermore, the model identifies seven explanatory variables m^i_j, k^i_{i+1}, h^{ij}, s^{ij}, v^i, λ and η.

The first explanatory variable is m^i_j, the monitoring cost. We use two specific measures to proxy for this variable. First, *district_capital* measures the distance (in kilometers) from the district facility level to Antananarivo, the nation's capital. Second, *district_school* measures the distance (in kilometers) from the district facility level to the

public primary school. Given the general lack of infrastructure and means of transport in Madagascar, this variable is a valid measure of the geographical isolation of the district facilities. Less remote districts, i.e. compared to the agents above – the central education authorities – or below – the schools – in the service delivery chain, will be more easily accessible by the respective agents and thus imply lower inspection costs. Consequently, it is expected that smaller distances to the districts from inspecting agents above or below in the education chain will lower capture at district level.

The second explanatory variable measures the information cost k_{i+1}^{i}. Several recent studies (e.g. Reinikka and Svensson, 2004a,b) show the importance of local, independent media as a tool to decrease information costs. We use the number of local (private) radio stations (*radio*) as a proxy for media. We believe this measure is a valuable instrument to capture and quantify media access because of three important reasons. First, radios play an important role in Madagascar, as they are the main source of mass media communication, especially in rural areas. Newspaper circulation is concentrated mostly in urban areas, and few newspapers are available in remote and rural areas. Moreover, many people are illiterate in these areas. According to a recent study of Andriantsoa *et al.* (2004) only 6% of the Malagasy population reads a newspaper. However, the National Household Survey of 1997 (INSTAT, 1997) showed that a high 45% of all households are in the possession of a radio and according to the Commune Census of 2001 (Cornell University, 2001) approximately half of all communes (48%) have access to a local radio.[18] Second, while in theory the government's Radio National Malagasy (RNM) broadcasts nationwide, in reality this is not the case. During our field interviews, we discovered that several communes often do not receive any signal at all or in case they do, the message is unclear. We therefore got to use only regional radio coverage, which is more accurate. Third, by using the number of media

[18] This compares to a low 18% to regional television.

outlets – and not just access to media – as our benchmark, we take other important factors into account, as for example, schools may be informed about the new educational policy through other people with radio access and the access of schools to a radio can fluctuate.[19]

Human capital (h^{ij}) of the different agents in the service delivery chain will affect capture. We expect higher educated district leaders to capture funds in a more sophisticated manner and hence experience a lower risk of detection. We define human capital at district level (h^{i}) as a categorical variable measuring the education level of the district director (*educ_district*). On the other hand, higher educated agents (above and) below in the service delivery chain will experience a lower monitoring cost as their capability to obtain information will be higher. Our measure of human capital at school level (h^{j}) is the quality of the parents-teachers associations' leadership, defined as the degree of literacy in the commune (*literacy*).

The impact of social capital (s^{ij}) on capture will also vary by agent. A district officer who is born in the district where he operates, has more informal connections than a newcomer. While his social capital could be an incentive to him to perform well (e.g. Putnam, 1993; Esping-Andersen, 1994), our approach accommodates the opposite concern that local elites seek to divert services to themselves, at the expense of non-elites (e.g. Rubio, 1997; Bardhan and Mookherjee, 1999, 2000a,b; Warren, 2004). Our proxy for social capital at district level (s^{i}) is the origin of the district leader (*origin_district*), defined as a dummy variable that is equal to one if the district head is born in the district where he operates; and zero otherwise.

We expect that the impact of local media on capture is conditional upon the characteristics of the population, in particular upon the literacy rate in the commune, so we include an interaction term in our analyses (*radio*literacy*) to account for this phenomenon.

[19] Partly because of the variation in how often the head teacher has access to a newspaper, Reinikka and Svensson (2004b) use the proximity to a newspaper outlet as an instrument for the exposure to the media campaign.

Our hypothesis is that local radio stations are more important tools to reduce capture in less educated areas as the population has less human capital to obtain information from other sources than from the mass media.

The quality and effectiveness of the local justice system (v^i) is measured by a dummy variable (*red_district*) with value one if the district is officially a red or highly unsafe district (i.e. a district where more than 50% of the communes suffer from an extremely high insecurity level); and zero otherwise. These red districts are insecure due to the presence of organized crime organizations (as the Dahalo[20]), which is a good indication of the lack of a well functioning judicial system.

Finally, different control variables (λ) are included in the regression. According to the theory of Reinikka and Svensson (2004a), the bargaining power of the school vis-à-vis the district officer will depend on her size. First, we use the relative school size (*schoolsize*), quantified by the size of the public primary school divided by the size of all primary schools, public as well as private, in the district, as our measure.[21] Second, the dummy variable of cyclical droughts (*drought*) equals one if the commune was hit by two or more droughts, i.e. heavy income chocks, during the last four years (1998/2002).[22] Parents who have to deal with cyclical shocks will care more about their family's instant needs then about education, so we expect this variable to have a negative impact on capture.

Third, after the elections, the new government replaced many district officials as part of the reorganization of the bureaucracy. While the objective of the replacement of officials was not specifically linked to the education programs, it might be that these changes had an impact. We measure the impact of the new representation on capture using a dummy variable

[20] The 'Dahalo' is a well-known crime organization in Madagascar that is specialized in large-scale zebu theft.
[21] Because the district officer is responsible for the distribution of the HIPC as well as the CRESED funds and the latter are also donated to private primary schools, we believe this variable will give us the most accurate measure of the school's bargaining power.
[22] Our data on cyclical droughts are consistent with the data of the Organisation for the Coordination of Humanitarian Affairs (OCHA; *http://ochaonline.un.org*).

(*new_district*) with value one if the district director is new in his position from the beginning or during the school year 2002/2003, i.e. after the appointment of the new president; and zero otherwise. Fourth, five regional dummies – corresponding with the provinces Antananarivo, Toamasina, Mahajanga, Toliara and Antsiranana – are included to capture additional fixed effects (η). The reference region is Fianarantsoa.

In short, our complete empirical model looks as follows (6.2),

$$c^i = \beta_0 + \beta_1 district_capital + \beta_2 district_school + \beta_3 radio + \beta_4 literacy + \beta_5 radio * literacy + \beta_6 educ_district + \beta_7 origin_district + \beta_8 red_district + \lambda + \eta + \varepsilon_{ij}$$

where c^i is censored from below[23], i.e. $c^i \geq 0$. The model suggests $\beta_1, \beta_2, \beta_5, \beta_6, \beta_7, \beta_8 > 0$; $\beta_3, \beta_4 < 0$.

Areas suffering from substantial local capture of public funds could be areas that, in general, are lagging behind in their development. For this reason these areas could have less media outlets compared to other well-developing regions. If this is the case, our *radio* variable suffers from unobserved heterogeneity. One of the solutions to this problem is to measure the exposure to the media campaign by taking into account the average number of regional radio stations in the district, taking out the number of radio stations in the respective commune. Our new variable is *radio_mean* and we will proceed with this variable in order to reduce endogeneity problems.

Moreover, the variable *origin_district* could also be claimed to be endogenous, as district officers from districts with more leakage could already have been replaced in the past, implying that these districts show lower current leakage levels. Although this is a valuable argument, results of a recent World Bank study (Francken, 2003) show that during the past three years there was a general lack of inspections in the education sector in Madagascar and in case of problems, sanctions were rare. Therefore we believe endogeneity not to be a serious concern.

[23] The majority of schools visited were not subject to capture, i.e. c^i equals zero.

7. Results

7.1. Descriptive statistics

Descriptive statistics are reported in Table 3. In our sample, the average distance from a district facility level to the capital, Antananarivo, is 561 km. However, there are large variations, with a maximum distance of 1235 km. The average distance from district facility level to public primary school is 26 km. The maximum distance is 107 km. The number of local radio stations fluctuates from 0 to 15, with 26% of the sample without access to any local radio. Overall, the mean number of local radio outlets is 4 and the medium is 3. The average literacy rate is 67% with large variation between communes. The lowest literacy rate is 7% and the highest 97%. Looking at the district characteristics, 28% of our sample of public primary schools is situated in highly insecure districts. Approximately half of the schools have a district director who is born in the district and the majority of district officers obtained a university degree. The remaining group of directors completed at least the first cycle of high school. Finally, the median relative school size is 0.007 and 27% of our sample of schools is situated in a commune that experienced cyclical droughts during the 1998/2002 period. After the elections, the new government replaced 89% of the district officials.

7.2. Determinants of cash leakage

The first model was estimated using a left-censored tobit regression. The results are shown in Table 4. As there is some concern on correlation between our key variables and some of the provincial dummies, we test for the significance of the variables with and without the provincial dummies. We also present the regression results with all key variables entered separately. *District_capital* comes out highly significant and with the predicted sign, both separate (Columns 1 and 2) and together with our other explanatory variables (Columns 7 and

8), meaning that a higher distance between the capital and the district facility level increases capture. On the other hand, the distance between the district facility level and the school (*district_school*) does not affect capture (Column 3). We thus find that monitoring "from above" – which is measured by distance from the centre – has a strong impact on capture. The inspection cost of the central monitoring agencies will increase with the geographical isolation of the district and therefore more remote districts will experience less control from the centre and thus suffer from more local capture. Considering that the government – with the support of the donors – increasingly relies on decentralized interventions and entities to improve educational services, this indicates important constraints on decentralization of public service delivery, in particular in the most remote areas.

Radio_mean enters significantly with the right sign, both individually (Columns 4 and 5) and jointly (Columns 7 and 8). Consistent with our expectations, we find that information on the disbursement of public funds to the intended beneficiaries – which is measured by the number of local media outlets – is a powerful monitoring tool "from below" that empowers citizens at the bottom of the service delivery chain in their interactions with local officials and politicians and, thereby, decreases the capture of public expenditures. These findings are consistent with the results of Reinikka and Svensson (2004b).

Moreover, *literacy* seems to be an important determinant of capture and the impact of local media on capture is conditional on the literacy rate of the population. According to our model and consistent with our results, schools that are situated in less educated areas experience a higher degree of capture as their ability to achieve information will be lower (and thus their monitoring cost will be higher compared to schools in better educated areas).

The interaction term (*radio_mean*literacy)* enters significantly at the 5%-level with a positive sign, meaning that the impact of local radio access on reducing capture is more important when illiteracy is more widespread. This is as we expected. A higher literacy rate

increases the ability to get informed, so the need for mass media as information tools is lower. Regional mass media might therefore be important in alleviating capture and corruption, especially in less educated areas.

Finally, *origin_district, red_district* and *drought* appear to be highly significant with a positive sign, suggesting that the degree of cash leakage increases with the social capital of the district director and the level of insecurity and cyclical droughts in the district. We do not find any significant effect of the education level of the district head, neither of the new representation at district level. While there could be a problem of selectivity bias as maybe only the bad district directors were replaced, the Ministry of Education indicated that all districts directors were to be replaced in the medium term.[24]

As an additional robustness test, we dropped, one at the time, all observations from each province in Madagascar to see whether any province-specific effects drive the results. The results remained intact. Moreover, we examined the conditioning of the matrix of independent variables according to Besley, Kuh, and Welsch (1980). If this number is large (Besley *et al.* suggest 30 or higher), there may be collinearity problems. Our conditioning value equals 23, implying that there are no important collinearity problems.

Given our small sample of schools with capture, we further took a closer look at the incidence of capture, without considering the size. We used a probit regression[25] to test for this (Table 5). The dependent variable takes the value of one if there is capture of local cash funds; and zero otherwise. Our results are robust to heteroskedasticity as we used Huber-White standard errors. As expected, the results are similar to the results of our previous model.

[24] Furthermore, anecdotal evidence showed us that one of the remaining district directors only started distributing the cash contributions after our visit, implying that he was not one of the best performing bureaucrats who deserved to stay in place.

[25] Estimating a single tobit and probit model was preferred over a two-step Heckman procedure because, given our small sample of schools with capture, significant effects were only found for the selection part of the model.

In summary, our results show that monitoring "from above" as well as "from below" play an important role in the occurrence and degree of capture of cash funds by local bureaucrats.[26] Remoteness and insecurity of the district facility level increase local corruption while higher educated parents of students and a more extensive access of the schools to the media decrease capture of cash funds. Moreover, our data reveal that the impact of the media is conditional upon characteristics of the population and will be higher in less educated areas. Finally, communes that are more frequently victim of climatic shocks and communes which are situated in districts run by a director who is born in the district suffer more from local corruption.

7.3. Determinants of in-kind leakage

The second part of our empirical work tries to explain the determinants of leakage of the less easily detectable, in-kind contributions. Table 6 reports a probit regression, with capture of in-kind contributions as the dependent variable. The variable equals one if the district officer reported to have sent more material than the school noted as received; and zero otherwise. We used the same explanatory variables as in our previous analyses.[27] To address the problem of heteroskedasticity, we used Huber-White standard errors. Consistent with our model, both *district_capital* and *radio_mean* come out with the predicted sign and are significant at the 1% and 5%-level respectively. The estimated z-values confirm that both variables are important determinants of capture of in-kind contributions. Isolation from the centre increases capture whereas the presence of more media outlets decreases corruption. Finally, schools that are situated in insecure areas or in areas suffering from cyclical droughts show higher capture of in-kind contributions.

[26] Our findings are consistent with the results of several qualitative studies of the education sector in Madagascar (Brinkerhoff and Keener, 2003; World Bank, 2004).

[27] Except for the provincial dummies Toamasina and Fianarantsoa, which are omitted because of perfect prediction.

In contrast with our previous analyses on cash funds, *educ_district* enters significantly at the 5%-level with a positive sign. A higher educated district officer seems therefore to practice more capture of the – less easily detectable – in-kind contributions. *Literacy* also enters significantly with a positive sign. A district director seeks to maximize his rents at all times, but since this is more difficult in higher educated areas – as the monitoring "from below" is higher – he tries to find another, more sophisticated way to capture; he captures more in-kind contributions. Finally, the new district representatives capture significantly less of the in-kind contributions. A possible explanation is that in-kind capture is a sophisticated process and the old representatives are more experienced with the district's accounting and its possibilities.[28]

In conclusion, district facility levels that are geographically isolated from the centre, that are situated in highly insecure areas, or that are more frequently victim of climatic shocks suffer more from local corruption. In contrast with capture of cash funds, district facility levels which are led by a higher educated officer or which are situated in higher educated areas show a higher capture of in-kind contributions. District facility levels which are situated in areas with an extensive access to the media or which are led by a new district officer show less capture of in-kind funds.

8. Conclusion

This paper examines the determinants of corruption by officials in public programs in the education sector in Madagascar. The analysis shows that local capture can be successfully contained as our data reveal relatively low levels of capture, especially if compared to the situation in some other Sub-Saharan African countries.

[28] This result also rules out any problem of selectivity bias as discussed above, since it shows that it are not the good bureaucrats that stayed in place.

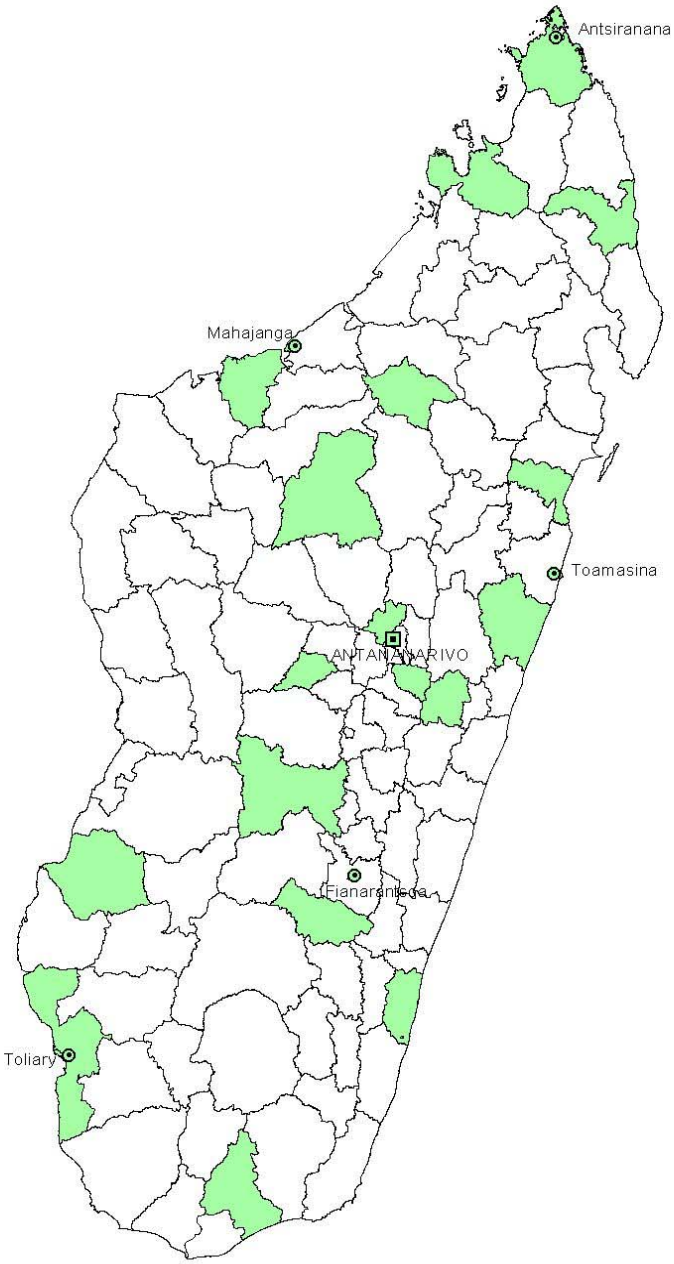
We find that the degree of local capture depends on the nature of public funding and on the type of funding program. Capture of in-kind contributions is more common than capture of cash funds. More transparent funding mechanisms – in the sense of easiest to monitor – are thus associated with lower capture, implying that transparency of funding programs should be encouraged. We also analyze the importance of monitoring "from above", i.e. by the central agencies, which are implementing the public policy. This type of monitoring has a strong impact on capture as remoteness or geographical isolation increases capture of public funds.

The presence of media reduces local capture, but the impact is conditional upon characteristics of the population. When many poor are illiterate, the impact of newspaper and poster campaigns is limited, and radios are a more important media tool. Moreover, we find that the impact of local radio access on reducing capture is more important when illiteracy is more widespread. It seems that the use of local mass media – especially in less educated areas – could therefore serve as a tool to increase the information level and thus help in the monitoring role of the beneficiaries.

Finally, our findings taken together have also implications for the debate on decentralization of public service delivery in developing countries as they indicate important constraints on decentralization, in particular in the most remote areas. In order to increase the efficiency of public spending on services for the poor, decentralization is for this reason best implemented in conjunction with regular monitoring and evaluation audits at the decentralized levels.

ANNEX

A.1. Map of Madagascar with interviewed districts (Budget tracking survey, 2003)



A.2. Data description

Cash funds received = cash funds noted as received in the public primary school records (Source: Budget Tracking Survey, 2003)

Intended cash funds from the district facility level = cash funds recorded as sent to the public primary schools in the accounting of the district facility (Source: Budget Tracking Survey, 2003)

Leakage of in-kind contributions = dummy variable which equals one if the district officer recorded to have sent more material than the public primary school stated to have received (Source: Budget Tracking Survey, 2003)

District_capital = the distance in kilometers from the district facility level to Antananarivo, the capital of Madagascar (Sources: Post-crisis Survey, 2002; Commune Census, 2001)

District_school = the distance in kilometers from the district facility level to the public primary school (Sources: Post-crisis Survey, 2002; Commune Census, 2001)

Radio = the number of local radio stations which can be received in the commune (Source: Post-crisis Survey, 2002)

Radio_mean = the average number of regional radio stations in the district, taking out the number of radio stations in the respective commune (Source: Post-crisis Survey, 2002)

Literacy = the literacy rate in the commune (Source: National Population Census, 1993)

Educ_district = the education level of the district facility director. It is a categorical variable (from 1 to 7) according to the years of study. Category 7 represents the group of district facility directors with a university degree (Source: Budget Tracking Survey, 2003)

Origin_district = dummy variable which equals one if the district facility director is born in the district where he is operating; and zero otherwise (Source: Budget Tracking Survey, 2003)

Red_district = dummy variable with value one if the district is officially declared as a red or highly unsafe district, which means a district where more than 50% of the communes suffer from an extremely high insecurity level (Source: Commune Census, 2001)

Schoolsize = the size of the public primary school divided by the size of all primary schools, public as well as private, in the district (Source: Cornell University Education Survey, 2003; Budget Tracking Survey, 2003)

Drought = dummy variable of cyclical droughts equals one if the commune suffered from two or more droughts during the last four years (1998-2002); and zero otherwise (Source: Commune Census, 2001)

New_district = dummy variable with value one if the district facility director is new in his position from the beginning of (or during) the school year 2002/2003, i.e. after the appointment of the new president (Source: Budget Tracking Survey, 2003)

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Table 1: Capture of HIPC cash contributions (according to formula (4.2.1) and as a dummy variable)

A. Capture according to formula (4.2.1) – in relative terms	*Mean*	*Median*	*St. dev.*	*Maximum*	*Minimum*	*Observations*
All schools						
Capture of cash funds	0.07	0.00	0.20	1.00	0.00	176
Per region						
Antananarivo	0.01	0.00	0.03	0.15	0.00	35
Fianarantsoa	0.08	0.00	0.13	0.40	0.00	30
Toamasina	0.08	0.00	0.23	0.86	0.00	30
Mahajanga	0.08	0.00	0.27	1.00	0.00	29
Toliara	0.15	0.00	0.26	0.75	0.00	25
Antsiranana	0.06	0.00	0.20	0.91	0.00	27
Schools with capture of cash funds (uncensored values)						
Capture of cash funds	0.35	0.29	0.32	1.00	0.01	36

B. Capture as a dummy variable with capture = 1	*Mean*	*Median*	*St. dev.*	*Maximum*	*Minimum*	*Observations*
All schools						
Capture of cash funds	0.20	0	0.4	1	0	176
Per region						
Antananarivo	0.09	0	0.28	1	0	35
Fianarantsoa	0.37	0	0.49	1	0	30
Toamasina	0.17	0	0.38	1	0	30
Mahajanga	0.17	0	0.38	1	0	29
Toliara	0.40	0	0.50	1	0	25
Antsiranana	0.07	0	0.27	1	0	27

Table 2: Capture of in-kind contributions (as a dummy variable with capture = 1)

	Mean	*Median*	*St. dev.*	*Max.*	*Min.*	*Obs.*
All schools						
Capture of in-kind contributions	0.41	0	0.49	1	0	176
Per region						
Antananarivo	0.37	0	0.49	1	0	35
Fianarantsoa	1.00	1	0.00	1	1	30
Toamasina	0.00	0	0.00	0	0	30
Mahajanga	0.21	0	0.41	1	0	29
Toliara	0.56	1	0.51	1	0	25
Antsiranana	0.33	0	0.48	1	0	27

Table 3: Descriptive statistics

Variable	*Unit*	*Mean*	*Med.*	*St. dev.*	*Max.*	*Min.*	*Obs.*
Determinants of capture							
District_capital	Km	560.7	473.0	410.7	1235.0	0.0	176
District_school	Km	26.0	21.5	24.4	107.0	0.0	176
Radio	Number	4.0	3.0	4.2	15.0	0.0	176
Radio_mean	Number	4.0	2.9	4.1	15.0	0.0	176
Literacy	Percent	66.9	71.2	23.7	96.6	6.9	176
Educ_district	Category	6.8	7.0	0.7	7.0	4.0	176
Origin_district	Dummy	0.5	1.0	0.5	1.0	0.0	176
Red_district	Dummy	0.3	0.0	0.4	1.0	0.0	176
Control Variables							
Schoolsize	Number	0.013	0.007	0.013	0.072	0.001	176
Drought	Dummy	0.3	0.0	0.4	1.0	0.0	176
New_district	Dummy	0.9	1.0	0.3	1.0	0.0	176

Table 4: Capture of cash funds from district to school level: Tobit analyses

	(1)	(2)	(3)	(4)	(5)	(7)	(8)
District_capital	0.001***	0.001***				0.001**	0.001**
	(4.20)	(3.58)				(2.16)	(2.15)
District_school			0.002			0.001	0.001
			(0.76)			(0.32)	(0.32)
Radio_mean				-0.061**	-0.073***	-0.301**	-0.310**
				(-2.18)	(-3.06)	(-2.25)	(-2.17)
Literacy						-0.015**	-0.015**
						(-2.02)	(-2.01)
*Radio_mean * literacy*						0.004**	0.005**
						(2.51)	(2.40)
Educ_district						-0.350	-0.356
						(-1.61)	(-1.61)
Origin_district						0.576**	0.588**
						(2.56)	(2.52)
Red_district						0.707***	0.712***
						(3.20)	(3.18)
Constant	-1.265***	-0.864***	-0.366**	-0.167	-0.273***	1.334	1.306
	(-4.16)	(-4.93)	(-2.25)	(-1.10)	(-2.61)	(0.77)	(0.75)
Control Variables	No	No	No	No	No	Yes	Yes
Schoolsize						9.771	10.113
						(1.55)	(1.54)
Drought						0.517***	0.508***
						(2.94)	(2.79)
New_district							0.048
							(0.20)
Provincial Dummies	Yes	No	Yes	Yes	No	Yes	Yes
No. observations	176	176	176	176	176	176	176
Pseudo R2	0.209	0.089	0.083	0.112	0.080	0.372	0.373

Note: Dependent variable is the degree of capture of cash funds (36 uncensored observations; 140 left-censored observations); t-statistics are reported in parentheses; significance levels of 10, 5 and 1 percent are represented by *, ** and ***.

Table 5: Capture of cash funds from district to school level: Probit analyses

	(1)
District_capital	0.002**
	(2.23)
District_school	0.001
	(0.18)
Radio_mean	-0.977***
	(-3.18)
Literacy	-0.056***
	(-3.58)
*Radio_mean*Literacy*	0.014***
	(3.60)
Educ_district	-0.967
	(-1.45)
Origin_district	1.590***
	(2.96)
Red_district	1.732***
	(2.90)
Constant	5.626
	(1.00)
Control Variables	Yes
Schoolsize	28.792*
	(1.86)
Drought	1.364***
	(3.17)
Provincial Dummies	Yes
No. observations	176
Pseudo R2	0.446

Note: Dependent variable equals one if the district officer noted to have sent more cash funds than the schools claimed to have received; results with Huber-White standard errors; z-statistics are reported in parentheses; significance levels of 10, 5 and 1 percent are represented by *, ** and ***.

Table 6: Capture of in-kind contributions from district to school level: Probit analyses

	(1)
District_capital	0.004***
	(4.85)
District_school	0.001
	(0.20)
Radio_mean	-0.530**
	(-2.36)
Literacy	0.033***
	(3.58)
*Radio_mean * literacy*	0.004
	(1.42)
Educ_district	0.696***
	(2.77)
Origin_district	-0.018
	(-0.06)
Red_district	0.518**
	(2.00)
Constant	-7.171***
	(-3.47)
Control Variables	Yes
Schoolsize	9.134
	(0.80)
Drought	1.008***
	(3.02)
New_district	-1.655***
	(-3.26)
Provincial Dummies	Yes
No. observations	176
Pseudo R2	0.276

Note: Dependent variable equals one if the district officer noted to have sent more in-kind contributions than the schools claimed to have received; results with Huber-White standard errors; z-statistics are reported in parentheses; significance levels of 10, 5 and 1 percent are represented by *, ** and ***.