Quality perceptions and school choice in rural Pakistan

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Abstract

A large body of research has well documented the growing contribution of private schools, including low-fee private providers, to education in underprivileged areas. Using a unique database from rural Pakistan, this paper determines the drivers of schooling behavior using a Heckman probit and a household fixed effects models that take into account non-random enrollment choice. The results suggest that gender and socioeconomic barriers still prevent certain parts of the population from accessing education and especially private schools. Both the lack of public schools and the perceived low quality of these schools explain why parents choose private schools even if free public schools are available. The household fixed effects model confirms the results and also shows that there is a significant intra-household gender gap in private school enrollment.

Keywords: Demand for schooling, Pakistan, Perceptions, Private schooling, Quality of education, School choice

JEL classification: I21, I25, I28

Résumé

Dans de nombreux pays en développement, on assiste à un développement de l'éducation privée, incluant notamment des écoles à bas coûts. En utilisant une base de données sur le Pakistan rural, cet article cherche à comprendre cette hausse de la scolarisation privée. Pour cela, nous estimons un probit Heckman mais aussi des modèles à effets fixes. Les résultats montrent que des barrières socio-économiques et de genre empêchent encore certaines franges de la population d'accéder à une éducation, et surtout à une éducation privée. Le manque d'écoles privées mais aussi le fait que les institutions publiques soient perçues comme de moins bonne qualité que les écoles privées expliquent le succès des écoles privées. Le modèle de probabilité linéaire avec des effets fixes ménages confirment ces résultats et suggère qu'il existe une discrimination de genre intra-ménage concernant l'éducation privée.

Keywords: Choix éducatif, Demande d'Education, Education Privée, Pakistan, Perceptions, Qualité de l'éducation

Classifications *JEL* : I21, I25, I28

1 Introduction

Improving access to primary education has been one of the major goals in developing countries as underlined during the Universal Declaration of Human Rights (1948)[1] and the World Conference on Education for All (Jomtien, 1990). In many developing countries, private schools, including schools charging low fees, have been flourishing in the 1990s'.[2] The effects of private schooling on both enrollment and equity remain however ambiguous and controversial.

On the one hand, private schooling could boost access to education by relaxing the governmental financial constraint. Private schools can be seen as an alternative to cope with the increasing demand for education when the number of public schools is insufficient. Advocates of the educational privatization also highlight that, by increasing schooling competition [Friedman, 2009], privatization exerts pressure upon both public and non-public schooling providers to perform better [Hoxby, 2007]. Private schools, even low-fee private institutions, are often viewed as more efficient in delivering high-quality knowledge in developing countries [Andrabi et al., 2008, Aslam, 2009, Das et al., 2006, French and Kingdon, 2010, Goyal, 2009, Khan and Kiefer, 2007, Kingdon, 2008, Muralidharan and Sundararaman, 2015, Pal, 2010, Tooley and Dixon, 2007b]. On the other hand, private schools can fail to reach poor and rural children and therefore increase the inequalities in the educational system [Aslam, 2009, Hartwig, 2013, Heyneman and Stern, 2014, Pal, 2010, Watkins, 2004].

The literature on private school choice is scarce in developing countries. Previous studies have failed to take into account the quality of schooling as a determinant of school choice. Parents may be more willing to send their children to schools if they provide basic and valuable knowledge. This study intends to determine why parents choose private schooling when free public schools are available.

This study contributes to the existing literature by integrating the quality of schooling as a potential determinant of schooling demand. The second originality of this paper is that it uses a Heckman probit specification to model private school choice. This model allows to control for selection within enrollment. Finally, to alleviate the endogeneity bias due to household heterogeneity, we use a household fixed effects model that also controls for non-random enrollment choice. The models are applied to primary education in three districts of Punjab province in Pakistan using a unique and complex database (LEAPS database).

The results validate two different models: the excess demand and the differentiated demand models. Both the lack of public institutions (excess demand) and the distinct char-

[1] The Universal Declaration of Human Rights states in 1948 that "Everyone has the right to education. Education shall be free, at least in the elementary and fundamental stages. Elementary education shall be compulsory".

[2] See Kitaev [1999] for an overview in Sub-Saharan Africa, Kingdon [1996] and Tooley and Dixon [2003] in India, Kitaev [2007] and Srivastava [2013] for a global overview in developing countries.

acteristics of private schools (differentiated demand), particularly in terms of quality, explain the demand for private schooling. Within a household, parental opinions about the quality of public and private schools explain private school choice. We also find evidence confirming the existence an intra-household gender gap in private school enrollment.

The rest of the papers is organized as follows. Section 2 describes the educational system in Pakistan with a focus on private schooling expansion. In Section 3, we review the relevant literature. Section 4 details the empirical specifications. In Section 5, we describe the LEAPS database along with the variables of interest. Sections 6 and 7 respectively present the empirical results and robustness tests. Finally, the last section concludes with the implications for educational policies in Pakistan and suggestions for future research.

2 Private and public education in Pakistan

Private schooling has a long history in Pakistan, dating back to before its independence. Before 1972, private schooling in Pakistan was restricted to the most important cities and was dominated by missionary schools targeting the wealthiest children [Jimenez and Tan, 1985, 1987]. In 1972, a wave of nationalizations developed public schooling and discouraged private schooling. However, because of a lack of public funding, the policy was reversed in 1979 and private schools reopened. A sharp rise in private enrollment occurred in the 1990's [Andrabi et al., 2008]. By the end of the 1990's, almost all rich Pakistani children in urban areas, a third of the richest rural children, and 10% of children in the poorest deciles were attending a private school. Private schools have emerged at all levels of schooling and enrollment in private schools has increased over the past decades (Figure 1). Whereas only 12% of primary school enrolled children were attending a private institution in 1992-93, this percentage increased to 37% in 2013-14. This rapid growth of private schooling in Pakistan is consistent with the situation in many other developing countries [Kingdon, 1996, Kitaev, 1999, 2007, Rose, 2006, Srivastava, 2013, Tooley and Dixon, 2003, 2007a]. The percentage of students attending primary private schools in developing countries doubled from 11% to 20% between 1990 and 2010 [Baum et al., 2014].

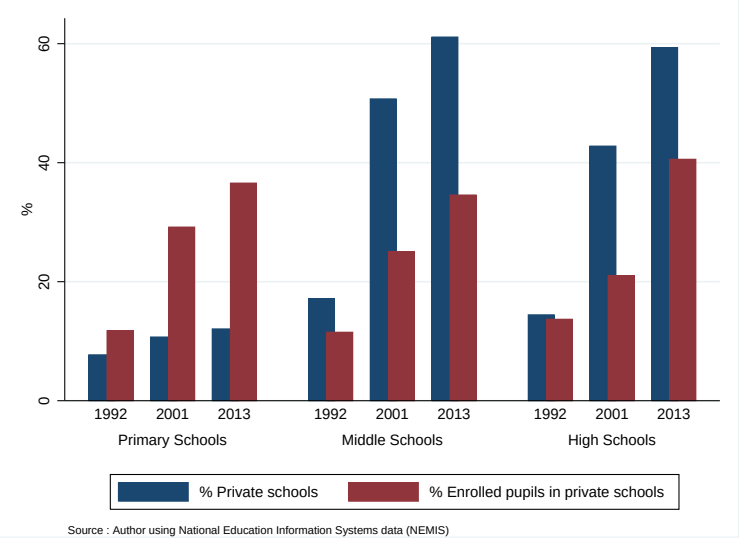
Over the last two decades, a low-cost private education market targeted at disadvantaged families has emerged in Pakistan [Andrabi et al., 2008, Fennell, 2013] like in many developing countries.[3] Alderman et al. [2001] note that in Lahore, even when they can attend a free public school, around half of the children coming from households earning less than $1 a day are enrolled in private schools. Today, the annual charged fees in an average private school in rural Pakistan amount to Rs 3,311 ($33.5)[4] whereas the monthly income by household belonging to the lowest quintile amounts to Rs 11,386 ($115)[5]. Private schools have managed

[3] See Tooley and Longfield [2013a,b] on Sierra Leone and Liberia and Tooley and Dixon [2007a] on India and Sub-Saharan Africa.

[4] 2011-2012 Pakistan Social and Living Standards Measurement (PSLM)

[5] 2010-2011 Household Integrated Economic Survey (HIES)

Figure 1: Prevalence of private schools and private enrollment in Pakistan, 1992-2013



to keep their fees low by lowering teachers' salaries. They recruit local young women, less educated and untrained, who accept lower wages because of low employment opportunities for women in Pakistan [Andrabi et al., 2008, Kingdon, 2008, Muralidharan and Kremer, 2006].

Two different explanations have been put forward in order to explain the surge in private enrollment [Heyneman and Stern, 2014]. The first one, known as the "excess demand" model, argues that, because of budgetary constraints, the number of public schools is not sufficient to meet the expanded demand for schooling [Colclough, 1997]. Excluded households seek alternatives in the private sector. The second explanation, called the "differentiated demand" model, states that private and public schools are imperfect substitutes. Parents opt for private schools because they seek certain specific characteristics such as quality of education, religious education or language of instruction [Andrabi et al., 2002, Aslam, 2009, Heyneman and Stern, 2014, Rose, 2006].

Although private schools have been less discriminating since the 1990's [Andrabi et al., 2008] (Figures 2 and 3), students attending public and private schools still have different profiles (Figure 4). Private schooling in Pakistan remains highly geographically concentrated with 50% of private school students residing in 10 out of 113 districts [Nguyen and Raju, 2014]. These districts are the wealthiest and the most urbanized of the country and are mainly located in the province of Punjab.

Enrollment in private schools is still conditioned by household wealth (Table 1). Indeed, 86% and 61% of primary students coming from the richest households in respectively urban and rural areas attend a private school whereas these proportions amount to only 21% and 11% for the poorest children. Private school enrollment also has a gender and regional com-

Figure 2: Trends in enrollment in private and public schools by gender, 1992-2013

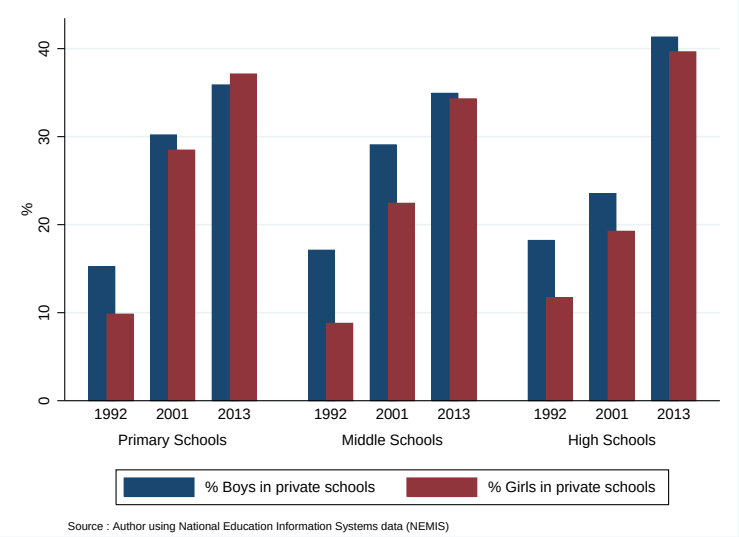
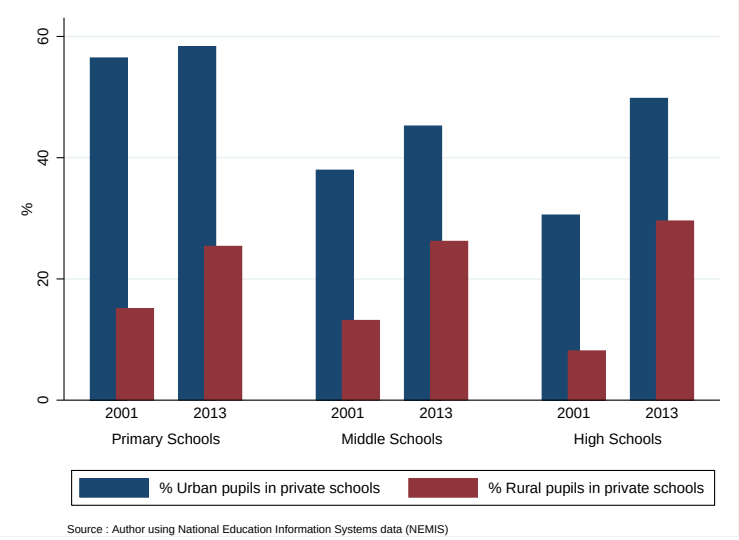


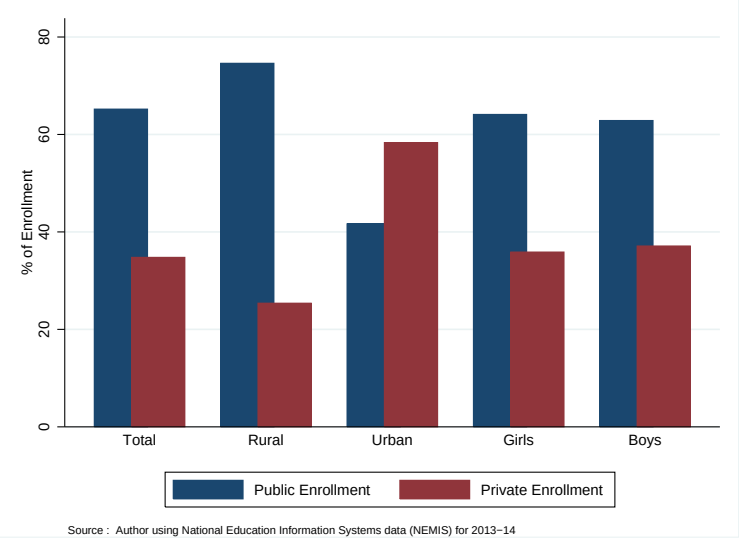
Figure 3: Trends in enrollment in private and public schools by location, 1992-2013



ponents. 65% and 28% of enrolled boys in respectively urban and rural provinces attend a private primary school compared with 59% and 25% for girls. These statistics raise concerns about equity. The rise of private schooling could increase inequalities if the access to non-state institutions is restricted to certain populations.

In this study, following Nguyen and Raju [2014], private schools represent formal institutions run by non-governmental actors with for-profit objectives. This definition includes private schools receiving public funding even though, in contrast with many other developing countries, the Pakistani government does not provide large subsidies for private schooling [Heyneman and Stern, 2014, Andrabi et al., 2014]. Non-profit schools (religious and NGO schools) are excluded from the scope of private schooling because they represent a very small portion of private schools that has been declining over the past years [Andrabi et al., 2008,

Figure 4: School primary enrollment in private and public sectors in Pakistan , 2013-14



Halil et al., 2014].[6]

Table 1: Primary level enrollment in private schools by quintiles and regions in Pakistan

	Urban Areas			Rural Areas		
	Male	Female	All	Male	Female	All
1st Quintile	21	21	21	12	11	11
2nd Quintile	42	38	40	21	17	19
3rd Quintile	60	57	58	32	25	29
4th Quintile	70	67	69	43	41	42
5th Quintile	88	83	86	62	59	61
All	65	59	62	28	25	27

Source : Author, using PSLM data for 2011-2012

[6]Less than 0.7% of all enrolled children between the ages of five and nineteen attend madrassas [Andrabi et al., 2006]. Rose [2006] indicates that there are around 500 community schools in Pakistan, a small number compared with almost 20,000 in Bangladesh.

The quality of schooling in Pakistan is relatively low. According to the ASER national survey, at the end of primary (grade 5), only 54% of the children can read a story in Urdu, 52% are able to read a sentence in English and 47% can divide 3-digit numbers.[7] When they leave schools, often even before completing grade five, most of the students still do not possess the basic knowledge valued by the labor market. The gap in learning between private and government schools is significant [Andrabi et al., 2008, Aslam, 2009, Das et al., 2006, Khan and Kiefer, 2007]. Andrabi et al. [2008] find that, even after controlling for parental education, wealth, child's age and gender, an average primary student in private school performs better in English than the top third of children in the public sector. This finding is consistent with other studies in India [Chudgar and Quin, 2012, Desai et al., 2009, French and Kingdon, 2010, Goyal, 2009, Kingdon, 2008, Muralidharan and Sundararaman, 2013, Pal, 2010] or in other developing countries (see Anand et al. [2009] for a study in Chile, Tooley and Dixon [2007b] in India, Ghana, Nigeria and Kenya, Tooley et al. [2011] in Nigeria and Thapa [2015] in Nepal).

This premium in cognitive abilities in private schooling has been attributed to the higher quality of teaching in these schools due to lower teachers' absenteeism [Andrabi et al., 2008, Muralidharan and Sundararaman, 2015, Tooley et al., 2011], more teaching activities (by opposition to administrative tasks) [Muralidharan and Kremer, 2006, Tooley et al., 2011], better teaching methods [Aslam and Kingdon, 2011] and a stronger accountability of teachers to employers [Aslam and Kingdon, 2011, Muralidharan and Kremer, 2006]. This higher quality of education is later translated in the labor market as private school graduates earn more than public school graduates in Pakistan [Asadullah, 2009].

3 Literature Review

3.1 Debates and controversies about private schooling

The development of private schooling alternatives in developing countries has generated significant and unsettled debates in line with the discussion about school choice initiated by Friedman [1955, 2009]. Andrabi et al. [2015], in a comprehensive and original article, use a fictional place called Taleem to describe the evolution of the educational landscape in developing countries and present the debates generated by the surge of private schools.

In an ideal educational marketplace, fully informed customers (parents) make a choice from a range of alternatives among providers (schools). When children are assigned to schools according to where they live (no official schooling choice), it increases educational gaps as only wealthy parents can afford to move in areas where the best schools are located. The

[7] Every year since 2008, the ASER (Annual Status of Education Report) project estimates the learning level of 5-16 years old children in 138 rural districts of Pakistan and, since 2011, in urban centers. In each district, 30 villages are selected randomly. In each village, 20 households are randomly selected and the children of these households are tested in Reading (Urdu, Pashto and Sindhi), Mathematics and English.

development of private schools can be seen as a way to increase competition in the schooling system [Friedman, 2009], which theoretically leads to efficiency gains, in terms of both quality and costs, as private and public schools compete to attract students [Holmes et al., 2003, Hoxby, 2007]. If customers are dissatisfied with the product (education), they can, following the Hirschman [1970] model, either exert their voice (complain) or their exit option (enroll their children in another school). Besides, as underlined before, private schooling is often considered as more efficient than public education: private schools produce higher learning outcomes at lower costs [Andrabi et al., 2008, Muralidharan and Sundararaman, 2014]. Two complementary arguments can be put forward to explain why private schools are more efficient. First, private schools may have specific pedagogical methods, methods of managements that make them more efficient. For instance Muralidharan and Sundararaman [2014] argue that one of the reasons why private schools in India produce higher learning in Hindi is that they devote more time to Hindi teaching. The second possible explanation lies in peer effects: in private schools, students benefit from being around better children coming from the wealthiest and the most educated households. Developing private schooling could theoretically achieve three goals: higher academic achievement, lower costs and greater equality of opportunity.

However, this relationship between school choice and efficiency is far from being straightforward as educational markets are distorted in many ways [Härmä, 2011]. First, parents are assumed to be fully informed about schools' performance in order to make an informed choice which is rarely the case in low-income countries [Watkins, 2004]. Second, because the survival of government schools does not depend uniquely on their capacity to attract children, public schools may not face the competitive pressure of private schools. Third, customers are not always able to exert their exit option because of geographical or budgetary constraints. When private schools are concentrated in particular areas, that are the wealthiest and most urbanized neighborhoods [Andrabi et al., 2008, Dixon, 2013, Muralidharan and Kremer, 2006, Pal, 2010], poor and rural households cannot exert their exit option and are doomed to leave their children in the worst schools. Private schools, by charging high fees, can exclude poor households [Heyneman and Stern, 2014]. Empirical evidence tends to show that private schools are not serving the poors (See Härmä and Rose [2012] for a study in India and Heyneman and Stern [2014] in Pakistan and Jamaica). If, through location strategies or fees policies, private schools attract pupils from wealthier and more educated households [Härmä, 2011, Watkins, 2004, Woodhead et al., 2013], the development of private schools could increase inequalities. Poor students, who cannot exert their exit option, attend schools where the quality has decreased because good peers have moved to private schools. The growth of private schooling could weaken the public education system if the best performing students desert the public schools and only the lowest performing pupils stay in public institutions. Evidence concerning the effect of competition from private schools on public school productivity are not convincing. For instance, Hsieh and Urquiola [2003] suggest that private schools in Chile worsens public sector performance due to cream skim-

ming effects. Similarly, Hsieh and Urquiola [2006] explain that private and public schools in Chile compete on peer composition rather than on productivity. Private schooling could also increase gender inequalities if girls are less likely to attend a non-state institution [Aslam, 2009, Härmä and Rose, 2012, Hartwig, 2013, Pal, 2010, Woodhead et al., 2013].

3.2 Determinants of school choice

Movements in private schools can be driven by both pull and push factors. The insufficient numbers of public schools [Colclough, 1997, Heyneman and Stern, 2014] and the dissatisfaction of households with public poor quality education [Andrabi et al., 2002, Aslam, 2009, Heyneman and Stern, 2014, Rolleston and Adefeso-Olateju, 2014, Rose, 2006], push factors, can partly explain enrollment in private schools. The particularities of private schools (medium of instruction, characteristics of teachers, etc), pull factors, can also explain why parents choose private schools.

Researchers have tried to identify the determinants of school choice through multinomial and nested multinomial logit models. Gertler and Glewwe [1990] initiated the research on this topic by estimating a well-known model of demand for secondary schooling in rural Peruvian households. They however do not study private and public choices but they distinguish local and faraway schools. Their theoretical framework and empirical models have nevertheless been used by the latter literature to explain private and public educational choices.

Glewwe and Patrinos [1999] address the demand of schooling in Vietnam for children aged 8 to 15 years using a multinomial logit. The results are quite consistent with their presumed impacts. Better-off and more educated households are more likely to send their children, especially boys, to private schools. The characteristics of private and public schools, measured by regional mean expenditures of each type of schools, do not have a significant impact on schooling decisions. As the authors do not have information on out-of-school children, they only look at enrolled children and do not control for selection. Only one measure of school characteristics is included whereas this variable is not a convincing proxy for quality of schooling and other school characteristics, such as the price or the number of schools available, could also explain school choice. Alderman et al. [2001] assess the determinants of school choice among low-income households in Pakistan separately for boys and girls using a multinomial nested logit. Contrary to Glewwe and Patrinos [1999], they also integrate information on not-enrolled children. The distance to a school type lowers the relative utility of choosing that option whereas school expenditures, a proxy for instructional resources available in the school, raise the relative utility of both private and government schools. Alderman et al. [2001] use a database with few out-of-school children as they study only urban neighborhoods in Lahore. Their findings may not be applied to rural populations. Another limit of this study resides in the lack of a measure of schooling quality.

Glick and Sahn [2006] estimate a model of primary schooling choice in rural Madagascar using a multinomial nested logit. Both poor facility quality (measured by window condition, building condition and pupil-teacher ratios) and multigrade teaching reduce the likelihood of enrollment. They show that rather than increasing schooling fees which will impact negatively enrollment of poor children, policies should focus on increasing facility quality and reducing multigrade teaching. Nishimura and Yamano [2013] implement a multinomial logit model using data in 2007 in rural Kenya to estimate the determinants of school choice. The only school characteristics included are the total number of respectively public and private primary schools in the community and pupils-teacher ratios. Their findings support the differentiated-demand model rather than an excess-demand model. Indeed, the supply of private schools increases by 3% points the probability of attending a private school but the number of public schools has no effect on private enrollment. Overcrowding in public institutes increases the probability of attending private schools. They also find that male and wealthy students are more likely to attend a private school.

Using the same database as us, Carneiro et al. [2016] estimate a model for the demand of differentiated products that accounts for the endogeneity of both school prices and peer group characteristics. Their approach is quite different as they do not look directly at the choice between private and private schools but they consider all the schools as imperfect substitutes. They also do not integrate into their demand function, the perception of the quality of the schools made by the parents. Carneiro et al. [2016] have rich information on the distance between the household and the school. Unfortunately, in this study, we do not have access to this information. They find that the distance is a central determinant of school choice whereas price elasticities are relatively low. Carneiro et al. [2016] also estimate the welfare cost associated with the abolition of the private school market. The results suggest that the value of private schooling amounts to 25% and 100% of monthly per capita income for respectively girls and boys.

Other recent studies have tried to explain intra-household school choice and especially the gender gap in private schools in India using models with household fixed effects. Using a household fixed effects model with selection, Maitra et al. [2014] find that child health and mother's education explain private enrollment. Note that they do not include any measure of school quality. Also in India, Sahoo [2015] confirms that there is an intra-household gender gap of 5.8 percentage points in private school enrollment. Sahoo [2015] tries to measure the quality of government primary schools by integrating an index of the infrastructure and the material available in public schools. However, recent studies have shown that these factors are weakly correlated with test scores and therefore are poor proxies of the quality of schooling [Glewwe and Muralidharan, 2015].

All these studies have very little, if any, information about the quality of the schools

available in the neighborhood whereas the low quality of governmental schools is supposed to be one of the main factors explaining the growth of private enrollment in developing countries. The novelty of this paper lies in three aspects. First, we integrate, in the determinants of school choice, a measure of perceived quality. More precisely, we test whereas the perception of low quality education in public institutions explains private school enrollment. Second, we specify a Heckman probit model that controls for selection. Finally, a model with household fixed effects is specified and also takes into account non-random enrollment decision process.

4 Empirical specifications

4.1 School choice

As it is common in the literature about school choice [Alderman et al., 2001, Glick and Sahn, 2006, Gertler and Glewwe, 1990], parents are assumed to derive their utility from their own consumption of goods and services (C) and from the human capital of their child (H). For simplicity, the model is a household unitary model with one period and one child. Parents are assumed to value their child's education because they are simply altruistic and/or because their educated child will earn more in the future and be able to support them financially once they get older. Parents' utility can therefore be written as:

$$U = u(C, H) \tag{1}$$

The level of consumption equals the income (Y) less schooling costs (P): $C = Y - P$.

Parents face a choice in terms of schooling: they can enroll their child in a public school (option G) or in a private school (option P). The human capital acquired by the child as well as the level of consumption of the household are different given each schooling choice. Therefore for both choices, parents' utility varies. Parents would opt for the schooling option maximizing their utility. The unconditional utility maximization problem can be written as:

$$U^* = max(U_G, U_P) \tag{2}$$

Where U_j, $j = [G, P]$, refers to parents' conditional utility (conditional to the chosen option j).

The utilities associated with public and private schooling (U_G and U_P) are specified in a nonlinear form in order to allow the household income to impact parental schooling decision. Indeed, as parents make their decision by differentiating the possible utilities ($U_P^* = U_P - U_G$), if consumption is entered in a simple linear form, attributes that are constant across alternatives, such as consumption, are differentiated out of the decision rule. To overcome this issue, we can, following Gertler and Glewwe [1990] and Alderman et al.

[2001], opt for a utility function where income enters in a quadratic form.

$$U_{ij} = \alpha_0 H_{ij} + \alpha_1 C_{ij} + \alpha_2 C_{ij}^2 + e_{ij} \Leftrightarrow U_{ij} = \alpha_0 H_{ij} + \alpha_1 (Y_i - P_{ij}) + \alpha_2 (Y_i - P_{ij})^2 + e_{ij} \quad (3)$$

Where U_{ij} denotes the utility of the individual i associated to the schooling option j ($j = G, P$). In line with Glick and Sahn [2006], we use a more flexible alternative method where the consumption term is interacted with dummy variables indicating the per capita expenditure quintile of the household.

$$U_{ij} = \alpha_0 H_{ij} + \sum_{k=1}^{5} \alpha_{1k} (Y_i - P_{ij}) E_k + \epsilon_{ij} \quad (4)$$

Because the increase of the human capital of the child associated with each alternative j, H_{ij}, is not directly observable, $\alpha_0 H_{ij}$ is replaced by its reduced form:

$$\alpha_0 H_{ij} = \beta_j F_i + \gamma_j QS_j + \delta_{ij} \quad (5)$$

Where QS_j represents a vector of school quality inputs (including school, teacher and classroom characteristics), F_i corresponds to a vector of observed household and child characteristics and δ_{ij} is a random error term.

Substituting equation (5) into the utility function (equation (4)) yields:

$$U_{ij} = \beta_j F_i + \gamma_j QS_j + \sum_{k=1}^{5} \alpha_{1k} (Y_i - P_{ij}) E_k + \eta_{ij} \quad (6)$$

The standard formulations of utility as a function of household net of schooling $(Y_i - P_{ij})$ presented previously impose the coefficient on income to equal the coefficient on the price of schooling whereas these coefficients may vary. For instance, as underlined by Manski et al. [1981], it can arise when unmeasured tastes affecting the utility of each alternative are linked with household income.[8] The model implemented in this study allows separate income and price coefficients:

$$U_{ij} = \beta_j^* F_i + \gamma_j^* QS_j + \sum_{k=1}^{5} \alpha_{1jk}^* E_k(Y_i) + \alpha_{2j}^* P_{ij} + \eta_{ij}^* \quad (9)$$

[8] An illustration of this can be depicted when an unobserved parental taste variable T_{ij}, representing preferences for schooling alternatives, is added to the conditional utility function:

$$U_{ij} = \beta_j^* F_i + \gamma_j^* QS_j + \sum_{k=1}^{5} \alpha_{1k} (Y_i - P_{ij}) E_k + dT_{ij} + \eta'_{ij} \quad (7)$$

If preferences are related to household income, these tastes can be parameterized by $T_{ij} = \lambda_j Y_i + \omega_{ij}$, yielding:

$$U_{ij} = \beta_j^* F_i + \gamma_j^* QS_j + [\sum_{k=1}^{5} (\alpha_{1k} E_k) - d\lambda_j](Y_i) - \sum_{k=1}^{5} \alpha_{1k} P_{ij} E_k + \eta'_{ij} + d\omega_{ij} \quad (8)$$

Parents choose a private school instead of a public school if:

$$\begin{aligned} & U_{iP} - U_{iG} > 0 \\ \Leftrightarrow & (\beta_P^* - \beta_G^*)F_i + (\gamma_P^* QS_P - \gamma_G^* QS_G) + \sum_{k=1}^{5} (\alpha_{1Pk}^* - \alpha_{1Gk}^*)E_k(Y_i) \\ & + (\alpha_{2P}^* P_{iP} - \alpha_{2G}^* P_{iG}) + (\eta_{iP}^* - \eta_{iG}^*) > 0 \end{aligned} \tag{10}$$

Denoting U_P^*, the net utility associated with private schooling ($U_P^* = U_P - U_G$), parents would choose to enroll their children in a private school if U_P^* is positive. Parents enroll their child in a private institution if the utility associated with private schooling is higher than the utility associated with governmental education.

$$\begin{cases} P = 1 \text{ if } U_P^* > 0 \\ P = 0 \text{ otherwise} \end{cases} \tag{11}$$

$$U_P^* = X_1\beta_1 + \epsilon_1 \tag{12}$$

P equals one if the child is enrolled in a private school and zero if he is enrolled in a public school. X_1 refers to the vector including the variables affecting the net utility of private schooling as described in equation (10).

4.2 Selection

One problem in estimating equation (11) is that P is observed only if parents enroll their child. Denoting S that equals one if the child is enrolled and zero if he is out-of-school, P is observed when $S = 1$. Enrollment is a non-random choice made by parents. Therefore, estimating equation (11) without taking into account selection within enrollment would lead to biased estimates if enrolled and out-of-school children have different characteristics. To correct for this selection bias, we need to specify the enrollment function.

$$\begin{cases} S = 1 \text{ if } S^* > 0 \\ S = 0 \text{ otherwise} \end{cases} \tag{13}$$

Where S^* refers to the net utility of enrollment:

$$S^* = X_2\beta_2 + \epsilon_2 \tag{14}$$

X_2 represents a vector including variables affecting the net utility of enrollment. Note that X_2 and X_1 have some common variables but X_2 also includes an exclusion variable that is an instrumental variable affecting the enrollment decision process but not the choice between private and public schooling. Assuming that error terms in both equations (equations

(12) and (14)) are normally distributed and denoting ρ the correlation between the error terms, a sample probit selection model, also known as the Heckman probit specification, can be estimated. This method has been used by Maitra et al. [2014].

$$\begin{cases} \epsilon_1 \sim N(0,1) \\ \epsilon_2 \sim N(0,1) \\ corr(\epsilon_1, \epsilon_2) = \rho \end{cases} \tag{15}$$

Given the assumptions in equation (15), we obtain the conditional probability of choosing private schooling:

$$P(P = 1|S = 1, X_1, X_2) = \Phi\left[\frac{X_1\beta_1 + \rho X_2\beta_2}{\sqrt{1-\rho^2}}\right] \tag{16}$$

The joint probabilities are given by:

$$\begin{aligned} P(P = 1, S = 1) &= P(P = 1|S = 1) * P(S = 1) = \Phi_2\left[X_1\beta_1, X_2\beta_2, \rho\right] \\ P(P = 0, S = 1) &= P(P = 0|S = 1) * P(S = 1) = \Phi_2\left[-X_1\beta_1, X_2\beta_2, -\rho\right] \end{aligned} \tag{17}$$

Where Φ represents the standard (univariate) cumulative normal distribution function whereas Φ_2 refers to the cumulative bivariate normal distribution function. If ρ is significantly different from zero, it prevents us from using a simple univariate probit model.

This specification is preferred to a simple probit model because it alleviates selection bias. The sample selection probit is also more appropriate than the simple multinomial logit that has been used in the previous literature. Indeed, the Heckman probit does not assume the Independence of Irrelevant Alternatives (IAA) which states that the odd ratios are independent from other alternatives. We also prefer this specification over the nested multinomial logit because the nested logit is computationally burdensome and does not allow us to include the same variables in both enrollment and private school equations. The main drawback of the sample selection model is that it requires an exclusion variable, that is a variable impacting enrollment choice but not private choice. We will detail the selected variable in the next section.

4.3 Household heterogeneity

Omitted variables reflecting unobserved household characteristics can bias our estimates (household's preference for education). ϵ_1 includes an unobserved household heterogeneity that is likely to be correlated with observed household characteristics. As we observe multiple children in a household and the same households are surveyed over time, it is possible to control for household fixed effects. Including household fixed effects allows us to control for household specific unobserved characteristics that are constant overtime. We can rewrite

equation (11) to explicit the temporal dimension:

$$\begin{cases} P_{iht} = 1 \text{ if } U^*_{P,iht} > 0 \\ P_{iht} = 0 \text{ otherwise} \end{cases} \quad \text{with } U^*_{P,iht} = X_{1,iht}\beta_1 + a_{1,h} + \epsilon_{1,iht} \tag{18}$$

where $U^*_{P,iht}$ is the latent net utility associated with private enrollment for the child i in the household h in time t. $a_{1,h}$ represents the household specific unobserved heterogeneity. Following Sahoo [2015], equation (18) can be estimated through a Linear Probability Model (LPM).[9]

The selection problem mentioned before and modeled in equation (13) still needs to be taken into account. Rewriting equation (13) to explicit the temporal dimension yields:

$$\begin{cases} S_{iht} = 1 \text{ if } S^*_{iht} > 0 \\ S_{iht} = 0 \text{ otherwise} \end{cases} \quad \text{with } S^*_{iht} = X_{2,iht}\beta_2 + a_{2,h} + \epsilon_{2,iht} \tag{19}$$

Equation (19) describes a binary selection rule: enrollment vs. non-enrollment. $a_{2,h}$ refers to the unobserved household characteristics. P_{iht}, the choice of private school, is observed only when the child is enrolled, $S_{iht} = 1$.

To control for household heterogeneity, within transformations or explicit fixed effects are traditionally used. However, in a specification with sample selection, this is not straightforward as the selection equation (19) is non-linear and therefore the within transformation cannot be used. Moreover, including specific fixed effects in a panel non-linear specification will lead to incidental parameters problem [Lancaster, 2000]. Wooldridge [1995], in the spirit of Heckman, provides a two-stage method to correct for sample selection bias in linear panel data specifications where the unobserved heterogeneity is allowed to be correlated with the independent variables in both the selection and the main equations.

In order to obtain a consistent pooled OLS estimate of equation (18), the conditional expectation should be [Dustmann and Rochina-Barrachina, 2007]:

$$E(a_{1,h}+\epsilon_{1,iht}|X_{1,iht}, S_{iht}=1) = E(a_{1,h}|X_{1,iht}, S_{iht}=1)+E(\epsilon_{1,iht}|X_{1,iht}, S_{iht}=1) = 0 \tag{20}$$

Equation (20) would not equal zero if the household heterogeneity term ($a_{1,h}$) is correlated with the observed explanatory variables ($X_{1,iht}$) or if the selection decision modeled by $S_{iht} = 1$ is not random. To deal with this issue, the estimator proposed by Wooldridge [1995] derives the expected value in equation (20) and includes it as an additional explanatory variable in the main equation. More precisely, Wooldridge [1995] proposes to parameterise the conditional expectations in equation (20). Based on Wooldridge [1995] and Sahoo [2015],

[9] This linear specification is chosen in order to include household fixed effects and to control for selection.

the assumptions of the household fixed effects model are described below. The first two assumptions concern the selection equation (19) whereas the last two concern the relationship between $a_{1,h}$ and $\epsilon_{1,iht}$.

(i) In line with Mundlak [1978] and Sahoo [2015], the household heterogeneity term ($a_{2,h}$) in the selection equation (19) is assumed to be a linear function of within-household average (over time and over children) of $X_{2,iht}$:

$$a_{2,h} = b_0 + \overline{X}_{2,h} b + c_h \tag{21}$$

Where c_h is a random term independent with regards to other factors. $\overline{X}_{2,h}$ represents the household average values of the observed variables included in equation (19). $\overline{X}_{2,h} = \frac{1}{T_h} \sum_t (\frac{1}{n_{ht}} \sum_i X_{2,iht})$ where T_h refers to the number of periods when the household h has at least one primary school age child ($T_h \in (1, 2, 3)$) and n_{ht} refers to the number of children in the h-th household at time t. Note that this specification is preferred to the specification used by Chamberlain [1979] where $a_{2,h}$ is a function of the leads and lags of $X_{2,iht}$ because the data we use are unbalanced as households do not have school age children in all periods [Sahoo, 2015].

(ii) Incorporating the equation (21) in equation (19) yields:

$$\begin{cases} S_{iht} = 1 \text{ if } S^*_{iht} > 0 \\ S_{iht} = 0 \text{ otherwise} \end{cases} \quad \text{with } S^*_{iht} = b_0 + \overline{X}_{2,h} b + X_{2,iht}\beta_2 + c_h + \epsilon_{2,iht} \tag{22}$$

The error term in the reduced form of the selection equation (22), $v_{iht} = \epsilon_{2,iht} + c_h$ is assumed to be independent of $X_{2,ih}$ with $X_{2,ih} = (X_{2,ih1}, ..., X_{2,ihT})$. v_{iht} is also assumed to follow a standard normal distribution: $v_{iht} \sim Normal(0, \sigma_t^2)$.

(iii) Turning to the main equation (18), similar to Mundlak [1978] and Sahoo [2015], the household heterogeneity term ($a_{1,h}$) is assumed to be a linear function of the explanatory variables averaged at the household level, yielding:

$$E(a_{1,h}|X_{2,ih}, v_{iht}) = \psi_0 + \overline{X}_{1,h}\psi + \pi_t v_{iht} \tag{23}$$

Where $\overline{X}_{1,h} = \frac{1}{T_h} \sum_t (\frac{1}{n_{ht}} \sum_i X_{1,iht})$. Under the exclusion restriction, the elements of X_2 that are not included in X_1 are independent of $\overline{X}_{1,h}$ and of $\epsilon_{1,iht}$ and therefore are not in equation (23).

(iv) Finally, conditional on v_{iht}, $\epsilon_{1,iht}$ is assumed to be mean independent of $X_{2,ih}$ and its conditional expected value is assumed to be linear with respect to v_{iht}:

$$E(\epsilon_{1,iht}|X_{2,ih}, v_{iht}) = E(\epsilon_{1,iht}|v_{iht}) = \rho_t v_{iht} \tag{24}$$

Where ρ_t is an unknown scalar. If v_{iht} is not observed directly, we observe the enrollment decision S_{iht} which is a function of $X_{2,ih}$ and v_{iht} as specified in equation (22). Applying the Law of Iterated Expectations to equations (24) and (25) yields:

$$\begin{aligned} E(a_{1,h} + \epsilon_{1,iht} | X_{2,ih}, S_{iht} = 1) &= \psi_0 + \bar{X}_{1,h}\psi + (\pi_t + \rho_t) E(v_{iht} | X_{2,ih}, S_{iht} = 1) \\ &= \psi_0 + \bar{X}_{1,h}\psi + \zeta_t \lambda_{iht} \end{aligned} \tag{25}$$

Where $\zeta_t = \pi_t + \rho_t$ and $\lambda_{iht} = E(v_{iht} | X_{2,ih}, S_{iht}) = 1$.

Replacing equation (25) in equation (18) yields the main equation modeling private school choice:

$$E(P_{iht} | X_{1,ih}, S_{iht} = 1) = \psi_0 + \bar{X}_{1,h}\psi + X_{1,iht}\beta_1 + \zeta_t \lambda_{iht} \tag{26}$$

To obtain a consistent estimate of β_1 in equation (26), a two-stage procedure has to be implemented. First, we estimate the reduced form of the sample selection equation (equation (22)) using a standard probit model for each period. These estimates give λ_{iht}, the ratio of normal density to the cumulative distribution function, that is the Inverse Mills Ratio (IMR). Please note that the IMRs are estimated separately for each period. In the second stage, equation (26) is estimated by pooled OLS method and in the explanatory variables the IMRs are included. Given the two-step procedure used, the standard errors are clustered and bootstrapped at the household level.

5 Database and variables

5.1 Description of the database

Pakistan provides a unique framework to study the choice between public and private schools. First, parents are allowed to choose freely the school of their child and setting up a new private school is relatively simple due to little government regulation [Andrabi et al., 2011, 2014]. Second, as underlined before, a typical rural private school remains affordable for low-income households [Andrabi et al., 2002]. Finally, in Punjab, the educational marketplace is relatively competitive with seven schools (private and public) in a typical village. The contextual factors of Pakistan - a rise in low-fee private schools with a premium in quality compared with government schools - are consistent and comparable with many other developing countries in South Asia and Africa. Research findings in Pakistan could be valuable information for a number of other countries.

The data used come from the Learning and Educational Achievement in Pakistan Schools (LEAPS) project.[10] Between 2001 and 2005, the LEAPS team gathered data on the distribution of schools in rural Punjab but also on the quality of education. The sample covers

[10]This project was implemented by Andrabi (Pomona College), Das (World Bank, DEC), Khwaja (Harvard University), Viswanath (World Bank, South Asia) and Zajonc (Harvard University).

823 schools (first round) in 112 villages in three districts: Attock (North), Faisalabad (Central) and Rahim Yar Khan (South). The sample is not representative of Punjab because villages were randomly chosen from a list of villages with both public and private schools. As expected, these villages are wealthier, larger and more educated than the average rural village. In the first year of the survey, 50% of the rural population of the Punjab rural lived in villages with at least one private school [Carneiro et al., 2016].

All private and public schools within each village boundaries and within a short walk of any village household were surveyed.[11] In addition, in each village, 16 households were surveyed. Twelve households were randomly chosen among the households with at least one child eligible for and enrolled in grade three. Four households were randomly chosen from the list of households with at least one child eligible for grade three, aged between 8 and 10 years old, but not enrolled.[12] In this study, we focus on children eligible for primary education and therefore restrict our sample to children aged between 6 and 12. In order to avoid repeated observations in the Heckman probit model, only one observation by child was kept as very few changed schools over the span of the survey.[13] The final sample gathers information about 4572 different children.

5.2 Supply of schools

Educational competition within a village is quite high as a typical village has seven schools, five of which (three private and two public schools) are located in the main settlement and are within 50-100 meters of each other.[14] On average, a school has three other schools at less than 15 minutes walking distance. Private schools locate in denser settlements.[15] For each village and year, we compute the market share in terms of primary school students (grades one to five) of each school. On average, each school gathers 14% of students market share. The Herfindahl-Hirschman index is consistent with a competitive environment.[16] Theoretically, parents have therefore quite a large scope of schools among which they can choose even though this choice can be limited by different factors (distance, fees, admission criteria or information).

[11] Short walk distance was defined as 15 minutes walking distance for Attock and Faisalabad and 30 minutes for Rahim Yar Khan, a less densely populated district. Villages with more than 24 schools were excluded.

[12] 96% of the households were tested during all the three waves. The remaining 4% were tested during two waves.

[13] When the child was surveyed more than once, we kept only the first observation.

[14] The sample villages have an average population of 4125 individuals compared with 2665 individuals in an average village in the three districts. This high population is explained by the sampling procedure.

[15] An average private school has five schools at less than 15 minutes walking distance whereas a typical public school has two schools located at less than 15 minutes walking distance.

[16] The Herfindahl-Hirschman index is a widely used measure of the size of firms in relation to their industry. It indicates the degree of competition within firms in a same industry. In our case, it is computed as $H = \sum_{i=1}^{N} s_i^2$ where s_i is the market share (in terms of students) of school i in the village and N is the number of schools in the village. The average Herfindahl-Hirschman index is of 0.11 indicating a competitive educational marketplace.

The place of residency and schooling quality could be endogenous if parents move to specific villages to be closer to certain schools. However, in the sample, less than two percent of household members report having moved to a new village in the past five years. Even when they moved, less than one percent claims it was for education reasons. Besides, parents may have some difficulties to base their housing choice on schools as new schools emerge quite often. Indeed, 150 schools have emerged in the sample villages between 2000 and 2005.

The number of private schools could also be endogenous. Indeed, the decision to open a private school could be conditioned by the number and the quality of available public schools. Tests of equality of means and of distributions nevertheless reject this hypothesis.[17]

Estimates for school characteristics could be biased if parents with strong preference for education provide direct financial support to schools or if they exert pressure on political authorities to provide more educational resources [Glick and Sahn, 2006]. Similarly, if policymakers implement policies to improve schooling quality in areas where enrollment is low the estimates would be biased. In both cases, the utility functions include in the error terms a component correlated with school covariates leading to biased results. Concerning parents' involvement in school resources, only 7% and 13% of respectively men and women have ever participated in school committees or parent-teacher meetings. Moreover, as very few schools (6%) receive external funding in addition with government financing and school fees, parental direct financial funding is unlikely to bias our estimates. In public schools, if the government invests more educational resources in certain areas, for instance in villages where enrollment and quality of education are low, the estimates could be biased.[18] This is a concern in Pakistan as financing primary education is decentralized at the provincial level. However, public schools with low test scores do not receive significantly more or less financing from the government.[19]

School choice could be restrained if schools exert strong selection. School selection is analyzed in Annex A. Even if most schools declare having a procedure for selecting students, they almost accept every applicant. However, in selective schools, students perform better and come from wealthier households suggesting that self-selection may bias the estimates.

5.3 Variables and descriptive statistics

We use various household- and child- specific variables to explain schooling choice. These variables are presented in the first part of Table 2. In the final sample, 16% of children are

[17] Results are available on request. The number of private schools in villages with less than four public schools (median of the number of public schools) is compared with the number of schools in villages with four or more public institutions. Similarly, we compare the average number of private schools in villages where the average score in public schools is below the median with villages where the average score is higher than the median. In both cases, no significant difference was found. To test the equality of distributions, two-sample Kolmogorov–Smirnov tests of the equality of distributions were implemented.

[18] In private schools this is not a concern as very few private schools receive financing from the government.

[19] When the amount of public financing is regressed on school test scores, no significant effect is found.

out-of-school, 25% are enrolled in a private school and 58% are attending a public school.

Table 2: Descriptive statistics

	Out-of-school children		Attending private schools		Attending Public schools	
	Mean	SD	Mean	SD	Mean	SD
Girl	0.58	0.5	0.43	0.5	0.46	0.5
Age	8.51	2.3	8.41	2.0	8.63	2.1
Mother's years of schooling	0.57	3.3	2.58	3.6	1.15	2.7
Father's years of schooling	2.18	3.4	5.33	4.4	3.93	4.1
(Monthly) Consumption per cap.	702.16	1253.1	1252.68	1609.1	888.09	1146.5
Members in hh < 5 years	1.26	1.1	1.14	1.3	1.00	1.1
Members in hh between 5 and 15 years	3.83	1.5	3.88	2.1	3.90	1.6
Members in hh > 15 years	3.66	2.0	3.97	2.7	3.84	2.2
No. of private schools	2.62	1.9	3.25	2.5	2.48	1.8
No. of public schools	4.93	3.1	3.98	2.6	4.23	2.7
% of public schools: high quality	0.09	0.2	0.10	0.2	0.13	0.2
% of private schools: high quality	0.18	0.3	0.33	0.3	0.24	0.4
% of public schools: average quality	0.29	0.3	0.33	0.3	0.42	0.3
% of private schools: average quality	0.16	0.3	0.29	0.3	0.19	0.3
% of public schools: low quality	0.10	0.2	0.19	0.3	0.12	0.2
% of private schools: low quality	0.02	0.1	0.06	0.2	0.05	0.2
% of public schools: unknown quality	0.52	0.4	0.37	0.4	0.33	0.3
% of private schools: unknown quality	0.63	0.4	0.33	0.3	0.52	0.4
% with hindrance - public schools	0.16	0.2	0.13	0.2	0.15	0.2
% with hindrance - private schools	0.09	0.2	0.09	0.2	0.10	0.2
Observations	748		1150		2674	

Source: Author using the three waves of the LEAPS project. Each child is observed only once (the first year of observation).

Demographic characteristics of children include their gender and age. Out-of-school students are more likely to be girls than enrolled children. Girls are underrepresented in private schools. Older children tend to be enrolled in public institutions rather than in private schools. We use various household-specific variables to explain schooling choice: wealth, education of the parents and structure of the household. Wealth, measured by the monthly household consumption per capita, and parental education are expected to impact positively attainment. On average, enrolled children, particularly in private schools, come from better-off and more educated families. The levels of education of both the father and the mother are included separately in the demand function as one parent may be more involved in schooling decisions. The correlation between parental education and household wealth is positive

but not that high to lead to potential multicolinearity bias.[20] The household structure can also influence parental educational choices. The number of youth in the household (under 5 years and between 5 and 15 years) is expected to impact negatively educational attainment because scarce resources have to be shared among children [Buchmann, 2000, Huisman and Smits, 2009]. This relationship is however not straightforward as more children may mean more potential help at home and thus may increase the probability for one specific child to go to school. The number of school-age siblings can also play a positive role in girls' attainment as parents can be less reluctant to send their daughters to school because of safety reasons if they go to school with their siblings. Additional adults are expected to provide income and domestic support to enable children to attend school [Huisman and Smits, 2009, Glick and Sahn, 2006]. A first look at the data suggests that the size and the composition of the household change a little among the three sub-samples. Out-of-school children have more under-five siblings than enrolled children.

Concerning school characteristics, to test the excess demand assumption, we include the number of private and public schools available in the village where the household lives. Recent studies have linked overall enrollment with the number of schools available [Alderman et al., 2003, Burde and Linden, 2013, Duflo, 2001, Handa, 2002]. We could therefore think that the structure of the educational supply could explain private school choice. On average, households live in villages where seven schools are located. Children enrolled in private schools tend to live in areas where more private schools are located.

The main originality of this paper lies in the inclusion of a perceived measure of schooling quality. Parents may enroll their children in private schools if they think that public schools provide low quality education. To test this hypothesis, we use parental perceived perceptions about the quality of the schools in the village. Parents were asked to rank the quality of each school (low, average, high or unknown). Descriptive statistics suggest that private schools are on average considered as better. Parents who enroll their children in public institutions have a worst opinion about private schools than parents who decide to enroll their children in a private school.

Because we do not have detailed data on the distance between the household and the different schools, we tried different proxies. Our preferred measure for distance is whether or not the household faces difficulties (hindrance) to reach the school. We therefore include the percentage of respectively private and public schools in the village for which the child encounters difficulty to reach.

The other school specific characteristics influencing schooling choice are presented in Table 3. In the estimates, all these variables are averaged by village. For instance the number of students in private schools will refer to the average number of students in private schools

[20]The coefficients of correlation between household consumption and father or mother education are respectively 0.07 and 0.09.

located in the village of the household. Table 3 presents the average characteristics of all sample private and public schools. More details about the differences between private and governmental institutions can be found in Annex B.

Table 3: Descriptive statistics : public and private schools

	Public		Private		Difference	
	Mean	SD	Mean	SD	Diff	T-statistic
School Resources						
Admission fees (grades 1 to 3)	1.37	12.9	91.58	130.6	-90.21***	(-15.24)
Annual school fees (grades 1 to 3)	19.50	154.7	1120.30	774.6	-1100.8***	(-30.68)
Admission fees (grades 4 to 5)	5.49	28.3	102.23	150.8	-96.74***	(-13.86)
Annual school fees (grades 4 to 5)	37.56	231.9	1327.40	833.3	-1289.8***	(-32.46)
School Structure						
No. of students	172.72	150.2	135.32	92.0	37.41***	(3.93)
Pupils-teacher ratio	35.04	15.2	19.61	7.6	15.43***	(16.52)
Monthly school expenditures (Thousand Rs.)	31.64	33.37	11.78	12.20	19.86***	(10.02)
Monthly school expenditures per capita (Rs.)	192.96	121.3	93.15	121.3	99.82***	(11.33)
Observations	496		307		803	

Notes: t statistics in parentheses : * $p < .05$, ** $p < .01$, *** $p < .001$.
Source: Author using the first wave of the LEAPS project.

The cost of schooling may explain schooling decision. Private institutions' resources come primarily from fees charged to children whereas donations remain limited.[21] These fees tend to increase with the grade. In sample private schools, annual charged fees amount to 1,120 Rs. (9.50 $) on average for students in grades one to three and 1,327 Rs. (11.25 $) for those in grades four to five. These fees are relatively low as they represent around 17% of the total monthly household income of the lowest quintile.[22] Moreover, 90% of private schools declare that they offer reduced fees for poor households. Few public schools also charged very low fees (See Annex B for more details).

The number of students in each type of schools can influence their reputation. Private schools are smaller with 173 students in an average public school and 135 students in a typical private school. As parents can try to avoid overcrowded schools, we include pupil-teacher ratios in our estimates. Private institutions are less crowded with an average class size of 20 students compared with 35 children in public schools.

To assess the quality of the infrastructure in the different alternatives, the average monthly expenditures per type of schools within the village are included [Alderman et al., 2001]. These expenditures are composed of all monthly expenditures. Teachers' wages represent 79% and 52% of monthly expenditures in respectively public and private schools.

[21] Less than one percent of private schools receive any grant from the government and less than one percent of them receive any money from donors.

[22] Data for the lowest quintile of income come from the Pakistan Household Integrated Economic Survey (HIES) for 2005-2006.

Surprisingly, private schools have lower expenditures suggesting that they are most efficient as they deliver higher learning outcomes at lower financial costs.[23] This lower level of expenditures, in line with evidence from India [Muralidharan and Sundararaman, 2014], is probably due to the efforts made by private schools to keep their costs low, mainly teachers' wages, in order to charge lower fees and attract more pupils [Andrabi et al., 2008].

In order to correctly estimate a Heckman probit, an exclusion variable is needed. This variable, also called exclusion restriction, must influence the selection variable without impacting the subsequent outcome of interest. Shocks impacting enrollment represent good candidates. The first exclusion variable considered indicates whether an adult of the household died during the last five years. This shock is expected to negatively impact enrollment. First, the death of a household member represents an important income shock. Indeed, medical expenditures as well as burial costs associated with illness and death are likely to reduce household income. The death of a working age member also reduces the resources available in the household. Secondly, the death of one household member increases the demand for care-giving, domestic and productive labor which raises the cost of opportunity associated with schooling. Parents may withdraw their child from school to face this situation. Most of the literature on this topic provides evidence of a negative relationship between enrollment and death shocks [Ainsworth and Filmer, 2002, Bicego et al., 2003, Case et al., 2004, Case and Ardington, 2006, Evans and Miguel, 2007, Senne, 2014, Yamano and Jayne, 2004] especially in poor households [Senne, 2014, Yamano and Jayne, 2004].

Similar to death shocks, if one adult leaves the household, it could affect educational attainment. Adults who left the household were on average 26 years old. The household therefore lost a potential help for domestic or labor work and it could push parents to withdraw children from school to compensate for this loss. One exception would be if the member who left still provide financial help to his family. The two main reasons why the member left are because of marriage or because he was looking for work. A wedding could induce an additional negative wealth shock as weddings can be expansive.[24] Combining information on death and leaving shocks, our exclusion variable indicates whether an adult died or left the household in the past five years. The effect of this variable on enrollment is expected to be negative. As very few children face the death or the leaving of more than one household member, we use dummies and not continuous variables.[25]

Table 4 shows that, on average, out-of-school children have more often experienced the death or the leaving of one adult in the last five years.[26]

To probe the hypothesis that death or leaving shocks are exogenous with respect to the

[23]This finding remains true even after controlling for the number of students. Test scores are significantly higher in private schools with an average standardised test score of 0.47 vs. -0.36 in public schools.

[24]In the sample, households who declare having spent money on wedding last year, spent on average 16472 Rs. (157$).

[25]Less than 11% of children who faced at least one death, faced more than one death. Less than 30% of children who live in household where one member left the household, experienced the leaving of more than

Table 4: Descriptive statistics: exclusion variables

	Out-of-school		Enrolled		Difference	
	Mean	SD	Mean	SD	Diff	T-statistic
At least one adult in the hh...						
...Died in the past 5 years (d)	0.33	0.5	0.25	0.4	0.0818***	(4.34)
...Left in the past 5 years (d)	0.28	0.5	0.23	0.4	0.0483**	(2.62)
...Died or left in the past 5 years (d)	0.54	0.5	0.43	0.5	0.1070***	(5.02)
Observations	639		3448			

Notes: t statistics in parentheses : * $p < .05$, ** $p < .01$, *** $p < .001$. Adults are defined as individuals older than 14 years.
Source: Author using the three waves of the LEAPS project. Each child is observed only once (the first year of observation).

choice between private and public schools, we regress the private school variable[27] on the exclusion variables. The estimates include all the controls used in the main equation. The results reported in Table 5 show that the coefficients associated with the exclusion variable are never significant in any specification.

Table 5: Validity of the exclusion variables - Average Marginal Effects

Dep var : private school=1	(1)	(2)
Death or leaving of one adult	-0.02	-0.02
	(0.02)	(0.02)
Observations	2145	2148
FE district	No	Yes

Notes: Additional explanatory variables are presented in Table 7
Source: Author using the three waves of the LEAPS project, only enrolled children. Each child is observed only once (the first year of observation).

6 Empirical results

6.1 Enrollment choice

The average marginal effects associated with enrollment (equation (14)) are reported in Table 6.

Consistently with national statistics, results suggest that gender inequalities in access to education remain important in Pakistan.[28] Being a girl reduces the probability of attending a school by 7% points. Parents' attitudes to education vary given the child's gender because of both economic factors and social norms. Economic considerations (differences in returns to education and labor opportunities) explain partly this bias against girls' education. With a female labor participation rate of 25% in Pakistan, parents may prefer to invest

one member.
[26] An adult is an individual 15 years old or older.
[27] This variable equals one if the child is enrolled in a private school and zero if he is enrolled in a public school.
[28] In 2014, only 67% of primary age girls attend a primary school compared with 79% for boys.

Table 6: AME with respect to P(S=1) (first-stage equation)

	All sample (1)	Girls (2)	Boys (3)
Girl	-0.07***		
	(0.02)		
Age	-0.01	-0.01	-0.00
	(0.00)	(0.01)	(0.01)
Father's years of schooling	0.01***	0.02***	0.01***
	(0.00)	(0.00)	(0.00)
Mother's years of schooling	0.01	0.01	0.02***
	(0.01)	(0.01)	(0.01)
2nd quintile hh consumption per cap	0.02	-0.00	0.04*
	(0.02)	(0.03)	(0.03)
3rd quintile hh consumption per cap	0.07***	0.09**	0.07**
	(0.03)	(0.04)	(0.03)
4th quintile hh consumption per cap	0.04	0.03	0.04
	(0.04)	(0.05)	(0.04)
5th quintile hh consumption per cap	0.14***	0.11**	0.16***
	(0.04)	(0.05)	(0.05)
Members in hh <5 years	-0.02**	-0.03**	-0.00
	(0.01)	(0.01)	(0.01)
Members in hh 5-15 years	0.01	0.00	0.01
	(0.01)	(0.01)	(0.01)
Members in hh >15 years	0.01	0.01*	0.00
	(0.00)	(0.01)	(0.01)
Death or leaving of an adult	-0.06***	-0.06**	-0.05**
	(0.02)	(0.03)	(0.02)
Observations	2504	1186	1318
District FE	Yes	Yes	Yes

Notes: Clustered (at the village level) and robust standard errors in parentheses: * p < .1, ** p < .05, *** p < .01. Adults are defined as individuals older than 14 years.
Reference categories: Boy living in a household belonging to the first quintile of consumption who has not experienced the death or the leaving of any member of the household in the past five years.
Source: Author using the three waves of the LEAPS project, only enrolled children. Each child is observed only once (the first year of observation).

in boys' education. When getting married, girls leave their natal homes in Pakistan and will not support their parents when they get older (they support their parents-in-law). Therefore, parents may not seen girls' education as a worthy investment [Purewal and Hashmi, 2015, Sawada and Lokshin, 1999]. Beyond economic factors, this gender gap reflects the socio-cultural gender norms of rural Pakistan. Women's seclusion and limited mobility in Pakistan is a factor explaining low female schooling participation. Being in contact with unrelated men and being exposed to ideas in contraction with traditional gender roles are perceived as threats to their respectability. Schooling may be seen as a corrupting force that drives girls away from their traditional gender roles [Purewal and Hashmi, 2015].

Similar to Alderman et al. [2001], Glick and Sahn [2000, 2006], Nishimura and Yamano [2013], the likelihood of enrollment increases with parental education. One additional year of education for the father increases the probability of being enrolled by 2% points and 1% point for respectively girls and boys. Parental education effect is particularly strong for poorer households (Figure 5). The positive impact of parental education can be due to sev-

eral channels in addition with its effect on household wealth. Educated parents may value more education and the returns to education can be higher as children could benefit from their parents' networks.

In line with Glick and Sahn [2006] and Nishimura and Yamano [2013], children, both boys and girls, coming from better-off families are significantly more likely to go to school. Coming from the richest households (5th quintile of wealth) raises the probability of attending any school by 11% and 16% points for respectively girls and boys. This finding is consistent with several studies in Pakistan that have positively linked household wealth and child's enrollment [Andrabi et al., 2007, Alderman et al., 2001, Burney and Irfan, 1995, Glick and Sahn, 2006, Lloyd et al., 2005, Sathar and Lloyd, 1994]. The household structure significantly affects girls' enrollment decisions. In line with Glick and Sahn [2000] and Glick and Sahn [2006], girls' likelihood of enrollment decreases with the presence of younger siblings to take care for. An additional household member under five years is associated with a decrease in girls' probability of enrollment by 3% points. This result reflects lower resources per child in large households. As underlined by Glick and Sahn [2006], it could also be that family size and preferences for education are negatively correlated. In line with Nishimura and Yamano [2013] and Glick and Sahn [2006], girls' likelihood of enrollment increases with the number of adults. Additional working-age individuals relax the budgetary constraint and reduce the costs of opportunity. As the effect is only significant for girls, it probably reflects a substitution in domestic work for girls. As expected, the household structure effects are stronger for poorer households because they face higher budget constraints (Figure 6).

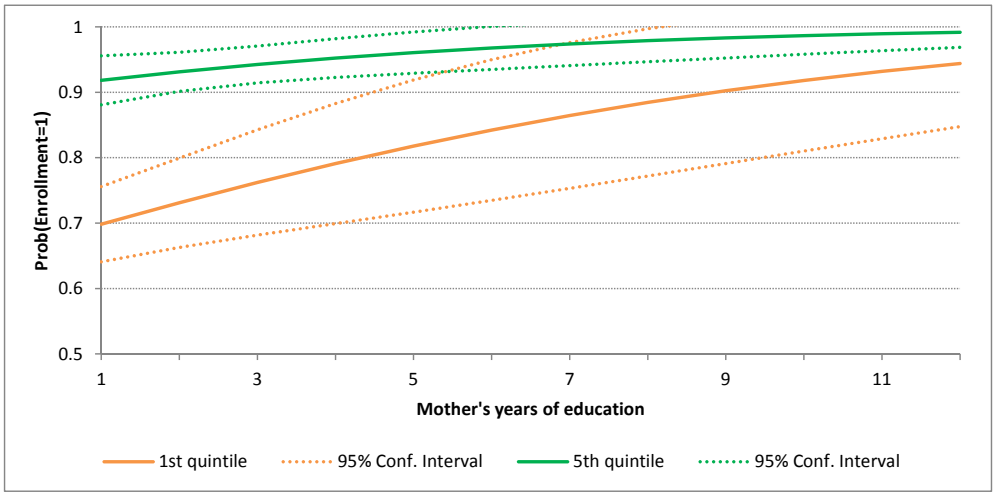
The exclusion variable significantly and negatively affects enrollment. Living in a household that experienced the death or the leaving of one adult decreases the probability of enrollment by 6% and 5% points for respectively girls and boys.

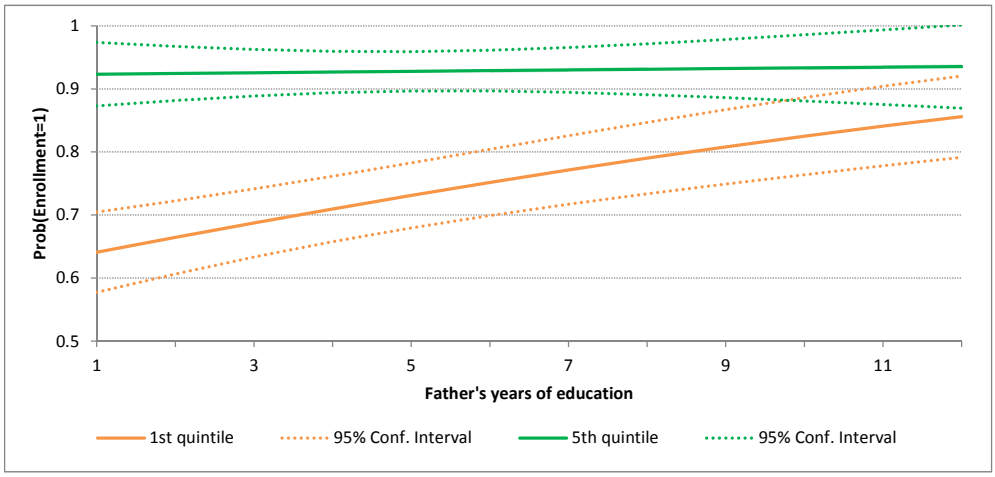
6.2 Private choice

Table 7 reports the estimates with respect to private school enrollment (equation (12)). The average marginal effects are presented.

Columns 1 and 2 report the results for the whole sample, columns 3 to 4 report the results for girls only and finally columns 5 to 6 present the results for boys. For each sample, the first columns present the estimates of a simple probit model (columns 1, 3 and 5) and the second columns report the results of the Heckman probit model (columns 2, 4 and 6). Estimates from the probit and the Heckman probit models are closed. Note that the Wald tests of independent equations suggest that the correlations between error terms of the main equation (private participation) (equation (12)) and the selection equation (equation (14)) are not null at least for girls. Any estimate of the determinants of private school choice for girls would be biased if sample selection is not controlled for.

Figure 5: Predictive margins with respect to enrollment - wealth and parental education

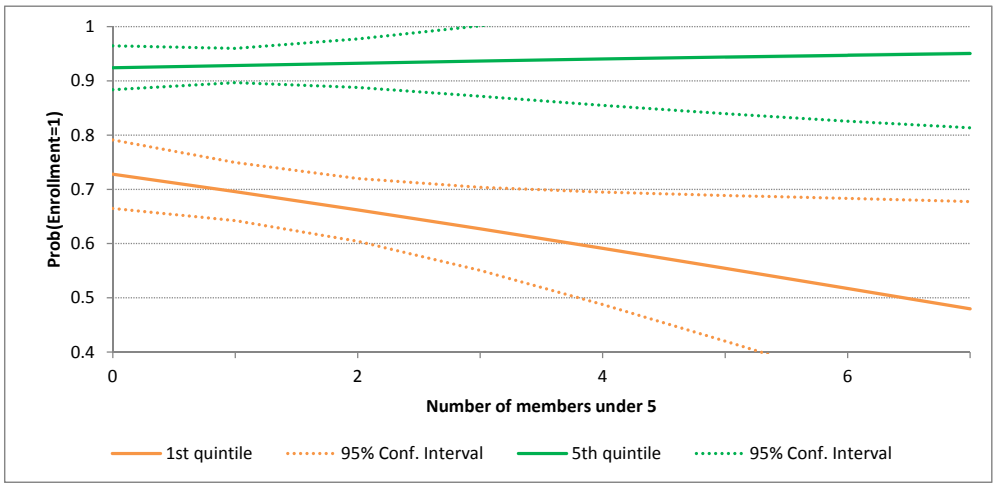


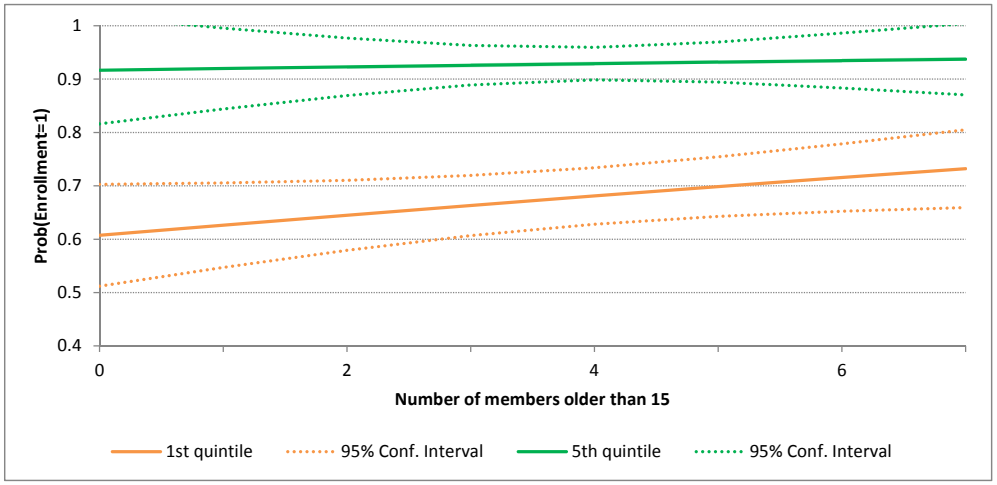


Source: Author, using the three waves of the LEAPS survey, results obtained after the Heckman probit.

Once controlling for selection within enrollment, we observe no difference in private

Figure 6: Predictive margins with respect to enrollment - household structure





Source: Author, using the three waves of the LEAPS survey, results obtained after the Heckman probit.

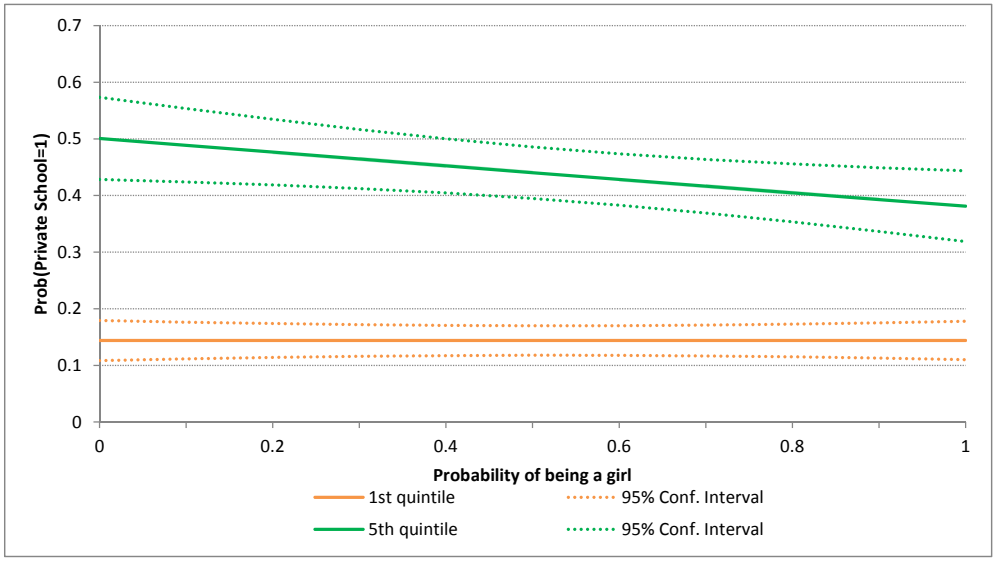
school enrollment between boys and girls. Better-off households tend to discriminate more girls compared with poorest households (Figure 7).

Table 7: Probit and Heckman probit estimates: AME with respect to P(P=1)

	All sample		Girls		Boys	
	(1) Probit simple	(2) Heckprobit	(3) Probit simple	(4) Heckprobit	(5) Probit simple	(6) Heckprobit
Girl	-0.04*	-0.03				
	(0.02)	(0.03)				
Age	-0.01*	-0.01	0.01	0.01	-0.02***	-0.02**
	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)
Father's years of schooling	0.01*	0.00	0.00	-0.00	0.01*	0.00
	(0.00)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)
Mother's years of schooling	0.02***	0.02***	0.01*	0.01*	0.02***	0.02***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
2nd quintile hh consumption per cap	0.06*	0.05	0.00	0.00	0.10***	0.08
	(0.03)	(0.04)	(0.05)	(0.05)	(0.04)	(0.05)
3rd quintile hh consumption per cap	0.07*	0.05	-0.01	-0.02	0.11**	0.09
	(0.04)	(0.05)	(0.06)	(0.05)	(0.04)	(0.06)
4th quintile hh consumption per cap	0.09**	0.08*	0.05	0.04	0.12***	0.10*
	(0.04)	(0.04)	(0.07)	(0.07)	(0.04)	(0.06)
5th quintile hh consumption per cap	0.13***	0.11**	0.05	0.05	0.18***	0.15*
	(0.04)	(0.05)	(0.06)	(0.06)	(0.05)	(0.08)
Members in hh <5 years	0.00	0.01	0.01	0.01	0.01	0.01
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)
Members in hh 5-15 years	-0.01	-0.01	-0.02	-0.02	0.00	-0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Members in hh >15 years	-0.00	-0.01	-0.01	-0.01	-0.00	-0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
No. of public schools	-0.03***	-0.03***	-0.01	-0.01	-0.04***	-0.04***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
No. of private schools	0.06***	0.06***	0.07***	0.07***	0.05***	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
% of public schools: poor quality	0.19***	0.20***	0.18**	0.18**	0.22***	0.23***
	(0.06)	(0.06)	(0.08)	(0.08)	(0.08)	(0.08)
% of public schools: average quality	0.06	0.06	0.07	0.07	0.08	0.09
	(0.05)	(0.06)	(0.07)	(0.07)	(0.07)	(0.07)
% of public schools: unknown quality	0.37***	0.38***	0.34***	0.34***	0.42***	0.44***
	(0.05)	(0.05)	(0.07)	(0.07)	(0.07)	(0.08)
% of private schools: poor quality	-0.06	-0.07	-0.04	-0.04	-0.08	-0.09
	(0.07)	(0.08)	(0.09)	(0.10)	(0.08)	(0.08)
% of private schools: average quality	0.01	0.01	0.04	0.04	-0.02	-0.02
	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)
% of private schools: unknown quality	-0.31***	-0.32***	-0.29***	-0.29***	-0.33***	-0.34***
	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)
% of public schools with hindrance	-0.00	-0.01	0.17*	0.17	-0.18*	-0.19**
	(0.08)	(0.08)	(0.10)	(0.10)	(0.09)	(0.10)
% of private schools with hindrance	-0.09**	-0.09**	-0.10	-0.09	-0.08	-0.08
	(0.04)	(0.04)	(0.07)	(0.07)	(0.06)	(0.06)
Log average total fees - public schools	-0.01	-0.01	0.00	0.00	-0.03**	-0.03*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Log average total fees - private schools	-0.05**	-0.05**	-0.02	-0.02	-0.07*	-0.07
	(0.02)	(0.02)	(0.02)	(0.02)	(0.04)	(0.04)
Log of no. of students - public schools	-0.05	-0.05	-0.08	-0.08	-0.03	-0.03
	(0.04)	(0.04)	(0.06)	(0.05)	(0.06)	(0.06)
Log of no. of students - private schools	0.10***	0.10***	0.12*	0.11*	0.11**	0.11*
	(0.04)	(0.04)	(0.06)	(0.06)	(0.05)	(0.06)
Log pupils-teacher ratio - public schools	-0.03	-0.03	-0.05	-0.05	-0.00	0.00
	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)
Log pupils-teacher ratio - private schools	0.16***	0.16***	0.17**	0.17**	0.13**	0.13*
	(0.04)	(0.04)	(0.07)	(0.07)	(0.07)	(0.07)
Log of expenditures - public schools	0.01	0.01	0.03	0.03	-0.00	-0.00
	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
Log of expenditures - private schools	-0.04**	-0.04**	-0.10***	-0.10***	0.00	0.00
	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)
Observations	2138	2699	977	1306	1161	1393
Censored observations		561		329		232
Rho		-0.43		-0.75		-0.64
Wald test of indep. eqns. (rho = 0)						
Chi(2)		0.47		3.61		0.56
Prob > chi2		0.49		0.06		0.45

Notes: Clustered (at the village level) and robust standard errors in parentheses: * p < .1, ** p < .05, *** p < .01
Reference categories: Boy living in a household belonging to the first quintile of consumption.
Source: Author using the three waves of the LEAPS project, only enrolled children. Each child is observed only once (the first year of observation).

Figure 7: Predictive margins with respect to private enrollment - gender



Source: Author, using the three waves of the LEAPS survey, results obtained after the Heckman probit.

Older boys are less likely to be enrolled in a private school. Similar to Glick and Sahn [2006], parental education, especially mother's education, increases the likelihood to attend a private institution. Increasing by one the number of years of education of the mother raises the probability of attending a private school by 1% point and 2% points for respectively girls and boys.

Coming from a wealthier household significantly increases the relative utility of enrollment in private institutions but only for boys suggesting that other barriers than simply credit constraints prevent girls from being enrolled in private institutions. For boys, belonging to the highest quintile of consumption, increases the probability of being enrolled in a private school by 15%. This result raises equity concerns that boys coming from poor households remain in low quality public schools. Similar to Nishimura and Yamano [2013], we find that, whereas the household structure affects the choice between enrollment and no enrollment especially for girls, it does not explain why parents choose private schools over public schools.

Parents seem to somehow respond to the structure of educational offer. Consistently with Nishimura and Yamano [2013], increasing the number of private schools raises the odds of being enrolled in a private institution for both gender. Once controlling for selection, if

the number of private schools in the village increases by one, the probability of attending a private institution increases by 6% points. Private schooling expansion would therefore lead to an increase in private enrollment. The effect is slightly stronger for girls (7% points vs. 5% points for boys). On the contrary, increasing the number of public schools by one decreases the odds of being enrolled in private institutions. This result supports an excess demand model where parents choose private schools because the number of public schools is insufficient. This effect is stronger for boys and rich households (Figure 8). Public education may not be the first option for boys and wealthy families but if a large number of public schools are located in their villages they would consider governmental schooling. This supply effect is probably partly due to a distance effect. This is confirmed by the results of the same regressions without the distance proxy.[29]

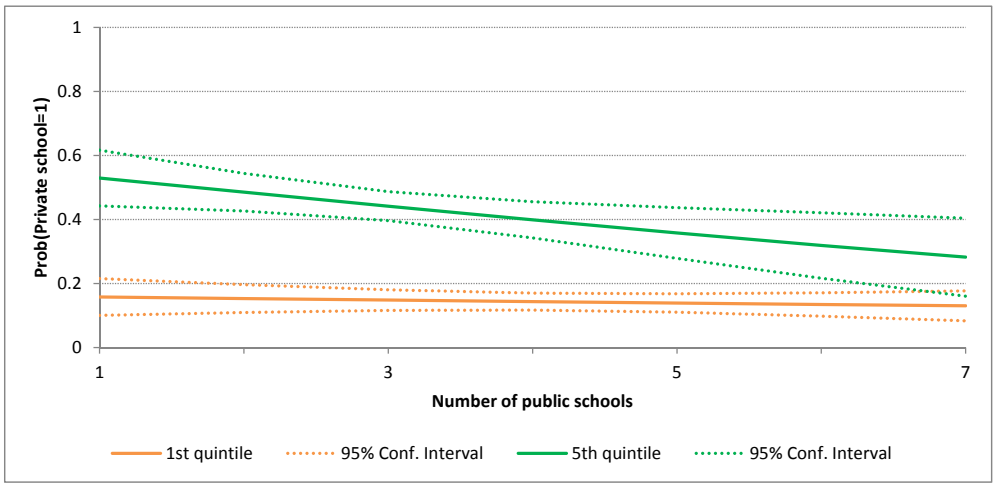
Parental perceptions about school quality explain school choice. This finding supports a differentiated demand model where parents choose private schools because they think these schools provide an education of higher quality. Results suggest that the effect of perception is different for private and public schools. When parents perceive that most of the publicly managed institutions are of low quality, they are more likely to enroll their children in a private school. This result holds for both gender but poorer households are more sensitive to the low quality of public schools (Figure 9). If public schools provide low quality education, it would influence poorer parents to choose a private option whereas for wealthier parents the choice of private education does not depend on the quality of governmental alternatives. Interestingly, even when private schools are perceived of low quality it does not reduce the odds of being enrolled in private schools and parents would still consider private schools as an option. When they cannot assess the quality of the schools, they prefer the other alternative. A lack of information on the quality of the alternatives push parents to prefer the other option. These findings hold for both gender even though the effect is stronger for girls.

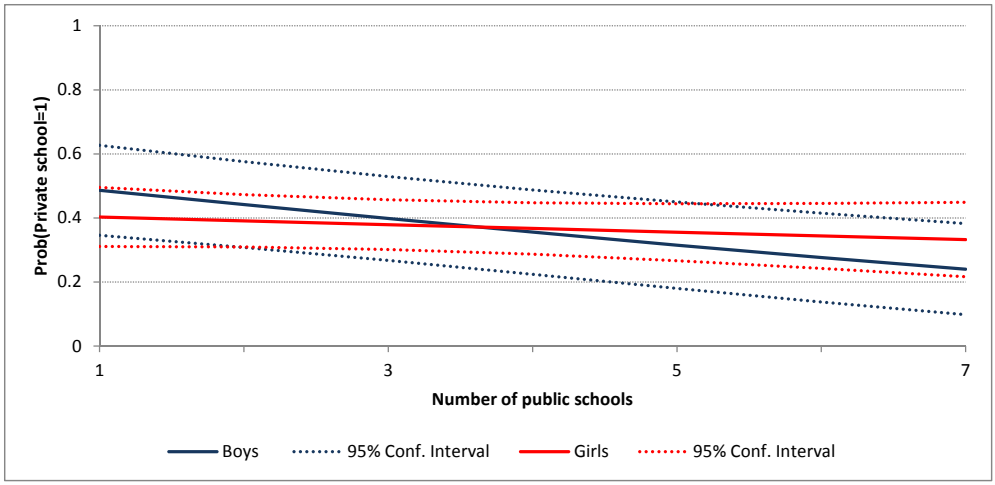
The proxied distance of private schools partly explains schooling choice. However, the coefficients associated with distance are relatively low probably because all villages have a large offer of schools and because we use an imperfect proxy for distance. Private school fees are associated with a decrease in private enrollment. An increase of one in the logarithm of private fees reduces the probability of attending a private school by 5% points.

The size of the schools, measured by the number of the students, explains the choice between private and public schools. The bigger the private schools, the higher the probability of choosing private institutions. Two mechanisms can be responsible for this effect. First, parents can be influenced by other parents in the neighborhood who have enrolled their own children in private institutions. Secondly, unusually small private schools can be perceived as a negative sign for parents who think that these schools cannot attract students because

[29]The coefficients associated with the number of schools increase.

Figure 8: Predictive margins with respect to private enrollment - offer of public schools

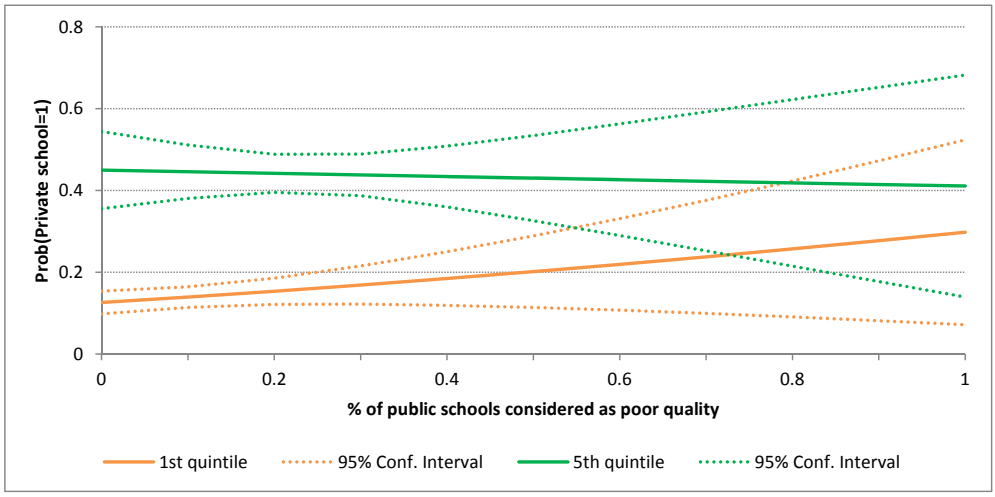




Source: Author, using the three waves of the LEAPS survey, results obtained after the Heckman probit.

they are of low quality.

Figure 9: Predictive margins with respect to private enrollment - poor quality public schools



Source: Author, using the three waves of the LEAPS survey, results obtained after the Heckman probit.

Results suggest that overcrowding in public schools is not the main reason why parents choose to enroll their children in private institutions. In line with Alderman et al. [2001] and Nishimura and Yamano [2013], when private schools are overcrowded, it increases the relative utility of the private option. Although this result may first appear surprising, it can be explained quite easily. In private schools, the average class size of 20 is probably manageable for teachers. The second reason is similar to the argument for school size and lies in the signal sent to parents by class sizes in private schools. Unusually small private class sizes can send a bad signal to parents. On the contrary, when class sizes are bigger it may mean that the school is popular and parents are influenced by neighbors who have enrolled their own children in this school.

Concerning the infrastructure in schools, represented by the level of expenditures, it has no significant effect except for girls where surprisingly a higher level of expenditure in private schools is associated with a lower probability of being enrolled in a private school. This can reflect a potential self selection phenomenon.

6.3 Household heterogeneity

Turning to the results of the empirical model used to model intra-household gender gap in private school, the results from equation (26) are presented in Table 8.[30] The first column reports the results of a model without selection (within transformation) whereas the second column shows the results when the selection is taking into account. The inverse mills' ratios being significant, the second model is more appropriate.

Being a girl reduces on average the probability of attending a private school instead of a public school by 8% points. Our estimates confirm the existence the an intra-household gender gap in private school enrollment. This results is consistent with similar studies in India [Maitra et al., 2014, Sahoo, 2015]. However, contrary to Sahoo [2015], we find no evidence supporting a preference for first born children.

Considering school variables at the village level, when the quality of public schools worsens overtime, it increases the likelihood of being enrolled in a private school. If an additional one percent of the public schools is considered as low quality schools by the parents, it increases the probability of enrollment in a private school by 8% points. When parents loose information on the quality of government schools, they are more prone to choose private institutions. If parents are not able to assess the quality of an additional one percent of the public schools, it increases the likelihood of private school enrollment by 16% points. The reverse is true for private schools. These findings confirm the results presented in the previous section without household fixed effects. After controlling for household heterogeneity, we find that parental perceptions about the quality of the schools do explain private school choice.

[30] The results of the first stage estimate (equation (22)) are available on request.

Table 8: Intra-household private school choice

	(1) Within	(2) Selection
Girl	-0.08***	-0.08***
	(0.01)	(0.02)
Age	-0.00	-0.01
	(0.01)	(0.01)
Wealth index	0.00	-0.01*
	(0.01)	(0.00)
Birth order	-0.02	-0.01
	(0.01)	(0.01)
No. of public schools	0.00	0.00
	(0.01)	(0.01)
No. of private schools	0.01	0.00
	(0.01)	(0.01)
% of public schools: poor quality	0.05*	0.08***
	(0.03)	(0.03)
% of public schools: average quality	0.02	0.05*
	(0.02)	(0.02)
% of public schools: unknown quality	0.09***	0.16***
	(0.03)	(0.03)
% of private schools: poor quality	-0.07*	-0.06
	(0.04)	(0.04)
% of private schools: average quality	0.00	-0.01
	(0.02)	(0.02)
% of private schools: unknown quality	-0.02	-0.08***
	(0.02)	(0.02)
% of public schools with hindrance	-0.03	-0.11
	(0.15)	(0.16)
% of private schools with hindrance	-0.14	-0.20
	(0.13)	(0.13)
Log average total fees - public schools	-0.00	0.00
	(0.01)	(0.01)
Log average total fees - private schools	-0.01	-0.00
	(0.01)	(0.01)
Log of no. of students - public schools	0.06	-0.01
	(0.04)	(0.05)
Log of no. of students - private schools	-0.01	0.01
	(0.03)	(0.04)
Log pupils-teacher ratio - public schools	0.01	-0.02
	(0.02)	(0.02)
Log pupils-teacher ratio - private schools	0.04	0.04
	(0.04)	(0.04)
Log of expenditures - public schools	-0.00	0.01
	(0.01)	(0.01)
Log of expenditures - private schools	0.01	-0.01
	(0.01)	(0.01)
IMR year 1		0.22***
		(0.08)
IMR year 2		0.19**
		(0.08)
IMR year 3		0.10
		(0.08)
Observations	5733	5559
R^2	0.036	0.251
District by time FE	Yes	Yes
Household FE	Yes	Yes

Notes: Bootstrapped standard errors (clustered at the household level) based on 500 replications:
* p < .1, ** p < .05, *** p < .01
Reference categories: Boy. *Control variables non presented*: parents' levels of education.
Source: Author using the three waves of the LEAPS project.

7 Robustness Checks

Both multinomial logit and nested logit models were implemented in order to check the robustness of the results and previous results remain valid (Annex C). The number of private schools increases the relative utility of private enrollment. On the contrary, the supply of public schools affects negatively private enrollment (or positively public enrollment). When public schools are seen as providing low quality education, parents are significantly more likely to choose the private alternative.

The results are robust to changes in specification especially when consumption is entered in a quadratic form instead of quintile dummies or when the consumption per capita is replaced by the total consumption of the household.[31]

Several alternative measures of distance were considered. Based on the fact that most of the private schools are located closed to the main road in our sample [Andrabi et al., 2007], we use the time taken to reach the main road from the household as a proxy for the distance to private schools. However, this information does not allow us to estimate the distance between the household and public schools. As a second alternative proxy for distance, we use data from the school survey, in which directors estimate the distance between the school and the health center, the community center and the bank. These measures are however limited as they do not include information of the household. No matter the distance variable used, the main findings remain unchanged.[32]

8 Conclusion

The surge of private schooling in developing countries, including Pakistan, has led to unsettled debates about the consequences on schooling inequalities. To our knowledge, no paper has succeeded in assessing properly why parents choose private schools when free public schools are available. In this paper, we make use of a unique database to assess the determinants of private schooling choice while controlling for selection.

Results suggest that, in spite of relatively low school fees, socioeconomic barriers still prevent certain groups from accessing to education and more precisely private schools. Children from poorer and less educated households are less likely to attend a private institution. Equity concerns about the consequences of growing private enrollment are therefore justified.

Both the excess demand and the differentiated demand models provide valid and complementary explanations to the growth of private schooling. Supporting the excess demand model, in villages where few public schools are located, parents are attracted by private

[31] For clarity the results are not presented but are available on the demand.
[32] For clarity the results are not presented but are available on the demand.

schools. When parents, especially in poorer households, think the education provided by public schools is low, they are more willing to enroll their children in a private school. This second result supports the differentiated demand model. Turning to intra-household school choice, the results confirm the existence of an intra-household gender gap of eight percentage points in private school enrollment. It also confirms that, within a household, time varying perceptions of school quality explain school choice.

Future research should try to assess the determinants of parental quality perceptions as it is a main factor explaining private school choice. It would be interesting to know whether parents value test scores or other school characteristics.

One limit of this paper is that private schools represent a heterogeneous group. In order to refine the research on public-private choice, it would be necessary to access more detailed data on schooling decisions to see if the determinants to choice depend on the type of private schools considered.

9 Annexes

A Annex - School selection

School selection could restrain parental school choice. Selective schools may be the best schools which would imply that parents cannot really choose schools according to their quality as the schools select children and not the reverse. However, very few parents have one child who has not been admitted in the school where he applied.[33] Most of the schools, both private and public, implement procedures in order to select children mainly through oral exams and previous school reports (Table A1). Private schools are slightly more selective than governmental institutions.

Table A1: Descriptive statistics: Schools selection process

	All schools		Public schools		Private schools	
	Mean	SD	Mean	SD	Mean	SD
Specific procedure for admitting kids	0.81	0.4	0.78	0.4	0.87	0.3
Observations	2356		1467		889	
First criterion for selection[a]						
Written or oral exam	0.69	0.5	0.57	0.5	0.88	0.3
Interview with parents	0.06	0.2	0.09	0.3	0.01	0.1
Characteristics of parents (wealth, educ, etc)	0.01	0.1	0.01	0.1	0.00	0.1
Child's reports from last school	0.24	0.4	0.33	0.5	0.11	0.3
Observations	751		461		290	
% children who applied and got admitted	0.99	0.1	0.99	0.1	0.99	0.1
Observations	2361		1471		890	

Lecture:[a] presents descriptive statistics for schools applying selection criteria. Among private schools applying selection, 88% use oral or written exams as first selection criterion.
Source: Author using the three waves of the LEAPS project.

However, even when they declare selecting children, schools admit almost every child who applies. When the child is weak on the selective process, most of the schools still admit him (90% of private schools and 86% of public schools). They accept almost all applicants even the weakest ones but they often admit them in a lower grade. Therefore, school choice is unlikely to be limited by school selection process but could still be biased by self-selection.

Table A2 presents the results of tests on the equality of means between selecting schools and other institutions. Public schools selecting children are significantly better on average than those who do not select students. For public schools, selection is a way to ensure quality of schooling whereas we do not observe such a difference for private institutions. Private schools selecting children are not significantly better that other private institutions but they charge higher prices. Children in selective schools (private and public) come from wealthier households suggesting that there may be a phenomenon of self-selection in play.

[33] Around 3% of parents have one child who applied in a school where he was not admitted (1.5% have been refused by a private school and 1.5% by a public institution).

Table A2: Mean-comparison tests between selective and non-selective schools

	All schools		Public schools		Private schools	
	Mean Diff	SD	Mean Diff	SD	Mean Diff	SD
Mean std total scores	-0.24***	-6.23	-0.18***	-4.41	-0.07	-1.10
Mean std English scores	-0.18***	-4.19	-0.09**	-2.01	-0.01	-0.09
Mean std Math scores	-0.12***	-3.23	-0.07*	-1.74	-0.02	-0.24
Mean std Urdu scores	-0.16***	-4.40	-0.12***	-3.08	0.00	0.07
Admission fees (grades 1 to 3)	-27.49***	-4.89	-1.00	-1.16	-45.29***	-3.01
Annual school fees (grades 1 to 3)	-212.89***	-5.34	-7.33	-0.74	-189.48**	-2.32
Admission fees (grades 4 to 5)	-23.01***	-3.62	4.33***	3.18	-40.00**	-2.32
Annual school fees (grades 4 to 5)	-244.16***	-5.33	-8.66	-0.73	-204.27**	-2.22
Mean wealth index	-0.47***	-10.30	-0.36***	-8.68	-0.32***	-3.74
% of children with uneducated dad	0.04***	3.55	0.03*	1.95	0.01	0.28
% of children with dad < primary	0.00	0.81	0.01	1.50	-0.02	-1.38
% of children with dad primary to high sec	-0.05***	-3.72	-0.04***	-2.63	0.01	0.43
% of children with uneducated mum	0.06***	4.78	0.05***	4.12	-0.01	-0.39
% of children with mum < primary	0.00	0.49	-0.00	-0.72	0.03**	2.12
% of children with mum primary to high sec	-0.07***	-5.23	-0.05***	-4.17	-0.02	-0.58
Observations	2356		1467		889	

Notes: * $p < .05$, ** $p < .01$, *** $p < .001$
Source: Author using the three waves of the LEAPS project.

B Annex - Private and public schools

Table B1 reports the descriptive statistics of private and public schools.

Table B1: Descriptive statistics : public and private schools

	Public		Private		Difference	
	Mean	SD	Mean	SD	Diff	T-statistic
School Structure						
Date of creation of the school	1967	23.5	1998	7.8	-30.77***	(-37.38)
No. of students in the school	181.85	154.8	142.26	100.9	39.60***	(6.80)
Single-sex school: girls	0.25	0.4	0.01	0.1	0.242***	(16.45)
Single-sex school: male	0.36	0.5	0.01	0.1	0.353***	(21.74)
School expelled kids last year (d)	0.09	0.3	0.21	0.4	-0.117***	(-6.65)
School Resources						
Admission fees (grades 1 to 3)	1.14	13.7	103.58	153.6	-102***	(-25.40)
Annual school fees (grades 1 to 3)	15.06	157.3	1154.11	830.8	-1139***	(-51.10)
Admission fees (grades 4 to 5)	3.93	21.7	111.67	175.0	-108***	(-23.30)
Annual school fees (grades 4 to 5)	32.41	187.9	1359.82	931.0	-1327***	(-52.91)
Money collected from government	0.35	0.5	0.01	0.1	0.341***	(20.89)
Amount collected from government	9506	41995	871	14969	8636***	(5.91)
Money collected from donors	0.02	0.1	0.01	0.1	0.011*	(2.04)
Amount collected from donors	342	6096	55	820	286	(1.39)
Money collected from religious charity	0.01	0.1	0.01	0.1	0.00	(0.42)
Amount collected from religious charity	133	2153	489	13990	-356	(-0.96)
School Infrastructures						
School has a library	0.23	0.4	0.37	0.5	-0.143***	(-7.57)
School has computer facilities	0.01	0.1	0.26	0.4	-0.248***	(-21.01)
School has sport facilities	0.11	0.3	0.35	0.5	-0.246***	(-15.24)
School has an activity room	0.07	0.2	0.17	0.4	-0.108***	(-8.30)
School has four walls	0.66	0.5	0.96	0.2	-0.297***	(-17.84)
School has fans or room coolers	0.46	0.5	0.93	0.3	-0.471***	(-26.11)
School has electricity	0.53	0.5	0.96	0.2	-0.431***	(-24.63)
School has toilets	0.72	0.4	0.97	0.2	-0.242***	(-15.37)
Pupils seat on the floor	0.22	0.4	0.01	0.1	0.210***	(14.82)
Children Characteristics						
Mean standardised total scores	-0.19	0.7	0.49	0.6	-0.678***	(-24.39)
Mean standardised English scores	-0.20	0.7	0.64	0.7	-0.837***	(-28.38)
Mean standardised Math scores	-0.11	0.7	0.35	0.6	-0.458***	(-16.41)
Mean standardised Urdu scores	-0.14	0.6	0.45	0.7	-0.584***	(-21.53)
Mean age	10.16	1.0	10.03	1.1	0.129**	(2.88)
Mean no. of elder siblings	6.58	1.5	6.96	1.2	-0.373***	(-6.17)
Mean wealth index	-0.44	0.7	0.47	0.9	-0.909***	(-28.53)
% of children with uneducated dad	0.44	0.2	0.27	0.2	0.170***	(18.11)

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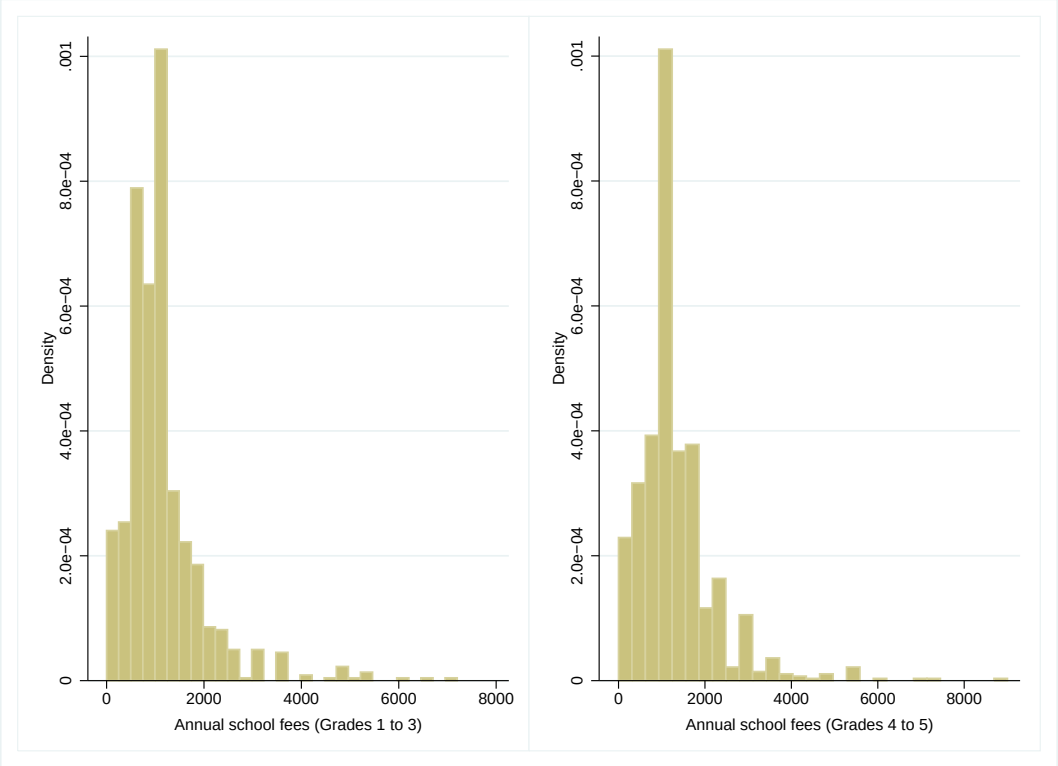
% of children with uneducated mum	0.74	0.2	0.53	0.3	0.205***	(21.00)
School Policy towards Teachers						
Teachers can get a bonus	0.35	0.5	0.39	0.5	-0.035	(-1.69)
Required duration for advance notice	1.38	0.9	1.20	0.6	0.181***	(5.19)
No penalty in case no advance notice	0.13	0.3	0.51	0.5	-0.382***	(-22.14)
Penalty in case no advance notice: 1 week-1 month pay	0.55	0.5	0.44	0.5	0.108***	(5.09)
Penalty in case no advance notice: >1 month pay	0.32	0.5	0.04	0.2	0.275***	(16.68)
No notice before firing teachers	0.16	0.4	0.15	0.4	0.0122	(0.79)
Notice before firing teachers: <1 month	0.21	0.4	0.29	0.5	-0.082***	(-4.57)
Notice before firing teachers: 1 or 2 months	0.63	0.5	0.56	0.5	0.070***	(3.39)
Teachers allowed to give private tuition	0.18	0.4	0.79	0.4	-0.602***	(-35.77)
Formal training for new teachers	0.41	0.5	0.35	0.5	0.0651**	(3.15)
Formal training by outsiders for new teachers	0.38	0.5	0.05	0.2	0.335***	(19.43)
Formal in-house training for new teachers	0.03	0.2	0.30	0.5	-0.270***	(-20.52)
Informal training for new teachers	0.48	0.5	0.63	0.5	-0.142***	(-6.76)
No training for new teachers	0.10	0.3	0.03	0.2	0.0767***	(6.89)
Teachers characteristics						
Mean age of teachers	38.26	5.2	25.46	4.1	12.80***	(62.25)
No. teachers by school	5.79	4.9	8.69	5.0	-2.904***	(-13.76)
% female teachers	0.47	0.5	0.78	0.3	-0.311***	(-17.18)
% male teachers	0.53	0.5	0.22	0.3	0.311***	(17.18)
% teachers with <1y of total teaching exp	0.06	0.1	0.25	0.2	-0.187***	(-24.54)
% teachers with 1-3y of total teaching exp	0.10	0.2	0.36	0.2	-0.265***	(-30.15)
% teachers with <1y of exp in this school	0.13	0.2	0.37	0.3	-0.236***	(-22.33)
% teachers with 1-3y of exp in this school	0.19	0.2	0.36	0.3	-0.168***	(-15.65)
% teachers with >3y of exp in this school	0.67	0.3	0.27	0.3	0.403***	(33.16)
% teachers with matric or less	0.42	0.3	0.43	0.3	-0.002	(-0.13)
% teachers with FA/FSc	0.19	0.2	0.35	0.2	-0.165***	(-17.68)
% teachers with BA/BSc	0.25	0.2	0.19	0.2	0.0585***	(6.28)
% teachers with MA or above	0.14	0.2	0.03	0.1	0.108***	(15.64)
% teachers with no training	0.08	0.2	0.73	0.2	-0.646***	(-80.14)
% teachers with PTC training	0.50	0.3	0.14	0.2	0.356***	(31.59)
% teachers with CT training	0.19	0.2	0.07	0.1	0.122***	(15.29)
% teachers with B.Ed training or above	0.23	0.2	0.06	0.1	0.168***	(19.75)
Mean monthly salary	6251	1758	1295	990	4956***	(76.87)
% teachers with temporary contract	0.20	0.3	0.83	0.2	-0.631***	(-60.46)
% local teachers	0.84	0.3	0.25	0.4	0.590***	(33.19)
Mean days of absence (last month)	2.65	2.6	2.12	2.6	0.527***	(4.69)
Observations	1471		890			

Notes: t statistics in parentheses: * $p < .05$, ** $p < .01$, *** $p < .001$

Source: Author using the three waves of the LEAPS project.

Private schools have been settled more recently as they emerged mainly during the 1990's. They are on average smaller than public schools and it is more common to find a co-educational private school. Private institutions' resources come primarily from fees charged to children whereas donations remain limited.[34] These fees tend to increase with the grade and represent around 17% of the total monthly household income of the lowest quintile.[35] We observe a real heterogeneity across private schools but the distribution of these schools is skewed at the left confirming that most of private schools charge relatively low fees (Figure B1).

Figure B1: Annual fees in private schools



Source: Author, using the three waves of the LEAPS survey.

A small portion of public schools also charge fees: 4% declare charging admission fees and 37% declare charging annual fees for grades one to three. These fees are however very small for a large part of these schools. Over the three rounds of the survey, only 7 and

[34]Over the three rounds of the survey, 22% of the sample private schools are free of admission fees but the majority (98%) charge annual fees.

[35]Data for the lowest quintile of income come from the Pakistan Household Integrated Economic Survey (HIES) for 2005-2006.

27 public schools charge respectively admission and annual fees above 30 Rs. (0.30$). We nevertheless look into the characteristics of these public schools charging fees to see if they statistically differ from other governmental institutions (Table B2). Scores in fee-charging public schools are not statistically better than in free public institutions. Charging fees in public institutions is not a signal for good quality. This limits the risks of multicolinearity between the variables fees and quality for public schools. Free public schools are on average bigger institutions with older teachers and older students coming from better-off families. In free public schools, teachers are also less absent, more trained and experienced. Because public schools charging fees are rare and do not perform better nor do they select more than other public schools, we do not distinguish these two types of schools.

Table B2: Mean-comparison tests between paying (annual or admission fees) and free public schools

	Diff Free-paying public schools	T-statistic
Date of creation of the school	-1.40	-1.11
No. of students in the school	16.99**	2.05
Single-sex school: girls	-0.02	-0.72
Single-sex school: male	0.03	1.01
School expelled kids last year	-0.08***	-2.70
Specific procedure for admitting kids	0.37***	18.46
% children who applied previous year who got admitted	-0.02***	-3.77
School has a library	0.06**	2.57
School has computer facilities	0.00	0.55
School has sport facilities	0.02	1.08
School has an activity room	0.00	0.09
School has four walls	-0.05*	-1.91
School has fans or room coolers	0.02	0.89
School has electricity	0.07***	2.64
School has toilets	-0.01	-0.47
Pupils seat on the floor	-0.06**	-2.51
Mean standardised total scores in school	0.11***	3.12
Mean standardised English scores in school	0.03	0.66
Mean standardised Math scores in school	-0.01	-0.25
Mean standardised Urdu scores in school	-0.01	-0.33
Mean age in school	0.42***	7.68
Mean no. elder siblings	-0.03	-0.36
Mean wealth index	0.28***	7.91
% of children with uneducated dad	0.02	1.48
% of children with uneducated mum	-0.01	-0.62
Teachers can get a bonus	-0.20***	-7.78
Teachers allowed to give private tuition	0.05**	2.30
Formal training for new teachers	0.05*	1.84

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	Diff	T-statistic
Informal training for new teachers	0.17***	6.36
No training for new teachers	-0.22***	-14.04
Mean age of teachers	0.97***	3.49
No. of teachers	0.65**	2.45
% female teachers	-0.09***	-3.30
% teachers with <1y of total teaching exp	-0.02***	-2.89
% teachers with 1-3y of total teaching exp	0.02*	1.90
% teachers with >3y of total teaching exp	0.00	0.31
% teachers with matric or less	-0.02	-1.45
% teachers with FA/FSc	-0.01	-0.53
% teachers with BA/BSc	0.02*	1.80
% teachers with MA or above	0.01	0.63
% teachers with no training	0.01	0.89
% teachers with PTC training	-0.02	-1.39
% teachers with CT training	-0.02	-1.34
% teachers with B.Ed training or above	0.03**	2.37
Mean monthly salary	994.74***	10.96
% teachers with temporary contract	0.03**	2.34
% teachers owner	0.00	0.87
% local teachers	-0.01	-0.81
% non local teachers	0.01	0.81
Mean days of absence (last month)	-0.45***	-3.14
Observations	1469	

Notes: * $p < .05$, ** $p < .01$, *** $p < .001$
Source: Author using the three waves of the LEAPS project.

Private schools invest more in physical inputs rather than human resources. As a result, private institutions are significantly more equipped and their teachers are significantly less paid than in public institutions. Private institutions hire younger, non-local, female, less educated, experienced and trained teachers than their public counterparts [Andrabi et al., 2008]. Private schools also usually hire contract teachers by opposition to regular (civil-servant) teachers. In private institutions, teachers have a more flexible status[36] but they are also more exposed to job insecurity because of the nature of their contract and the relatively short duration notice required before getting fired. Practices concerning in-service training for new teachers also differ. Private schools tend to rely more on informal training or in-house formal training whereas public schools mainly use formal training by outsiders.

In private schools, students perform better in all the three tested subjects than their colleagues in government institutions. This result is consistent with the existing literature in Pakistan and other developing countries [Anand et al., 2009, Andrabi et al., 2008, Aslam, 2009, Chudgar and Quin, 2012, Das et al., 2006, French and Kingdon, 2010, Goyal,

[36]Private school teachers are required to give a shorter period notice before leaving the school, they risk a lower penalty in case they do not respect this duration and they are also most often allowed to give private tuition outside their schools.

2009, Khan and Kiefer, 2007, Kingdon, 2008, Pal, 2010, Tooley and Dixon, 2007b]. The demographics and socioeconomic backgrounds of children are different in these two types of schools. Not surprisingly, on average, children attending private schools come from better educated and richer households.

C Annex - Multinomial and nested logit specifications

As robustness tests, two additional specifications were implemented in line with the existing literature: the multinomial logit and the nested logit models. The average marginal effects estimated with the multinomial logit model are reported in Table C1. Table C2 reports the results of the nested logit model. In the nested specification, the sign of τ supports the use of a nested specification over the multinomial logit model only for boys.

Table C1: Multinomial Logit - Average Marginal Effects

	(1) No school	(2) Public	(3) Private
Girl	0.05***	-0.01	-0.05**
	(0.02)	(0.02)	(0.02)
Age	0.00	0.00	-0.01
	(0.00)	(0.00)	(0.00)
Father's years of schooling	-0.01***	0.00	0.01***
	(0.00)	(0.00)	(0.00)
Mother's years of schooling	-0.02***	-0.00	0.02***
	(0.01)	(0.01)	(0.00)
2nd quintile hh consumption per cap	0.00	-0.06*	0.06**
	(0.02)	(0.03)	(0.03)
3rd quintile hh consumption per cap	-0.02	-0.05	0.07*
	(0.02)	(0.04)	(0.03)
4th quintile hh consumption per cap	-0.02	-0.08*	0.10***
	(0.03)	(0.04)	(0.04)
5th quintile hh consumption per cap	-0.06*	-0.07	0.13***
	(0.03)	(0.04)	(0.03)
Members in hh < 5 years	0.01*	-0.02	0.00
	(0.01)	(0.01)	(0.01)
Members in hh 5-15 years	-0.00	0.01	-0.00
	(0.01)	(0.01)	(0.01)
Members in hh > 15 years	-0.00	0.01	-0.00
	(0.00)	(0.01)	(0.00)
No. of public schools	-0.02**	0.02**	-0.01
	(0.01)	(0.01)	(0.01)
No. of private schools	-0.00	0.05**	-0.05**
	(0.02)	(0.02)	(0.02)
% of public schools: poor quality	-0.03	-0.12***	0.14***
	(0.04)	(0.04)	(0.04)
% of public schools: average quality	-0.04*	0.06	-0.02

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	(0.02)	(0.04)	(0.04)
% of public schools: unknown quality	-0.01***	-0.04***	0.06***
	(0.01)	(0.01)	(0.01)
% of private schools: poor quality	-0.01	0.03***	-0.03***
	(0.00)	(0.01)	(0.01)
% of private schools: average quality	0.07**	-0.02	-0.05
	(0.03)	(0.04)	(0.04)
% of private schools: unknown quality	0.01	-0.09**	0.08**
	(0.03)	(0.04)	(0.03)
% of public schools with hindrance	-0.00	0.03*	-0.03*
	(0.02)	(0.02)	(0.02)
% of private schools with hindrance	-0.03*	0.01	0.02
	(0.02)	(0.02)	(0.02)
Log mean annual fees - public schools	0.00	0.06	-0.06
	(0.06)	(0.08)	(0.07)
Log mean annual fees - private schools	0.04	-0.04	0.00
	(0.03)	(0.04)	(0.03)
Log of no. of students - public schools	0.10***	0.20***	-0.30***
	(0.03)	(0.03)	(0.03)
Log of no. of students - private schools	0.01	-0.18***	0.17***
	(0.06)	(0.06)	(0.05)
Log pupils-teacher ratio - public schools	-0.03	-0.04	0.07
	(0.04)	(0.05)	(0.05)
Log pupils-teacher ratio - private schools	0.08**	-0.40***	0.32***
	(0.04)	(0.05)	(0.05)
Log of expenditures - private schools	0.02	-0.01	-0.01
	(0.05)	(0.09)	(0.08)
Log of expenditures - public schools	-0.01	0.10**	-0.09***
	(0.04)	(0.05)	(0.03)
Death or leaving of an adult	0.04**	-0.00	-0.04*
	(0.02)	(0.03)	(0.02)
Observations	2511	2511	2511
District FE	Yes	Yes	Yes

Notes: Clustered (at the village level) and robust standard errors in parentheses: * $p < .1$, ** $p < .05$, *** $p < .01$, School alternatives variables are computed at the village level.
Reference categories: Boy living in a household belonging to the first quintile of consumption who has not experienced the death or the leaving of any member of the household in the past five years.
Source: Author, using LEAPS database (three waves). Each child is observed only once (the first year of observation.

Table C2: Nested Logit - Coefficients

	All	Girls	Boys
	(1)	(2)	(3)
Level 1: Attending School			
Girl	-0.44***	1.41	
	(0.12)	(1.08)	
Age	-0.01	-0.06	0.02
	(0.03)	(0.04)	(0.04)
Father's years of schooling	0.08***	0.10***	0.06**
	(0.02)	(0.03)	(0.03)
Mother's years of schooling	0.18***	0.24***	0.13**
	(0.04)	(0.07)	(0.05)
2nd quintile of hh consumption per cap	0.28*	0.04	0.61***
	(0.15)	(0.21)	(0.23)
3rd quintile of hh consumption per cap	0.41**	0.49*	0.38
	(0.19)	(0.27)	(0.26)
4th quintile of hh consumption per cap	0.58***	0.64*	0.48
	(0.22)	(0.33)	(0.30)
5th quintile of hh consumption per cap	0.97***	0.75**	1.26***
	(0.27)	(0.37)	(0.42)
Members in hh < 5 years	-0.10*	-0.17**	-0.05
	(0.05)	(0.08)	(0.08)
Members in hh 5-15 years	0.01	0.02	0.01
	(0.04)	(0.06)	(0.07)
Members in hh > 15 years	0.03	0.03	0.02
	(0.03)	(0.05)	(0.05)
Death or leaving of an adult	-0.41***	-0.41**	-0.38**
	(0.12)	(0.17)	(0.18)
Level 2: Attending a Private School			
No. of private schools	0.28***	0.44***	0.16***
	(0.05)	(0.09)	(0.05)
% of private schools: poor quality	-0.16	-0.19	-0.10
	(0.23)	(0.41)	(0.21)
% of private schools: average quality	0.10	0.16	-0.00
	(0.14)	(0.28)	(0.12)
% of private schools: unknown quality	-1.76***	-2.20***	-1.17***
	(0.30)	(0.50)	(0.40)
% of private school with hindrance	-0.68***	-0.97**	-0.36
	(0.25)	(0.47)	(0.23)
Log mean annual fees - private schools	-0.25***	-0.19	-0.24**
	(0.07)	(0.14)	(0.09)
Log of no. of students - private schools	0.50***	0.74**	0.30*
	(0.17)	(0.32)	(0.16)
Log pupil-teacher ratio - private schools	0.70***	0.83**	0.35**
	(0.19)	(0.35)	(0.18)
Log of expenditures - private schools	-0.24***	-0.66***	-0.00

Continued on next page

Following the previous table

	(0.09)	(0.20)	(0.06)
Level 2: Attending a Public School			
No. of public schools	0.09***	0.08**	0.08***
	(0.02)	(0.04)	(0.03)
% of public schools: poor quality	-0.74***	-1.07***	-0.55**
	(0.21)	(0.39)	(0.22)
% of public schools: average quality	-0.04	-0.33	-0.08
	(0.17)	(0.33)	(0.14)
% of public schools: unknown quality	-1.61***	-2.13***	-1.10***
	(0.26)	(0.44)	(0.35)
% of public school with hindrance	0.23	-0.56	0.61**
	(0.21)	(0.34)	(0.28)
Log mean annual fees - public schools	0.10***	0.05	0.08**
	(0.04)	(0.06)	(0.04)
Log of no. of students - public schools	-0.02	0.04	0.02
	(0.14)	(0.23)	(0.13)
Log pupil-teacher ratio - public schools	0.24**	0.22	0.12
	(0.12)	(0.21)	(0.12)
Log of expenditures - public schools	0.06	-0.03	0.05
	(0.06)	(0.11)	(0.06)
Out-of-school τ	1 (constrained)	1 (constrained)	1 (constrained)
Attending school τ	0.80***	1.03***	0.48***
	(0.13)	(0.22)	(0.16)
Observations	7533	3570	3963
Nb of cases	2511	1190	1321
LR test for IIA (τ=1) chi2(1)=	2.11	0.02	7.71
Prob > chi2	0.15	0.88	0.01

Notes: Clustered (at the village level) and robust standard errors in parentheses: * $p < .1$, ** $p < .05$, *** $p < .01$, School alternatives variables are computed at the village level.
Source: Author, using LEAPS database (three waves). Each child is observed only once the first year of observation.

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