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Abstract

The role of school fees in achieving both allocative and productive efficiency in the delivery of primary education has been a subject of intense debate. Building on a simple model that makes explicit the role of school fees in determining the optimal level of parental participation to school governance, this paper contributes to the debate by evaluating empirically the relationship between fees, participation and the accountability framework in public primary schools in Madagascar.

The results show evidence that schools requiring parents to pay more fees experience a higher degree of parental participation. While results are consistent with the theoretical model, the empirical analysis provides evidence that school fees increase participation beyond their effect on the power relationship between the community and the school authorities. The model hypothesis that school fees modify the accountability framework, which leads to more productive participation efforts, is challenged by alternative explanations. One of them is that participation aims not to increase education quality but rather to decrease the amount of fees requested by the school.

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1 Introduction

Education is widely considered a fundamental ingredient to economic growth and building of sustainable institutions. As a step towards the completion of universal primary education, many developing countries have abolished all school fees in government primary schools during the past two decades as a way to weaken the financial barrier to access to education faced by the poorest. This policy has generally led to a sharp increase in enrolment and attendance rates[1]. The relatively high price elasticity of demand for education in developing countries has been confirmed by experimental evidence[2]. School fees and other direct costs of education appear to significantly impede school participation.

Almost inevitably, however, the dramatic increase in enrolment levels has been accompanied by a general decline in the quality of education provided by the public sector (Deininger, 2003; Bold et al., 2010). Three mechanisms linking the removal of school fees with a reduction in the quality of education have been documented in the literature (Bold et al., 2010): a change in the overall financial and human resources available to public schools, a modification in the composition of children attending public schools and a deterioration of the accountability relationship between the community and the school authorities.

To compensate for the financial loss incurred by the reduction in parental contributions to their budget, public schools have generally received a yearly grant from their central government. The change in the total amount of funding available to each school is therefore of ambiguous sign. If the loss revenue from the collection of fees is less than compensated by the increase in public funds transferred to the school, total financial resources available to the school decline. The removal of school fees also has an impact on the composition of students attending public schools. Families whose decision to enrol their children is dependent on the removal of tuition fees are either those who face the strongest financial constraints or those who value education the least. Consequently, children who attend public schools as a direct result of the abolition of user fees are likely to systematically differ from existing students in terms of socio-economic background, age and ability. Additionally, better-off parents may choose to remove their children from the public education system as a result of the removal of school fees because they anticipate a reduction in the quality of education (Bold et al., 2010). Lastly, the introduction of free primary education in government schools can lead to a weakening of the accountability framework in those schools. In

other words, the removal of fees may undermine the willingness and ability of parents to monitor the school and participate in its management. While the first two mechanisms have recently received a lot of attention in the literature, little is known beyond anecdotal evidence about the role of the school accountability structure in explaining the relation between school fees and education quality.

The main objective of this paper is to evaluate whether school fees influence the level of parental participation in the management of the public primary schools via a modification of the school accountability framework. This paper relates to the literature on the impact of pricing on product use. Paying for a service may give an additional incentive for households to actually use the service. This psychological effect, often referred to as the sunk cost fallacy (Thaler, 1980), induces higher attendance rates for children whose parents had to pay for their education. It also means that parents will be more willing to get involved in the governance of the school if they contribute financially to its running. The payment itself screens out those who value the good the least. This screening effect increases the efficiency of allocation, by concentrating take-up on those who attribute the highest value to education (Oster, 1995). Of course, payment is also likely to screen out children who belong to the most financially constrained households, regardless of their valuation of education. Recent field experiments have rejected the sunk cost fallacy hypothesis, thus ruling out the existence of a trade-off between efficiency (wastage in the absence of a payment) and equity (greater access for underprivileged) in the provision of free products (Cohen and Dupas, 2007; Shapiro et al., 2007).

However, as Bold et al. (2010) note, "maintaining efficiency without charging fees may be more severe in the education context". Some authors have advocated for the maintaining of a certain form of payment from parents to the school as a way to motivate providers and ensure sustainability (Kremer and Holla, 2009). Payment for access to education likely matters for the strength of the accountability relationship between providers and clients. Parents who pay school fees may be in a better position to demand action from the school authorities in case the quality of education does not meet the expected standards. In this sense, this paper also relates to the literature on the determinants of community participation in the provision of quality schooling in developing countries. Studies have shown that the success of programmes promoting community participation as a tool to improve the quality of local public services is highly context-dependent. Banerjee et al. (2010) found no impact of a campaign aiming at promoting community participation in Indian schools by providing infor-

mation and training. Bjorkman and Svensson (2009) found that an initiative aiming at reinforcing community-based monitoring of local health service delivery in Uganda resulted in a large improvement in both the quality and quantity of the service provided. To my knowledge, however, no studies have tried to explain and quantify the role of fees on community involvement in school monitoring. This is the contribution to this literature this paper is intending to make.

I propose a simple theoretical model that makes explicit the role of school fees in determining the optimal level of parental participation to school governance and test the predictions of the model on a cross-sectional data set of fifty-eight Madagascar government primary schools. Although tuition fees have been officially removed in Madagascar public primary schools[3], some schools continue to ask parents for a contribution at the beginning of the school year, often because they experience delays in the reception of the government grant. Parents also continue to pay a non-trivial amount to Parents Associations (FRAM[4]), notably to cover the costs of contractual teachers. Substantial variation across schools in the amount of fees charged to parents provides a suitable framework to empirically evaluate the relationships between fees, participation and the school accountability framework.

I find evidence that evidence that schools requiring parents to pay more fees experience a higher degree of parental participation. While results are consistent with the theoretical model, the empirical analysis provides evidence that school fees increase participation beyond their effect on the power relationship between the community and the school authorities. The model hypothesis that school fees modify the accountability framework, which leads to more productive participation efforts, is challenged by alternative explanations. One of them is that participation aims not to increase education quality but rather to decrease the amount of fees requested by the school.

The remainder of the paper is as follows. Section 2 presents the analytical framework; Section 3 presents some background on Madagascar's public primary education system and describes the data; Section 4 presents the empirical results; and Section 5 discusses the findings and concludes.

2 Analytical Framework

This model is based on a model proposed by Beasley and Huillery (2012) which considers how parental participation to school functioning can determine the quality of and demand for education. Parents decide on their level of participation based on their expected benefits, which depend on the impact of their participation on the quality of education, and on their expected costs.

I adapt this model to introduce school fees paid by parents to the school. The amount of fees paid by parents contributes to determine the relative bargaining power of the school community over decisions regarding the school. I also add a dimension of heterogeneity among parents in terms of real authority, or bargaining power, vis-à-vis school authorities. This enables me to capture relevant dynamics in parental participation at school level as well as develop predictions that can be tested empirically. The model also reveals the main channels of impact of the level of school fees on parental participation to school governance, namely a modification in the school accountability framework and a change in the size and composition of the school community.

2.1 Model Setup

There are two groups of parents $k \in \{1, 2\}$ within the school: the relatively powerless (indexed 1) and the relatively powerful (indexed 2). Parents i are homogenous within each group and have perfect information regarding the types and payoffs of all parents. They do not coordinate their decision making. The participation effort of parent i of group k is denoted $e_{i,k}$; the total effort of other parents from the same group is denoted $e_{-i,k}$ and the total effort of parents from the other group is denoted e_{-k}. Parents maximise their individual payoff by choosing their optimal level of participation effort $e^*_{i,k}$ which equalizes their marginal benefits with their marginal costs of participation, taking the effort of other parents as given (Nash equilibrium)[5].

Benefits from participation depend on the impact of overall participation on school quality and on the benefits parents gain from education[6] ($b > 0$). School quality is a function of the amount of participation from parents of both groups and of their level of real authority, captured by the group-specific parameter $\theta_k > 0$. This parameter is itself a positive function of the level of school fees ω[7]: $\theta'_k(\omega) > 0, \forall k \in \{1, 2\}$. Real authority of powerful parents is higher, regardless of the level of school fees

$(\theta_2(\omega) > \theta_1(\omega), \forall \omega \geq 0)$. Participation costs are expressed as a function of the level of participation $e_{i,k}$.

The payoff $U_{i,k}$ of parent i of group k is given by:

$$U_{i,k}(e_{i,k}) = b\, q[e_{i,k}, e_{-i,k}, \theta_k(\omega), e_{-k}, \theta_{-k}(\omega)] - c(e_{i,k}) \tag{1}$$

With $q[.]$ the school quality production function evaluated at the level of participation effort of the school community and $c(.)$ the participation cost function evaluated at the individual level of participation effort. Parents do not derive any utility from participation other than through the improvement in the quality of education. Efforts made by powerful parents are more efficient in improving education quality ($\frac{\partial q}{\partial e}(\theta_2) > \frac{\partial q}{\partial e}(\theta_1), \forall e > 0$).

2.2 Impact of Fees on Optimal Participation

I further assume that the school quality production function has diminishing returns to individual effort ($q'(e_{i,k}) > 0$; $q''(e_{i,k}) < 0$) and that the participation cost function is strictly convex in individual effort ($c'(e_{i,k}) > 0$; $c''(e_{i,k}) > 0$). The first-order conditions of the maximisation problem are, for all i and all $k \in \{1, 2\}$:

$$\frac{\partial U_{i,k}(e^*_{i,k})}{\partial e_{i,k}} = 0 \Longrightarrow b\, \frac{\partial q}{\partial e_{i,k}}[e^*_{i,k}, e^*_{-i,k}, \theta_k(\omega), e^*_{-k}, \theta_{-k}(\omega)] - c'(e^*_{i,k}) = 0 \tag{2}$$

Given the assumptions on the school quality production function and the participation cost function, a stationary point satisfying the above first-order conditions is necessarily a maximum. Parents from the same group share the same characteristics: $\theta_{i,k} = \theta_k, \forall k \in \{1, 2\}$. Consequently, we obtain a symmetric equilibrium at the group level: $e^*_{i,k} = e^*_{j,k} = e^*_k/n_k, \forall \{i, j\} \in k, \forall k \in \{1, 2\}$ with $n_k > 0$ the number of parents in group k and e^*_k the total level of effort from parents of group k, at equilibrium.

We are interested in the marginal impact of school fees on the optimal effort of parent i of group k, which is given by the following total derivative:

$$\frac{\mathrm{d}\, e^*_{i,k}}{\mathrm{d}\, \omega} = \frac{\partial e^*_{i,k}}{\partial \omega} + \frac{\partial e^*_{i,k}}{\partial e_{-i,k}} \frac{\mathrm{d}\, e^*_{-i,k}}{\mathrm{d}\, \omega} + \frac{\partial e^*_{i,k}}{\partial e_{-k}} \frac{\mathrm{d}\, e^*_{-k}}{\mathrm{d}\, \omega} \tag{3}$$

Parents belonging to the same group are identical in all respects, which implies that the marginal effect of a change in school fees on the level of their optimal participation

is the same. Formally, we can write $\frac{\mathrm{d}\, e^*_{-i,k}}{\mathrm{d}\,\omega} = \frac{\mathrm{d}\, e^*_{i,k}}{\mathrm{d}\,\omega}(n_k - 1)$. Using this equation to simplify and rearrange equation (3), we obtain:

$$\frac{\mathrm{d}\, e^*_{i,k}}{\mathrm{d}\,\omega} = \frac{\frac{\partial e^*_{i,k}}{\partial \omega} + \frac{\partial e^*_{i,k}}{\partial e_{-k}} \frac{\mathrm{d}\, e^*_{-k}}{\mathrm{d}\,\omega}}{1 - \frac{\partial e^*_{i,k}}{\partial e_{-i,k}}(n_k - 1)} \tag{4}$$

To find the sign of the partial derivatives in equation (4), I use the implicit function theorem. Starting with the denominator:

$$\frac{\partial e^*_{i,k}}{\partial e_{-i,k}} = -\frac{\frac{\partial^2 q}{\partial e_{i,k}\partial e_{-i,k}}[e^*_k, \theta_k, e^*_{-k}, \theta_{-k}]}{\underbrace{\frac{\partial^2 q}{\partial e^2_{i,k}}[e^*_k, \theta_k, e^*_{-k}, \theta_{-k}]}_{<0} - \underbrace{\frac{1}{b} c''(e^*_{i,k})}_{>0}} \tag{5}$$

Using the symmetry of the Nash equilibrium within group k, which allows me to write $\frac{\partial^2 q}{\partial e_{i,k}\partial e_{-i,k}} = \frac{\partial^2 q}{\partial e^2_{i,k}}$, I find $\frac{\partial e^*_{i,k}}{\partial e_{-i,k}}$ to be strictly negative, meaning that efforts from parents belonging to the same group are necessarily substitutes.

$$\frac{\partial e^*_{i,k}}{\partial e_{-i,k}} = \frac{1}{\underbrace{\frac{c''(e^*_{i,k})}{b\frac{\partial^2 q}{\partial e^2_{i,k}}[e^*_k, \theta_k, e^*_{-k}, \theta_{-k}]}}_{<0} - 1} < 0 \tag{6}$$

With $\frac{\partial e^*_{i,k}}{\partial e_{-i,k}} < 0$ and $n_k > 0$, the denominator of equation (4) is unambiguously positive. Predicting the sign of the partial derivative $\frac{\partial e^*_{i,k}}{\partial \omega}$ in the numerator of equation (4) requires two more definitional assumptions and two simplifying assumptions:

1. $\frac{\partial^2 q}{\partial e_{i,k}\partial \theta_k} > 0$. A marginal increase in the real authority of group k has a positive partial effect on the return to effort of parent i from group k ("authority").

2. $\frac{\partial^2 q}{\partial e_{i,k}\partial \theta_{-k}} < 0$. A marginal increase in the real authority of group $-k$ has a negative partial effect on the efficiency of parent i from group k ("crowding out").

3. $\frac{\mathrm{d}\,\theta_k}{\mathrm{d}\,\omega} = \frac{\mathrm{d}\,\theta_{-k}}{\mathrm{d}\,\omega}$. A marginal change in the level of school fees has the same effect on the real authority of both groups.

4. $|\frac{\partial^2 q}{\partial e_{i,k}\partial \theta_k}(e^*_k, \theta_k, e^*_{-k}, \theta_{-k})| > |\frac{\partial^2 q}{\partial e_{i,k}\partial \theta_{-k}}(e^*_k, \theta_k, e^*_{-k}, \theta_{-k})|$.
   At equilibrium, the magnitude of the "authority" effect is higher than the magnitude of the "crowding out" effect.

$$\frac{\partial e^*_{i,k}}{\partial \omega} = -\frac{\overbrace{\frac{\partial^2 q}{\partial e_{i,k}\partial \theta_k}(e^*_k, \theta_k, e^*_{-k}, \theta_{-k})\frac{\mathrm{d}\,\theta_k}{\mathrm{d}\,\omega} + \frac{\partial^2 q}{\partial e_{i,k}\partial \theta_{-k}}(e^*_k, \theta_k, e^*_{-k}, \theta_{-k})\frac{\mathrm{d}\,\theta_{-k}}{\mathrm{d}\,\omega}}^{>0}}{\underbrace{\frac{\partial^2 q}{\partial e^2_{i,k}}(e^*_k, \theta_k, e^*_{-k}, \theta_{-k})}_{<0} - \underbrace{\frac{1}{b}c''(e^*_{i,k})}_{>0}} > 0 \quad (7)$$

The direct effect of a marginal increase in school fees on the optimal level of participation is positive for both groups. However, the fact that one group increases its level of effort has further consequences for the optimal level of effort of the other group. Formally, using the implicit function theorem:

$$\frac{\partial e^*_{i,k}}{\partial e_{-k}} = -\frac{\frac{\partial^2 q}{\partial e_{i,k}\partial e_{-k}}(e^*_k, \theta_k, e^*_{-k}, \theta_{-k})}{\underbrace{\frac{\partial^2 q}{\partial e^2_{i,k}}(e^*_k, \theta_k, e^*_{-k}, \theta_{-k})}_{<0} - \underbrace{\frac{1}{b}c''(e^*_{i,k})}_{>0}} \quad (8)$$

Under the assumption that efforts between groups are not substitutes ($\frac{\partial^2 q}{\partial e_{i,k}\partial e_{-k}} \geq 0$), the total effect of an increase in fees on the optimal level of participation of both groups is unambiguously positive ($\frac{\mathrm{d}e^*_{i,k}}{\mathrm{d}\omega} > 0, \forall k \in \{1, 2\}$). Complementarity in efforts is possible if participation from the two groups is different not only in efficiency, but also in the type of actions undertaken[8]. If participation efforts between groups are substitutes (as they are within groups), it is possible that only one group raises its level of participation as the result of an increase in the level of school fees.

Whatever the level of substituability of efforts between groups, the level of generality of the model does not allow us to draw definite conclusions on which group gains the most in terms of participation from an increase in school fees. If the relatively powerless group increases its effort level to a larger extent than the relatively powerful group, the process of participation becomes more inclusive as the level of participation of the relatively powerless group gets closer (albeit always smaller - see next subsection) to that of the relatively powerful group. If, however, the relatively powerful group increases its effort level by more than the relatively powerless group, the participation process becomes more elitist as the distance between the participation levels of the two groups increases. In the case where efforts between groups are substitutes, participation from the relatively powerless group may actually decrease.

2.3 Impact of Fees on School Size and Composition

The change in the level of school fees also has an effect on the size and composition of the school community. A rise in fees may induce some parents among the poorest to remove their children from the school. Conversely, an increasing number of wealthier parents from the local community, anticipating an improvement in the quality of education, may choose the public primary school for their children. If wealth correlates positively with real authority, which is reasonable since wealth is often a determinant of social power, the number as well as proportion of powerless and powerful parents in the school is altered by the change in fees. As equation (4) shows, the absolute number of parents from both groups matters to determine the total effect of a change in fees on their level of participation. The composition of the school (i.e. the proportion of parents from each group) is also relevant for determining this effect empirically.

We know that, at equilibrium, for all i and all $k \in \{1, 2\}$:

$$\frac{\partial q}{\partial e_{i,k}}(e_k^*, \theta_k, e_{-k}^*, \theta_{-k}) = \frac{1}{b} c'(e_{i,k}^*) \tag{9}$$

Since benefits from education b are the same for all parents, we have $\frac{q'(e_1^*)}{c'(e_1^*)} = \frac{q'(e_2^*)}{c'(e_2^*)}$ and $e_2^* > e_1^*$, with e_1 and e_2 the individual level of effort of parents from powerless and powerful groups, respectively. At equilibrium, the individual level of effort of relatively powerful parents is strictly higher than that of relatively powerless parents[9].

The expected participation effort of a randomly picked parent j is equal to:

$$E(e_j^*) = e_1^*(\omega)(1 - p(\omega)) + e_2^*(\omega)p(\omega) \tag{10}$$

with $p \in (0, 1)$ the probability that parent j is powerful (type 2). The impact of a marginal change in school fees on the expected participation effort of parent j is:

$$\frac{\mathrm{d}\, E(e_j^*)}{\mathrm{d}\, \omega} = \frac{\mathrm{d}\, e_2^*}{\mathrm{d}\, \omega} p + \frac{\mathrm{d}\, e_1^*}{\mathrm{d}\, \omega}(1 - p) + \underbrace{(e_2^* - e_1^*)}_{>0} \underbrace{\frac{\mathrm{d}\, p}{\mathrm{d}\, \omega}}_{>0} \tag{11}$$

The last term of equation (11), which represents the composition effect, pushes up the marginal effect of an increase in school fees on average participation. Because we only observe parents who remain with the school, this composition effect makes fees look more productive in fostering community participation than they are in reality.

2.4 Discussion

The model predicts that an upward shift in fees increases the participation of at least one group of parents, and possibly of both groups, depending among other variables on the level of substituability in participation efforts between groups. The increase in fees also changes the number of powerless and powerful parents in the school and, ultimately, the optimal participation level of both groups. The shift in the composition of the school towards powerful parents also increases average participation. These are the predictions I will test empirically.

In this model, school fees influence the real authority of the community over school officials. Fee-paying parents may have more power for several reasons. First, they can threaten the school authorities with cancelling their contribution to the school budget if their opinion is not sufficiently taken into consideration. School managers are arguably more receptive of parental complaints and suggestions when parents are in a position to withdraw their financial contributions, with potentially severe budgetary repercussions for the school. Such financial concerns may be particularly relevant when fees are used to pay the salary of contractual teachers[10]. Parents who pay school fees may also have a stronger feeling of ownership over the school and therefore expect a higher degree of accountability from school officials.

By shifting more power to the hands of parents, fees contribute to the raising of their voice in the decision-making processes regarding the school. The enhanced ability of parents to influence school authorities increases the efficiency of their participation. All other things held equal, schools requesting parents to pay more fees are therefore expected to experience a higher degree of parental involvement.

Parents participate to increase education quality. The model rules out other potential mechanisms linking school fees to parental participation, including the possibility that school fees give parents a direct incentive to increase their participation by increasing their valuation of education (sunk cost fallacy hypothesis). The model also ignores the fact that fees can directly raise the productivity of participation as schools charging a higher level of fees have, *ceteris paribus*, more financial resources than those requiring parents to pay less fees.

Whether the relationship between fees and participation works via a modification of the school accountability framework will also be tested empirically.

3 Institutional Background and Data

3.1 Institutional Background

Madagascar has an extensive network of primary schools. Under Didier Ratsiraka's first presidential term (1975-1993), the socialist government in power set a target of providing each of the 11,000 *Fokontany* (the lowest administrative unit in Madagascar) with a public primary school (OECD, 2002). Despite several major political and economic crises, the rule has survived through to today. Also, in response to dissatisfaction with the quality of education provided by the public system, private primary schooling has expanded steadily in recent years (Glick and Sahn, 2006). The availability of schools, both public and private, combined with a strong social demand for education has produced relatively high enrolment rates to first grade. This favourable feature of the education system is, however, undermined by a low retention rate in subsequent grades and a high repetition rate (Lassibille and Tan, 2003).

In 2003, the public education sector has been subject to structural changes intended to bring decision-making closer to the beneficiaries, and to give communities a greater voice in the management and governance of the schools. These reforms have attributed extensive responsibilities to local authorities at regional, district and school levels. Under this new framework, public primary schools receive every year a capitation grant from the central government to cover non-salary expenditures. This grant is managed by a School Management Committee (FAF[11]), also responsible for the development of the yearly School Development Plan. These committees are composed of school and local officials, including the school head teacher, as well as parents' representatives.

Every school in Madagascar also has a Parents Association (FRAM) responsible for hiring and managing contractual teachers. FRAM representatives are elected by parents during a general assembly held annually. Although tuition fees have been abolished in public primary schools, FRAM are allowed to raise local contributions, mainly to cover the salary of contractual teachers.

FAF and FRAM are the two formal channels through which parents can voice their concerns and complaints to the school authorities. They are, therefore, the main vectors of parental participation to school governance (Transparency International - Initiative Madagascar, 2009).

3.2 Data

3.2.1 Data sources

Data come from three sources: (i) survey data collected as part of the Africa Education Watch project, implemented by the NGO Transparency International in 2008, (ii) administrative data collected by Madagascar's Ministry of Education, and (iii) commune census data from the Ilo programme of Cornell University.

Africa Education Watch was a three year (2007-2010) programme designed to assess whether decentralised education management systems were effective in controlling and preventing corruption and resource leakages. The programme covered seven countries in Africa, including Madagascar. As part of the project, Transparency International undertook, between March and May 2008, a large-scale assessment of the effectiveness of decentralised accountability structures, quality of governance in schools and transparency in the management of their resources. In Madagascar, sixty public primary schools were randomly selected using a stratified sampling procedure[12]. In each school surveyed, the head teacher, the head of the FRAM and twenty households randomly selected from the school roster were interviewed. Respondents were asked about the existence of mechanisms or channels to voice parents' opinion and hold school management accountable; the use of these mechanisms by parents, their experiences with and perceptions of corrupt practices in their primary school and the education system and any other problems they identified (Transparency International, 2010).

Administrative data collected by Madagascar's Ministry of Education complement the Africa Education Watch survey with information on the number of students and teachers for each surveyed school for the school year 2008-2009 as well as the total number of schools in each commune[13] surveyed by the Africa Education Watch programme. A remoteness index of Madagascar's communes from Ilo programme's 2001 Census is used to test the validity of an instrument for the level of school fees.

3.2.2 Variables

Using those data, I construct indicators capturing the different elements of the model of parental participation presented in the previous section. Due to data limitations, the indicators generated do not always thoroughly cover the concepts they are supposed to measure. Some other variables cover more than one aspect of the model.

Participation to School Governance (e_k)

This indicator provides a binary response $y \in \{0, 1\}$, with 1 meaning that the person interviewed participates to the governance of their local school. The indicator is made of seven components, with four referring to the respondent's reported interest in school governance and the remaining three to their basic knowledge of the accountability framework of the school[14]. The indicator codes 0 if the interviewee reported no visit to the school in the last 12 months, is not a FRAM or a FAF member, did not attend any FRAM or FAF meetings in the last 12 months, or reported having no interest in school finances. The variable also codes 0 if the interviewee does not possess the basic knowledge associated with any meaningful active participation to school governance: knowledge of the yearly grant received from the central government and knowledge of the two school accountability structures (FAF and FRAM)[15].

Benefits from Education (b)

The model makes the simplifying assumption that households have only one child enrolled in the school. This is surely not the case for many households in practice. The number of children attending the school impacts household's benefits from improvements in education quality. Having more than one child attending the school makes participation more profitable relative to having only one child enrolled, as improvements in the quality of education are assumed to impact equally all enrolled children[16].

Efficiency of Participation

Efficiency of participation depends on the degree of real authority of the parent and the household as well as on the strength of the school accountability framework, the initial school quality and the total level of participation of other parents.

The social position of the survey respondent[17] is proxied by the gender of the respondent and a dummy variable coding 1 if the respondent is one of the two parents of the children attending the school and 0 otherwise.

The social position of the household within the community is captured by its wealth and the level of education of the survey respondent. Wealth reflects the social status relative to the rest of the community, but also relative to the school managers. Wealthier parents are therefore expected to have a stronger voice within the school community. Household wealth is computed as the first component of a principal com-

ponent analysis of eight durable goods possessed by the households[18]. Education is another indicator of social status. It also reflects the capacity to perform certain tasks, such as reviewing school records or understanding basic financial information, skills that facilitate a meaningful involvement in the running of the school. Educated parents are therefore expected to be more involved in the governance of the school. The education variable is a dummy taking the value of 0 if the respondent did not attend school or attended but did not complete primary school, and the value of 1 if the respondent completed at least primary school.

The school accountability framework also contributes to determine the efficiency of participation. If school officials are not responsive to parents, participation will hardly have any significant impact on the way the school is managed. The strength of the school accountability framework is captured by three different variables[19], which report the survey respondents' level of agreement with the statements that (1) parents can influence school decisions (*influence*), (2) complaints made by parents are taken seriously by the school authorities (*complaints*), and that (3) it is easy to know exactly how much resources are allocated to the primary school (*transparency budget*).

School fees are believed to modify the power relationship between parents and the school authorities[20]. As discussed in the previous section, schools that require parents to pay fees are arguably more prone to taking into consideration parents' opinion and complaints. This increases the efficiency of participation. It can be expected, therefore, that school fees impact positively the level of parental participation.

Participation is likely to have a larger impact when the initial quality of education is low. The initial level of school quality is measured by an index composed of a measure of school infrastructure, the average class size, and an indicator of the number of problems encountered by households the school year preceding the survey[21].

The model starts from the basic assumption that participation from other parents in the school is an input in the individual calculation of the level of participation effort. It predicts that the number of parents from both the relatively powerless and relatively powerful groups also affects the marginal impact of school fees on optimal participation for all parents. Accordingly, I control for school size and composition in my empirical specifications, with two variables: the number of parents from the same educational group as the survey respondent and the number of parents belonging to the opposite educational group[22].

Selection

As the model predicts, the size and composition of the school community may vary according to the level of fees paid to the school. In order to prevent this selection effect threatening the identification of the direct effect of school fees on parental participation, one option is to include in the empirical specifications to estimate the variables driving the selection, household wealth (ability to pay) in this case.

While the number of schools located in the surroundings of the surveyed schools does not impact participation directly, it may affect the magnitude of the selection effect. In communities where only one school is available, wealthy parents who value education highly will keep their children in that school even if the school is free. In the case alternative schooling options are available, those parents will be more likely to remove their children from a free school to enrol them in a supposedly better fee-charging (typically private) school[23]. The total number of public and private primary schools in the commune of the surveyed schools will be used to determine the strength of the selection effect.

3.2.3 Summary Statistics

Table 3 shows descriptive statistics of the variables used to test the predictions of the theoretical model.

Across the sample of 1,137 households for which the indicator of participation has been computed[24], 31 percent are classified as participating to the governance of the public school. As Figure 3 shows, there is a large variability across districts and schools in terms of the proportion of participating households. Participation appears to be lower on average in the highlands and higher in coastal districts.

Data on payment of school fees (expressed in thousands of *Ariary*, the national currency) shows high heterogeneity across schools[25]. About 10 percent of schools do not charge fees. On average, parents give 6,330 Ariary to their children's school. They pay 13,000 Ariary or more (about 8 US dollars[26]) in 20 percent of the schools. Figure 4 shows the disparity in the level of school fees across schools and districts.

4 Empirical Strategy and Results

4.1 Empirical Strategy

We test empirically the implications of the model regarding the impact of fees S (set at school level) on the level of parental participation in the running of their children's school, y^*. Although the level of effort y^* is unobserved, we have a fairly precise idea of what constitutes a minimum level of interest and knowledge expected from any household who participates actively in the running of their school. The dependent variable splits the sample of respondents into two groups according to this criterion.

The main specification that is being tested is the following:

$$y^*_{ijd} = \alpha + \beta S_{jd} + X_{ijd}\gamma + Z_{jd}\zeta + D_d\eta + \epsilon_{ijd}$$

with $\epsilon_{ijd} \sim Normal(0, 1)$. y_{ijd} is determined by the following rule:

$$y_{ijd} = 1 \text{ if and only if } y^*_{ijd} > 0$$
$$y_{ijd} = 0 \text{ if and only if } y^*_{ijd} \leq 0$$

with y^* a latent variable for the level of participation of parent i in school j of district d, X_{ijd} a set of respondent and household-level covariates, Z_{jd} a set of school-level covariates, D_d a vector of district dummy variables, and α a constant term. This probit model is estimated with maximum likelihood[27].

I interpret the results in two ways, the first being the marginal effect of the model covariates on the probability that parents have a positive level of participation ($P(y = 1|x)$) and the second the marginal impact of those covariates on the level of participation effort. The latter is given by the marginal effect of the independent variables on the unobserved regressand of the latent variable model ($E(y^*|x)$), which can be interpreted in this case as the level of participation effort.

4.2 Correlates of Participation

Estimates for the coefficients of the probit model are shown in Table 1. The distribution of the predicted values of the latent variable model is presented in Figure 5[28]. Marginal effects (average partial effects) are reported in Table 2.

Table 1: Regressions (coefficients)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 4 IV	Model 4 CMP
school fees	0.028**	0.069**	0.074***	0.055**	0.073**	0.292***	0.289***
	(0.01)	(0.03)	(0.03)	(0.03)	(0.03)	(0.10)	(0.10)
education (year≥6)		0.454***	0.514***	0.444***	0.459***	0.354***	0.358***
		(0.08)	(0.12)	(0.08)	(0.08)	(0.10)	(0.10)
nb children		0.133***	0.132***	0.136***	0.138***	0.085*	0.087*
		(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)
parent		0.390*	0.394*	0.424*	0.389*	0.342*	0.349*
		(0.22)	(0.22)	(0.23)	(0.22)	(0.20)	(0.20)
gender (male)		0.397***	0.395***	0.386***	0.400***	0.330***	0.332***
		(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
wealth		0.058†	0.057†	0.048	0.153†	0.034	0.035
		(0.04)	(0.04)	(0.04)	(0.09)	(0.04)	(0.04)
school quality		-0.195***	-0.197***	-0.167**	-0.191***	-0.296***	-0.297***
		(0.06)	(0.06)	(0.07)	(0.07)	(0.08)	(0.08)
nb parents same group		-0.001*	-0.001*	-0.001*	-0.001*	-0.002**	-0.002**
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
nb parents other group		-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
education*fees			-0.009				
			(0.01)				
influence				-0.046		0.063	0.060
				(0.06)		(0.08)	(0.08)
complaints				-0.045		-0.035	-0.038
				(0.05)		(0.05)	(0.05)
transparency budget				0.243***		0.114†	0.120†
				(0.06)		(0.08)	(0.08)
nb schools					-0.006		
					(0.01)		
nb schools*wealth					-0.005		
					(0.00)		
urban		-0.465***	-0.465***	-0.449***	-0.486***	-0.598***	-0.601***
		(0.17)	(0.17)	(0.16)	(0.18)	(0.20)	(0.20)
constant	-0.680***	-1.490***	-1.525***	-1.754***	-1.386*	-4.202***	-4.171***
	(0.11)	(0.55)	(0.55)	(0.62)	(0.75)	(1.07)	(1.08)
district dummies	No	Yes	Yes	Yes	Yes	Yes	Yes
N	1117	1117	1117	1117	1117	1117	1117
McKelvey's R^2	0.028	0.315	0.317	0.342	0.317	-	-

† p<0.20, ∗ p<0.10, ∗∗ p<0.05, ∗∗∗ p<0.01

Results are coefficients.

Robust standard errors are reported in parentheses.

Table 2: Regressions (marginal effects)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 4 IV
school fees	0.010**	0.021**	0.022***	0.016**	0.022**	0.080***
	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.03)
education (year≥6)		0.135***	0.153***	0.129***	0.137***	0.097***
		(0.02)	(0.04)	(0.02)	(0.02)	(0.03)
nb children		0.040***	0.039***	0.040***	0.041***	0.023*
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
parent		0.116*	0.117*	0.123*	0.116*	0.093*
		(0.07)	(0.07)	(0.07)	(0.07)	(0.06)
gender (male)		0.118***	0.118***	0.112***	0.119***	0.090***
		(0.03)	(0.03)	(0.03)	(0.03)	(0.02)
wealth		0.017†	0.017†	0.014	0.045†	0.009
		(0.01)	(0.01)	(0.01)	(0.03)	(0.01)
school quality		-0.058***	-0.059***	-0.049**	-0.057***	-0.081***
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
nb parents same group		-0.000*	-0.000*	-0.000*	-0.000*	-0.001**
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
nb parents other group		-0.000	-0.000	-0.000	-0.000	-0.000
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
education*fees			-			
			-			
influence				-0.013		0.017
				(0.02)		(0.02)
complaints				-0.013		-0.010
				(0.02)		(0.01)
transparency budget				0.071***		0.031†
				(0.02)		(0.02)
nb schools					-0.002	
					(0.00)	
nb schools*wealth					-	
					-	
urban		-0.138***	-0.139***	-0.131***	-0.145***	-0.163***
		(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
district dummies	No	Yes	Yes	Yes	Yes	Yes
N	1117	1117	1117	1117	1117	1117
% 0 correctly predicted	-	63	62	67	64	56
% 1 correctly predicted	-	76	76	78	76	78

† p<0.20, ∗ p<0.10, ∗∗ p<0.05, ∗∗∗ p<0.01

Results are marginal effects (average partial effects).

Robust standard errors computed using the Delta-method are reported in parentheses.

Marginal effects for interaction variables are reported in Figures 1 and 2.

The first column of Table 1 (Model 1) reports a bivariate regression of participation on the level of school fees. It shows a positive and significant linear relationship between school fees and parental participation. An increase of 6,000 Ariary in school fees (about 2 US dollars), which is approximately equal to the mean and the standard deviation of the distribution of fees across schools, increases the probability for parents to be actively involved by approximately 6 percent[29], on average. It produces a 0.16 standard deviation[30] increase in the underlying latent variable y^*.

Model 2 includes controls for the various components of the utility function described in Section 2. As expected, the number of household children attending a primary school increases participation. Measures of real authority: gender (male), education, and type of the respondent (parent vs. other household member) report results that are consistent with an increase in the level of participation resulting from a higher efficiency. Results confirm one prediction of the model which is that educated (relatively powerful) parents participate more on average than less educated (relatively powerless) parents[31]. Household wealth is not significant, however. This may be explained by the fact, in this context, wealth captures both the social position of the household within the community and part of the indirect costs of participation (cost opportunity of time). As expected, the lower the initial quality of the school, the higher the level of participation. Also in accordance with the theoretical model, an increase in the number of parents from the respondent's educational group reduces his optimal participation level. The number of parents from the opposite educational group does not appear to affect the chosen level of participation, which may indicate that participation efforts from different groups are neither substitutes, nor complements[32].

As a result of the inclusion of these additional covariates as well as district dummies[33] and an additional urban/rural dummy variable, the marginal effect of the level of school fees on participation increases sharply. The same increase of 6,000 Ariary in school fees now increases the probability of positive participation by an average of 12 percent and the level of participation effort by 0.34 standard deviation.

Model 3 adds to the previous specification an interaction term between parental education and the level of school fees (see Figure 1 for average partial effects computed following Norton et al. (2004)). The coefficient for the interaction term is statistically insignificant at conventional levels. If we believe education to be a suitable proxy for the level of real authority, these results provide evidence that the marginal effect of school fees on the optimal level of participation is not systematically different for rel-

atively powerless (uneducated) and relatively powerful (educated) parents. Any rise in school fees will generate an increase in participation from all types of parents of about the same magnitude. Since relatively powerless parents start with a lower level of participation on average, an increase in school fees benefits more to that category of parents, in proportional terms. With the increase in fees, the share of participation effort from the relatively powerless parents expands in the total of participation effort produced by all parents.

The behaviour of school authorities matters to determine the efficiency of participation, and therefore its optimal level. Model 4 adds three indicators for the strength of the school accountability framework. The inclusion of these three indicators reduces the magnitude of the coefficient for school fees. This suggests that part of the effect of school fees on participation is channeled through the school accountability framework. This result is consistent with our theoretical model. The effect is entirely driven by a single variable which measures the level of transparency in the amount of resources received by the school. If we believe our theoretical model to be an accurate representation of the reality, this would mean that an increase in school fees translates into more bargaining power for parents, which is used to force school authorities to be more transparent in terms of the budget they manage. This improvement in accountability, reflected in the higher level of perceived transparency in schools charging more fees[34], increases the efficiency of participation and hence its optimal level. Surprisingly, parental participation does not appear to increase with perceived ability from parents to influence school decisions, or improvements in the way parents perceive school authorities to deal with their complaints. Also, the coefficient for school fees remains significantly positive after the inclusion of these additional variables measuring the strenght of the accountability framework, meaning that school fees have an impact on participation over and beyond a change in the power relationship between the community and the school authorities. This important result and its implications are discussed in the following section.

In Model 4, the residual effect of an increase of 6,000 Ariary in school fees on the level of participation is 0.27 standard deviation. The McKelvey and Zavoina pseudo-R^2 is reported in Table 1 as a relevant goodness-of-fit measure for a linear latent variable model. For Model 4, the pseudo-R^2 is 0.34. The percentage of correct predictions is reported in Table 2 as an alternative goodness-of-fit measure (for a threshold of 0.5).

4.3 Selection

The model predicts that the positive correlation observed between school fees and average parental participation may be partly driven by a selection effect that modifies the optimal participation level of both groups as well as shifts the composition of the school towards more powerful parents whose average participation is higher. Parents whose children attend fee-paying schools are likely to be of higher social status (more powerful) on average than their counterparts in free schools. Consequently, they are expected to be more involved in school management. One possible solution to this particular type of endogeneity problem is to control explicitly in the structural equation for all relevant variables that drive the selection process. Household wealth controls for this effect in our empirical specifications.

In our sample, the school average educational level of respondents is not correlated with the amount in fees charged by the school. Pearson's correlation coefficient between these two variables is not statistically significant (p-value=0.54). School fees are also uncorrelated with average wealth (p-value=0.41). The level of school fees is not a predictor of either school average education or wealth, when controlling for locality (urban/rural) and districts in a linear regression.

As emphasised in the previous section, the number of schools located in the vicinity of the surveyed schools may affect the strength of the selection effect. Model 5 includes a variable for the number of primary schools in the surveyed schools' communes as well as an interaction term between this variable and household wealth, our control for the selection effect. None of these two variables is statistically significant. Selection does not appear to be a strong driver of the relationship between school fees and parental participation[35]. This could mean that the price-elasticity of primary education is not very large in Madagascar. Alternatively, the absence of sensitivity of the selection effect with respect to the number of neighbouring schools may result from a poor account of selection. If household wealth does not capture most of the selection effect in the structural equation, endogeneity may still threaten the identification of the impact of school fees on participation[36].

Marginal effects for interaction variables, computed following Norton et al. (2004):

Model 3:	Variable	Obs	Mean	Std. Dev.	Min	Max
education*fees	Marginal effect	1117	0.0018072	0.0039229	-0.0093282	0.0065471
	Standard error	1117	0.0048805	0.0013321	0.0005732	0.007475
	Z-statistic	1117	0.54524	0.9387003	-2.759017	2.061419

Model 5:	Variable	Obs	Mean	Std. Dev.	Min	Max
nb schools*wealth	Marginal effect	1117	-0.0015592	0.0005483	-0.0021607	-0.0000188
	Standard error	1117	0.0013106	0.0004334	0.0000273	0.0020358
	Z-statistic	1117	-1.172776	0.1320522	-1.761713	-0.6401837

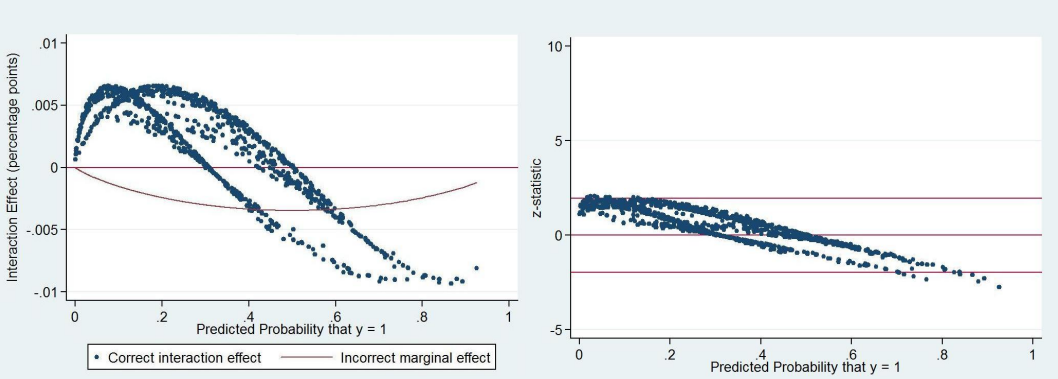

Figure 1: Interaction effects and Z-statistics - Model 3

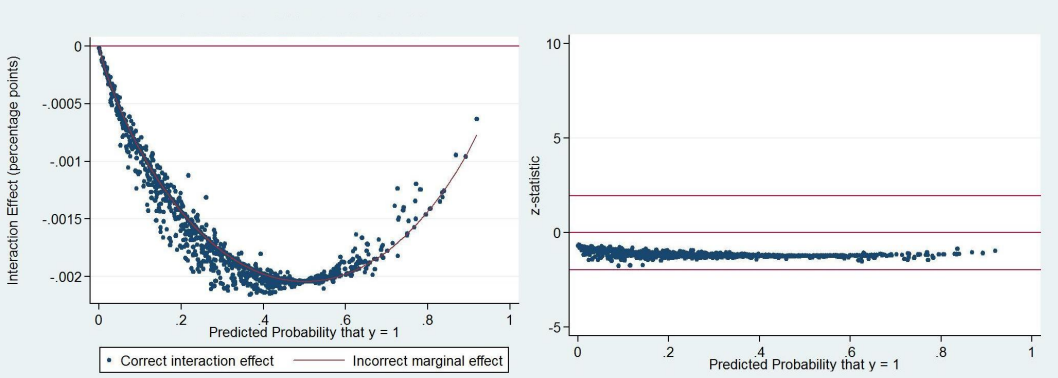

Figure 2: Interaction effects and Z-statistics - Model 5

4.4 Endogeneity

The model says nothing about how the level of fees is set. If school fees are endogenous in our empirical specifications in any ways, we may end up with inconsistent estimates[37]. A possible solution is to find an instrument for the level of school fees. One candidate instrument is the delay in the reception of the 2006-2007 school year capitation grant from the central government, as reported by both the head teacher and the person in charge of school finances (typically the head of the FAF). If a school receives funds late in the year, school authorities will be more prone to ask for parental contributions to ensure that the school can cover its running costs while waiting for the grant to come through. The variable codes 0 (no delay reported), 0.5 (delay reported by one respondent), or 1 (delay reported by both respondents). Statistics are reported in Table 3. This variable is positively and significantly (p-value=0.01) correlated with school fees (Pearson's correlation coefficient of 0.33). While delays are likely non-random, there is no significant correlation in the sample between delays and distance from the district office, locality (urban/rural), remoteness of the commune, tenure of the head teacher and total size of the school. This suggests that we can reasonably consider delays in the reception of funds a valid instrument for school fees.

Specification 4 IV is estimated with a probit model with endogenous regressors, using maximum likelihood[38]. Table 1 reports the coefficients estimated for the latent variable model. These results must be taken with caution as school fees, our potentially endogenous variable, is not continuous. As Dong and Lewbel (2010) note, "control function estimators are inconsistent when used with discrete endogenous regressors"[39]. Acknowledging this shortcoming, the probit model can still provide a first approximation that is easy to interpret in the framework of a latent variable model. An alternative that is often prescribed in the case of a binary choice model with discrete endogenous regressors, the conditional recursive mixed process estimator, gives estimates very similar to the probit estimator. Estimations from the mixed process estimator are reported in the last column of Table 1.

The instrument is statistically significant in the first-stage estimation of Model 4 IV (at 1 percent). A rise in the level of school fees of 6,000 Ariary increases the probability of positive participation by 48 percent, on average. The coefficient is highly significant. These results show that endogeneity is indeed an issue and that school fees most likely have an effect on participation through channels other than a shift in the real authority of parents relative to the school authorities.

5 Conclusion

Parental participation in public primary school governance in Madagascar is responsive to the amount of fees paid to the school. Participation increases with fees regardless of the initial degree of real authority. Results suggest that the composition of the school does not change with the level of school fees and provide some evidence that fees improve parental real authority. These conclusions are compatible with the predictions of the model developed in this paper. However, the results also indicate that fees have an impact on participation other than through a modification of the accountability framework of the school. In other words, school fees do not appear to increase the level of parental participation only by improving their authority over school management.

Different factors could explain these results. First, measurement error in the variables used to determine the state of the accountability framework may undermine the identification of the channel through which school fees affect participation. It is also possible that the selection effect generated by school fees is not well accounted for in the structural equation. Third, fees could drive participation through other mechanisms than an improvement of the school accountability framework. Parents could participate because they value more education if they pay for the service (sunk cost fallacy). Alternatively, fees may act as a signal for the quality of education parents can anticipate from the school. For the same level of education quality, fee-paying parents will have more incentives to participate because the potential of their school in terms of quality improvement is relatively higher as those schools have more financial resources. Lastly, parents could participate not to improve education quality but to reduce the level of fees requested by the school. Those alternative explanations are also compatible with the empirical results. A possible area for further research would be to assess the relative importance of these different explanations to account for the positive impact of school fees on parental participation to school governance.

Another possible follow-up to this research would be to explain the determinants underlying the disparity in the level of fees across public schools in Madagascar. Also, if further investigations confirm that school fees do increase parental participation, determining whether this increase in participation leads to improvements in the quality of education provided by the public system would be of relevance for education policy. If school fees increase education quality through community participation, policy-makers need to take this element into account when designing a suitable policy for the sharing of education costs between the beneficiaries and the State.

Notes

[1]In Uganda, the number of children enrolled in primary schools nearly doubled between 1996 and 1997 as a result of the "Universal Primary Education" programme, which dispensed Ugandan families to pay fees for primary enrolment (Deininger, 2003). Similar patterns have been observed in Kenya and Tanzania (Glewwe and Zhao, 2005).

[2]Kremer (2003) for a review of randomised evaluations of educational programmes aiming at increasing school participation.

[3]The introduction of the "Education for All" plan in Madagascar in 2003, which included among other measures the abolishment of tuition fees in public primary schools, has contributed to increasing the number of children attending a primary school by more than 50 percent: from 2.8 million in 2002-2003 to 4.3 million in 2008-2009 (UNICEF, 2012).

[4]*Fikambanan'ny Ray aman-drenin'ny Mpianatra* in Malagasy (Transparency International - Initiative Madagascar, 2009).

[5]We obtain the classical free-rider problem in collective action. The parental participation level determined as a decentralised equilibrium is less than socially optimal as parents tend to undervalue the spillover benefits of their own effort on other parents (Banerjee et al., 2007).

[6]For simplicity, we assume in this model that parents have only one child in the school.

[7]See sub-section Discussion on page 9 for intuition.

[8]Complementarity in efforts between groups may arise through the resolution of an information problem. School authorities may have an incentive to use a "divide-and-rule" strategy in the absence of participation from both types of parents. It may also be the case that some powerful parents, on average more educated that their powerless counterparts, need to create an accountability framework (e.g. set up a Parent-Association, organise a meeting with the school head teacher) before other parents can participate meaningfully. On the other hand, powerful parents, if they are relatively few in the school, may not reach alone the "critical mass" needed to make school authorities accountable.

[9]Proof by contradiction. If $e_1 \geq e_2$, then $\frac{q'(e_2)}{c'(e_2)} > \frac{q'(e_1)}{c'(e_1)}$. This proof makes use of our assumptions on the school quality and participation cost functions as well as the fact that efforts of the powerful group (type 2) are more productive ($\frac{\partial q}{\partial e}(\theta_2) > \frac{\partial q}{\partial e}(\theta_1), \forall e > 0$).

[10]In Madagascar, a large proportion of school fees is used to pay contractual teachers hired by the Parents Association. The remaining is usually spent for building construction and repair (Transparency International - Initiative Madagascar, 2009).

[11]*Fiombonan'Antoka amin'ny Fampandrosoana* or Partnership for School Development (Transparency International - Initiative Madagascar, 2009).

[12]Only 58 schools are included in the analysis due to a (random) coding error in the dataset.

[13]There are about 1,400 communes (*kaominina*) in Madagascar. The average population of a commune was approximately 15,000 inhabitants in 2001 (Ilo census data, 2003).

[14]The reasoning behind dichotomising the dependent variable has two grounds. First, there is no obvious way to weight the different components into a single, objective index of participation. Second, the fact that respondents answer positively on some of the seven questions (e.g. a respondent knows the school FRAM) does not contribute to raise their level of participation effort if, on the other hand, the same respondents report no knowledge or interest in school governance on some of the other components (e.g. the respondent has not been to the school in the last 12 months).

[15]Using responses from the head teacher and the head of the FRAM, it has been possible to confirm that FAF and FRAM do exist in all surveyed schools, that at least one meeting of the FAF or the FRAM had taken place within 12 months prior to the survey and that every sample school did receive a capitation grant from the central government at the beginning of the school year.

[16]Note that the level of school fees is the same for every household within each school and therefore does not depend on the number of children from the household that are enrolled in the school.

[17]The interview was conducted with the relative (e.g. father, mother, sister) who was following the children's schooling most closely (Transparency International, 2010).

[18]The goods are: house, land, livestock, vehicle, bicycle, radio, mobile phone, and television.

[19]These three variables share the same response scale, ranging from 1 (strongly disagree) to 5 (strongly agree) with 1-point increments.

[20]It is worth noting that parents who pay a fee to the FRAM do not automatically become members of the association. In fee-paying schools, the FRAM membership rate is 55 percent as compared to 35 percent in free schools. Tests on the sub-sample of fee-paying parents confirm that our mesure of participation is not directly driven by the payment (e.g. parents visit the school because they come to pay the fees). Also note that children whose parents are unable or unwilling to pay the school fees are not allowed to attend classes.

[21]The index is the first component of a principal component analysis of those three elements.

[22]To construct these two variables, I first created a proxy for the number of parents in the school by dividing the number of enrolled children with the average number of children per surveyed household, making the implicit assumption that these households form a representative sample of their respective school communities. In a second step, I used the proportion of respondents who completed primary education (an indicator for real authority) to obtain proxies for the number of powerless and powerful parents in the school. Lastly, I matched those proxies with the education dummy to determine, for each respondent, the number of parents belonging to their group and to their opposite group.

[23]Alternatively, if parents can hire one of the school teachers to give private lessons to their children (i.e. private tutoring), they may be more willing to keep them in the public school even when alternatives are available. Meanwhile, their incentive to participate to improve overall school quality will drop. Availability of private tutoring is not a significant variable in the specifications tested and therefore has been omitted in the regressions reported in Tables 1 and 2.

[24]Nineteen interviewees were not asked about their interest in school finances and an additional four did report having no child attending the primary school surveyed.

[25]In the case of one school, the amount reported by households was not consistent. This school was therefore removed from subsequent analyses.

[26]This represents a non-trivial amount in a country where the nominal GDP per capita was USD 412 in 2009 (IMF, 2012). Furthermore, households whose children attend a public school are generally of a more disadvantaged background.

[27]Estimations from the logit model are very similar to the probit model. Results not reported.

[28]The probit model imposes two normalisation restrictions: the first on the threshold level of the latent variable ($y^* > 0$ if $y = 1$), the second on the standard deviation of the error term ($\sigma = 1$). Consequently, coefficients do not have a concrete interpretation in units of measurement. Results can, however, be compared between regressions for which the same restrictions apply.

[29]Because a change of one standard deviation in school fees is large, calculations based on marginal effects are inherently imprecise.

[30]To obtain the effect of a change in school fees in terms of standard deviations of the latent variable, I computed the variance of y^* which is equal to the variance of the fitted values plus the variance of the error term, set to 1 in the probit model.

[31]A Wald test indicates that the log-likelihood of both Model 2 and that of an unrestricted version of Model 2 with interaction terms between all explanatory variables (except district and urban/rural dummies) and the educational level of the respondent are not significantly different from one another (p-value=0.35). This means that interactions terms are insignificant and carrying out this regression on the entire sample is appropriate, at least with respect to the dimension of respondents' education.

[32]Going back to the model, this translates in the term $\frac{\partial e^*_{i,k}}{\partial e_{-k}}$ from equation 3 being likely null. Alternatively, this result may indicate that the increase in participation resulting from the greater number of parents in a group is exactly compensated by a reduction of the same amount of effort from parents currently in the group, leaving the total amount of effort from this group unchanged.

[33]The sixty primary schools surveyed as part of the Africa Education Watch programme are located in twelve randomly defined districts, with five schools per district. A Wald test rejects the null hypothesis that district dummies are jointly insignificant at 1 percent in specifications 2 to 5.

[34]The Pearson's correlation coefficient between school fees and perceived budget transparency is 0.1, with a significance level below 1 percent.

[35]As mentioned in footnote 23, availability of private tutoring does not affect participation, either directly or via the marginal impact of wealth on participation.

[36]If the same amount of fees were to be charged to all parents whose children attend a primary school in the same region, and with mandatory schooling, the magnitude of the selection effect would drop. This general equilibrium effect makes it relevant to disentangle the effect of selection from the other effects of fees on participation. Selection also raises important concerns regarding equity.

[37]We may have inconsistent estimates for other reasons that endogeneity, notably in the presence of heteroscedasticity and non-normality of errors. This issue is discussed on page 31.

[38]The ivprobit command in Stata. Maximum likelihood is the default estimator.

[39]Our estimator also requires the instruments to be exogenous in the first stage equation and the functional form of the first stage equation to be correctly specified.

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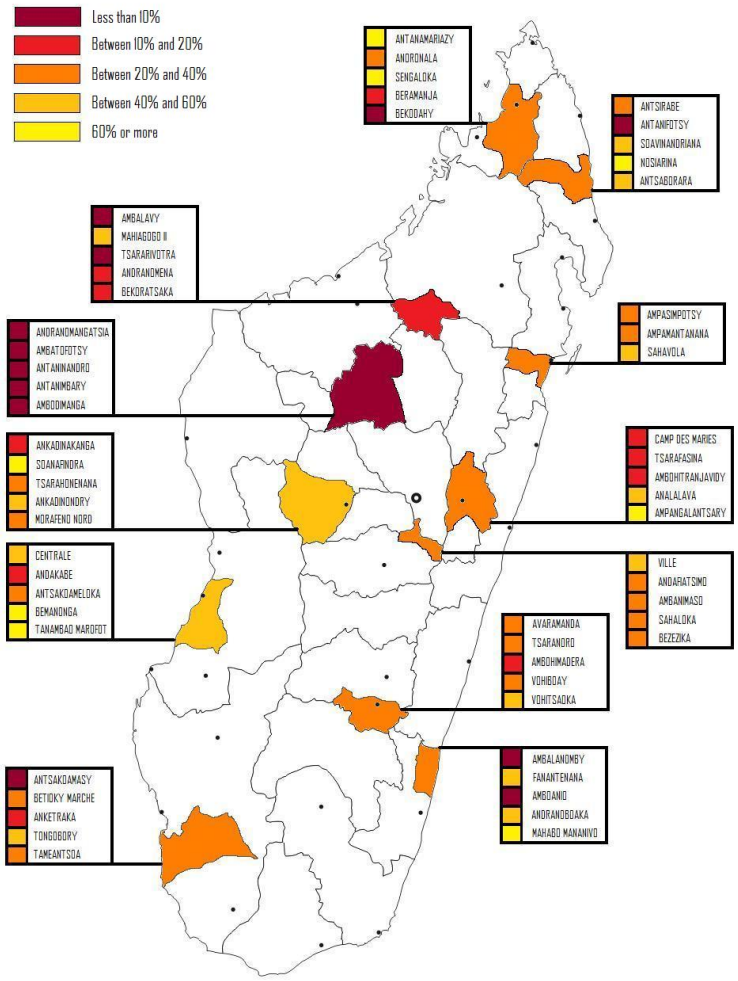

Figure 3: Participation by School

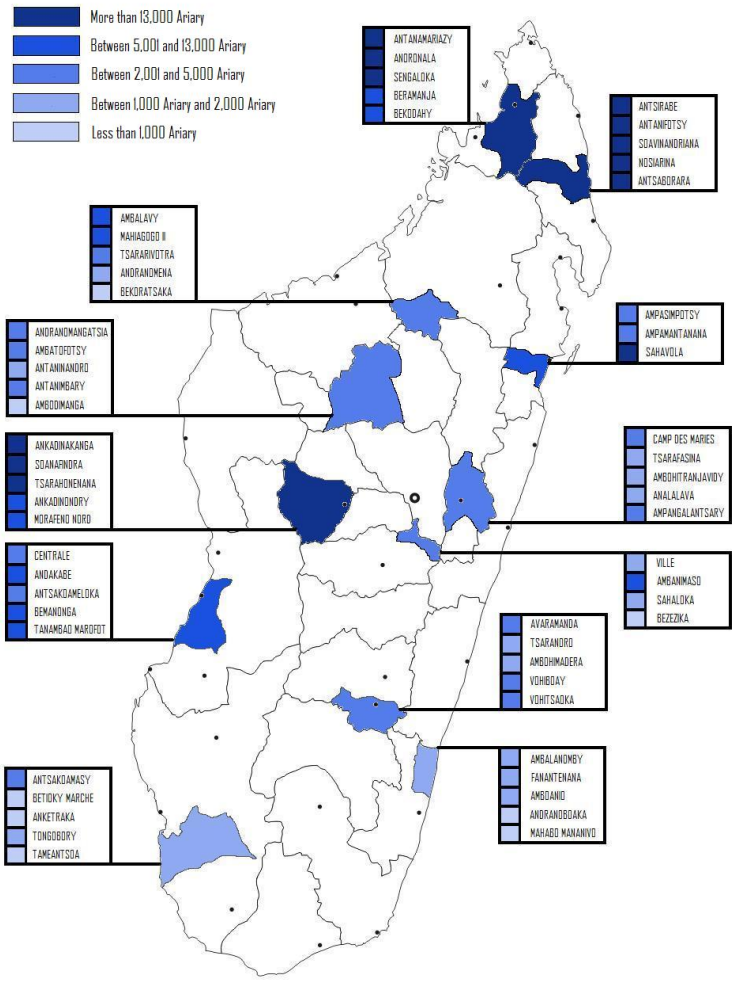

Figure 4: Fees by School

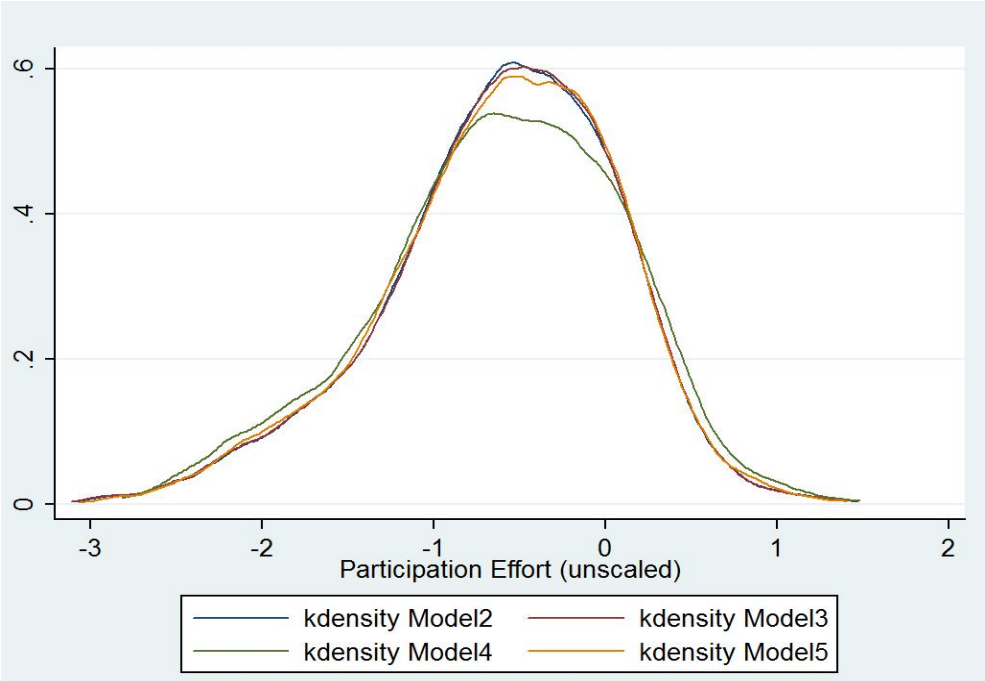

Figure 5: Distribution of fitted values (Kernel densities)

Table 3: Summary Statistics

	N	mean	p25	p50	p75	sd	min	max	range
participation	1137	0.31	0	0	1	0.46	0	1	{0,1}
school fees (in th. Ariary)	57	6.33	1.5	3.6	12	6.11	0	20	[0,-]
urban	58	0.62	0	1	1	0.49	0	1	{0,1}
education	1156	0.58	0	1	1	0.49	0	1	{0,1}
nb children	1156	2.23	1	2	3	1.17	1	9	[1,-]
parent	1156	0.94	1	1	1	0.24	0	1	{0,1}
gender (male)	1156	0.42	0	0	1	0.49	0	1	{0,1}
wealth	1156	0.00	-1.08	-0.22	1.11	1.39	-2.15	3.77	-
school quality	58	0.00	-0.56	-0.08	0.83	1.16	-3.58	2.28	-
nb parents same group	116	123.82	50.47	86.53	166.14	102.33	8.27	545.47	[0,-]
nb parents other group	116	123.82	50.47	86.53	166.14	102.33	8.27	545.47	[0,-]
influence	1156	3.89	4	4	4	0.75	1	5	[1,5]
complaints	1156	3.73	3	4	4	0.93	1	5	[1,5]
transparency budget	1156	3.25	2	3	4	1.06	1	5	[1,5]
nb schools	58	19.52	11	18	25	11.24	7	61	[0,-]
delay	58	0.74	0.5	1	1	0.33	0	1	[0,1]

Model 1: Bivariate probit model with school fees (and a constant)
Model 2: Probit model with controls (except school accountability framework)
Model 3: Probit model with controls and an interaction between school fees and education
Model 4: Probit model with the entire set of controls
Model 5: Probit model with controls, number of schools and its interaction with wealth
Model 4 IV: Probit model with an endogenous regressor (school fees)
Model 4 CMP: Probit model with an endogenous regressor (school fees), estimated with a mixed process estimator

In all regressions, the dependent variable is a binary measure of the level of parental participation effort in the governance of the local public primary school. All estimations take into account the possibility that observations within the same school are correlated in some unknown way by clustering errors at school level.

As Freedman (2006) states: "The sandwich algorithm, under stringent regularity conditions, yields variances for the MLE that are asymptotically correct even when the specification - and hence the likelihood function - are incorrect. However, it is quite another thing to ignore bias". In the presence of heteroscedasticity, the MLE estimator is generally inconsistent. A Wald test performed after a maximum-likelihood probit estimation robust to multiplicative heteroscedasticity (hetprob command in Stata) does not reject the null hypothesis of absence of heteroscedasticity (p-value=0.36) in Model 4 when heteroscedasticity is suspected to affect the entire set of explanatory variables (with the exception of urban/rural and district dummies).

The last regression of Table 1 is estimated with a mixed process estimator (cmp command in Stata). The conditional recursive mixed process estimator offers more flexibility than the probit estimator with continuous endogenous regressors (ivprobit command in Stata). It can provide consistent estimates for the parameters of the model even when the endogenous regressors are discrete variables (Roodman, 2011).