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## **Abstract**

The paper explores the effect of primary school access, type, and quality on the decision to enroll in rural Pakistan using a 1997 survey especially designed for this purpose. A unique contribution of the paper is the construction of gender-specific dimensions of school accessibility and school quality according to school type (i.e., public vs. private). Within the same village, girls and boys often face starkly different options for schooling in terms of distance, type, and quality. Public primary schools are segregated by sex; private schools, whose numbers have grown rapidly in recent years in response to rising demand and the inadequate supply of public schools, are more typically mixed. The decision to enroll in school and the choice of school type are modeled simultaneously using a nested multinomial logit model. Simulations of alternative scenarios in terms of school access (measured as whether or not a primary school is located in the village), type, and quality are used to express our findings. The presence of a public school for girls in the village makes an enormous difference for girls in primary enrollment given parents' reluctance for girls to travel far from home; for boys this is less of an issue because most villages have at least one public school for boys. We find that the addition of a private school option in a village that already has a public school has little impact on overall enrollment rates but rather leads to a redistribution of enrollment from public to private school. Girls' enrollment in public primary is particularly responsive to improvements in some aspects of school quality, in particular whether or not the teacher resides in the village. This would suggest that school quality is important not only for retention but also for enrollment.

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In the last 15 years, there has been a major change in educational policy in Pakistan, reflected in a shift of funding away from tertiary education toward basic schooling. The allocations for basic education (grades 1–8, which include primary and middle school) increased from 32 percent of the education budget in 1983–88 to over 50 percent in 1993–98 (Mahmood 1997). Public spending on education as a percentage of GNP, however, remained low at an average of 2.7 percent from 1990 to 1996 (World Bank 2001). By comparison, the overall average for low-income countries—the group in which Pakistan belongs—is 3.8 percent of GNP during the same period.

The achievement of universal primary education with a particular emphasis on girls' enrollment is now a government priority. Even though there was a doubling in the number of boys' and girls' public primary schools between 1988 and 1998, the percentage of all public primary schools that are girls' schools has stayed roughly the same for the country as a whole, at about 30 percent (Mahmood 1997). This proportion continues to reflect the earlier government practice of building approximately one girls' school for every two boys' schools (Warwick and Reimers 1995). Little is known about the extent to which investments have been made to upgrade and improve conditions in existing public primary school facilities or how these resources might have been distributed between schools for boys and schools for girls.

During the same period in which the government has invested an increasing share of its education budget in primary schooling, there has been a rapid growth in private-school enrollments at the primary level, even in rural areas (Sathar, Lloyd, and ul Haque 2000), suggesting the possibility that the supply of government primary schools has not been keeping up with demand. This would not be surprising given the fact that the population of 5–14-year-olds in Pakistan has grown from 20.3 million in 1980 to 36.8 million in 2000 (United Nations 2001a). This shift toward private schooling at the primary level might be occurring because the number of public primary schools is not sufficient and/or because their quality is not acceptable to parents. For girls, the school availability/accessibility argument could be quite convincing because many Pakistani villages lack primary schools that admit girls. But most villages have at least one public primary school for boys, so lack of public-school access is less likely to be an explanation for the private schooling of boys. Furthermore, rural public primary schools typically have rela-

tively low enrollments (roughly 125 in five grades of primary) and do not appear to be overcrowded by international standards (roughly 25 students per teacher) (Sathar, Lloyd, and ul Haque 2000). It is likely that the quality of public primary schooling is a concern for parents, leading some of them to see private schooling, even when significantly more expensive, as an attractive alternative.

The goal of this paper is to assess the role of primary school access, type (i.e., public vs. private), and various dimensions of primary-school quality in parents' decisions to enroll or not to enroll their children in primary school. We use data collected especially for this purpose in rural Punjab and Northwest Frontier Province (NWFP) in 1997. In a context in which many children, particularly girls, never enter school, it is critical to understand more fully the determinants of enrollment. Once in school, the retention rate appears to be relatively high for both boys and girls (Sawada and Lokshin 2001). A unique contribution of the paper is the construction of gender-specific dimensions of school accessibility and school quality according to school type. Within the same village, girls and boys often face starkly different options for schooling in terms of distance, type, and quality. Public primary schools are segregated by sex; private schools are more typically mixed but are also occasionally single-sex.

The paper begins with a review of the literature on the determinants of school entry and choice in developing countries, with emphasis on the newer literature on school quality and public/private school choice. This is followed by an overview of educational policy and primary schooling in Pakistan. Next, we introduce our data and use them to provide some background on relevant dimensions of schooling context in our sample villages. Finally, we present our findings from the multivariate analysis and conclude with some thoughts on critical educational policy issues in Pakistan.

## **REVIEW OF THE LITERATURE**

Most recent empirical studies of the determinants of school entry have integrated some aspect of the supply environment into the analysis, most typically indicators of school access measured at the community or district level. A number of researchers have estimated models of the likelihood of school entry using cross-sectional data that control for relevant family and individual factors and add some measure of school access.

Some of these factors include the presence of a primary school either at the time of the survey or at the time of the schooling decision (Alderman et al. 1995 and Sawada and Lokshin 2001 for Pakistan), the number of years a school has been present in the community (Beutel and Axinn 2001 for Nepal), the distance to the nearest school (Sathar and Lloyd 1994; Durrant 1999; and Alderman, Behrman, Lavy, and Menon 2001 for Pakistan; Bommier and Lambert 2000 for Tanzania), or the presence of a school within some fixed distance or travel time (Handa and Simler 2000 for Mozambique). In these settings, studies have universally found access to be a statistically significant factor explaining cross-community variations in school entry or enrollment. When results are disaggregated by sex, it appears that access is more important to the enrollment of girls than of boys, particularly in societies that are strongly segregated by sex (Sathar and Lloyd 1994). The fact that more studies of this issue over the years have been done in Pakistan than in any other developing country suggests its continuing importance.

While the role of access has been extensively explored as a factor in parents' decision whether to enroll their children in school, the same cannot be said for school quality or school choice (e.g., private vs. public), the two other dimensions of schooling opportunity that are important to enrollment decisions. The typical approach to incorporating some dimension of school quality into modeling the enrollment decision has been to integrate an indicator, such as the student/teacher ratio, reported at the community or district level into the regression analysis (Lloyd and Gage-Brandon 1994 for Ghana; Handa and Simler 2000 for Mozambique). More recently, Alderman, Orazem, and Paterno (2001) developed a more refined approach to capturing school quality by creating weighted averages of various school-quality indicators by community (using the proportion of students attending each school in the community as weights) and found effects on enrollment for instructional expenditures per pupil and the student/teacher ratio. To date, there has been no attempt to identify community-wide school-quality indicators separately for boys and girls—a refinement that could be appropriate in settings where single-sex schooling is the rule.

On the other hand, a growing number of studies of retention and dropout (confined to children who have entered school) have linked students to the characteristics of the specific schools they have attended in order to identify the dimensions of school quality that are the most important determinants of retention and dropout. Investigators

found that various dimensions of school quality appear to matter depending on the context (Lloyd, El Tawila, Clark, and Mensch 2001 for Egypt; Glewwe and Jacoby 1994 for Ghana; Glewwe, Grosh, Jacoby, and Lockheed 1995 for Jamaica; Lloyd, Mensch, and Clark 2000 for Kenya; Alderman et al. 1995 and Behrman, Khan, Ross, and Sabot 1997 for Pakistan; Mete 2000 for Tunisia; Behrman and Knowles 1999 for Vietnam). An important finding from the studies of Kenya and Egypt, where school quality was assessed separately for boys and girls, is that the effects of school quality vary by sex. However, we are aware of no study that looks at gender-specific indicators of school quality in the community as a factor in parental decisions about enrollment.

Studies of the effects of school choice—in particular choice between public and private schooling—on enrollment are equally rare. James, Primo Braga, and Afonso de Andre (1996) investigated the determinants of rates of private enrollment in Brazil and found strong income effects, concluding “the private sector will be larger in states where families are polarized into high- and low-income groups, rather than falling into a large middle class” (p. 493). In the Philippines, Jimenez and Sawada (2001) used regional data to test the hypothesis that where an active private-school sector already exists, an expansion of public schooling may draw away students who may have gone to school anyway. The authors find a sizable crowding-out effect at the secondary level, but not at the primary and tertiary levels. Jimenez and Lockheed (1996) and Lockheed and Jimenez (1996) compared the performance of students in private versus public *secondary* schools in Colombia, the Dominican Republic, the Philippines, Tanzania, and Thailand. This research suggests that private schools are more efficient than public schools at the secondary level. Even though public and private schools in the sample were roughly similar in terms of resources, they differed in their management organization, leading the authors to conclude that government subsidies may not be effective if they limit the schools’ ability to combine resources efficiently.

Two recent studies of the effect of private-school availability focused on urban communities in Pakistan. In the first, Alderman, Orazem, and Paterno (2001), using data from urban low-income neighborhoods in Lahore, found that private-school enrollment is surprisingly high even among the poorest households. They concluded that providing a public subsidy to private schooling may be a viable option for increased delivery of pri-

mary schooling to poor households. This view is based on their finding that schooling choices of poor households appear to be very sensitive to quality and that private schools generally tend to be of higher quality. However, relatively few children in their study population are out of school, so it is not clear that these findings may be applied to rural populations where enrollment rates are much lower and where gender differences in enrollment remain pervasive. In the second study, Kim, Alderman, and Orazem (1999) evaluated an intervention to introduce a subsidized private school into each of ten poor neighborhoods in Quetta, which were randomly drawn from a pool of 30 neighborhoods, none of which had a public girls' school. Enrollment increases have been very large since the intervention, particularly for girls, and increases have continued even after subsidies had been lowered in subsequent years. However, the response has varied widely across communities for reasons that are not immediately apparent. It could be that the effects of variations in school quality between neighborhoods have not been captured in this analysis. Furthermore, it is not known how responses to private schooling might differ in environments where public schools, even of poor quality, were previously available.

From this review, we can see that there is a growing interest in the role of school quality and school choice as factors in enrollment decisions in developing countries. Previously, the assumption in the literature had been that parental demand for basic schooling was largely a function of family factors such as education and income and that, with rising income and education, all children would enroll in school. It is increasingly recognized that, in developing-country settings where universal enrollment in basic schooling has not yet been achieved, parents may also be sensitive to school-quality issues.

## **PRIMARY SCHOOLING IN PAKISTAN**

In the Pakistani context, there is no compulsory schooling law on the books at the national level (Mahmood 1997), much less any attempt by the government to directly influence parents' decisions about their children's schooling through other means such as media campaigns. A decade ago many argued that enrollment rates in Pakistan were so low because of the overall weakness of demand (Birdsall, Ross, and Sabot 1993; Hamid 1993). More recent studies, however, have questioned this view and suggested that levels of demand are high but that governmental investment in primary schooling



has been too low (World Bank 1996 as cited by Gazdar 1999). Indeed, it appears that the aforementioned practice of building one girls' primary school for every two boys' primary schools implied an assumption of weak parental demand for girls' schooling and an acceptance of the status quo.

It is doubtful that variations across communities in the supply of *public* schools can be explained by variations in the level of local demand. There is evidence that one of the most important factors historically in determining the location of new schools and the allocation of resources to existing schools was pressure from powerful "feudals" or local military officers, who had the opportunity to gain directly from profitable school construction as well as from the dispensation of political patronage (Alderman et al. 1995; Gazdar 1999). Furthermore, in recent years other aspects of school resource allocation have become increasingly politicized as a result of the growing involvement of members of national and provincial assemblies in the selection and assignment of teachers. This development has further implications for the supply of schooling in that it affects the extent to which nonlocal teachers are assigned tenured positions in the system, with consequences for absenteeism, school closures, and the distribution of sham or "ghost" schools.<sup>1</sup> As long as the distribution of political influentials across communities is not correlated with the distribution of demand for primary schooling in the community, one can assume that in the past the supply of *public* schools was determined independent of demand. Indeed, Alderman et al. (1997) argue that availability of schools in the community can be considered beyond the control of individual households in rural Pakistan, based on a weak relationship between school location and community characteristics. This situation may be changing as a result of the structural adjustment policy. However, we were unable to find any documentation about the current system of resource allocation for public primary schools at the community level.

The total supply of schools and their quality reflect not only decisions (or neglect) by provincial and district educational authorities about the placement of new public schools and the allocation of resources to existing schools but also the demand at the community level as expressed in the recent growth of private-school enrollment. Private schooling in Pakistan has a long history. At the time of independence, the educational system was made up largely of private and locally managed schools.

**Table 1** Trends in primary school enrollment by sex and by school type

	Never enrolled	Public	Private
Boys			
10–15 yrs	11.0	74.7	14.3
16–20 yrs	9.9 (0.38)	81.2 (1.72)	8.8 (1.15)
Girls			
10–15 yrs	36.6	55.0	8.5
16–20 yrs	44.4 (1.74)	51.9 (1.75)	3.7 (1.99)
Total			
10–15 yrs	24.0	64.7	11.3
16–20 yrs	26.2 (0.82)	67.3 (0.86)	6.4 (2.57)

**Note:** |t| statistics are listed in parentheses, illustrating the extent to which cohort differences in enrollment are statistically significant for each category.

In 1972 all private schools were nationalized by law. In 1979 the policy shifted again, and in the sixth five-year plan (1983–88) the opening of new private schools was encouraged as was the return of nationalized and formerly private schools to their owners. Currently the government provides little financial assistance to private schools but asks those that are registered to follow government-prescribed curricula (Jimenez and Tan 1987).

Neither the International Food Policy Research Institute rural survey beginning in 1986 (Alderman et al. 1995) nor the 1991 Pakistan Integrated Household Survey (PIHS) (Sathar and Lloyd 1994) found many children in rural areas attending private schools. Until the early 1990s, private schooling appears to have been largely an urban phenomenon. From 1990 to 1997, by contrast, the number of primary schools attended by children in our 12 sample villages rose from 34 to 50, and 11 of the 16 new schools were private primary schools. In 1990, there were only three private schools. Table 1 shows recent changes in enrollment by school type in our rural sample. From this it is clear that there has been a recent rise in enrollment in private schools, nearly doubling from 6 percent among 16–20-year-olds to 11 percent among 10–15-year-olds; and the increases have been of the same magnitude for both boys and girls although from a lower base in the case of girls.<sup>2</sup>

## DATA

Data were collected in 12 rural communities in Pakistan—six from Punjab and six from NWFP—drawn from three districts in each province. Once the scale of the survey was determined, in large part by the project budget, the selection of the villages became an issue as a random sample of 12 villages might not have produced sufficient variation in community-schooling conditions. As a result, based on the per capita consumption information collected by the 1995/96 PIHS (Federal Bureau of Statistics 1996), three districts were selected within each province. Within each of the districts, two communities or primary sampling units (PSUs) were selected that had enrollment rates as calculated from the PIHS that appear average for the district selected. Within each of the 12 communities, 60 households were randomly selected. In the selected households all currently married women ages 20–45 were interviewed, as were all husbands who could be located during the period. This resulted in a sample of 722 women and 3,657 (ever-born) children, including 1,174 children ages 10–20 at the time of the survey.

Data were collected on the educational history of each child who survived long enough to reach school age. Background data on women, their husbands, and consumption of the household were also collected (drawing on the approach used in the recent Living Standard Measurement Survey in Pakistan with its modified consumption module). These data were supplemented by in-depth interviews with a few parents in each community to probe attitudes toward schooling.

These household-based data were supplemented by visits to all 38 primary schools (26 public schools and 12 private schools) located within each of the 12 villages.<sup>3</sup> A survey covering other relevant features of the community was administered as well. Data collected on schools included information on the number of schools in the community, their type (public, private, boys', girls', mixed), the year they were founded, enrollments, numbers of teachers and their credentials and attendance, and various aspects of the physical facilities and the language of instruction. The school visits were unannounced so we can assume that the data collected are characteristic of a typical school day.

Table 2 shows the range of school choice across our villages for boys and girls separately. In the case of girls, three of the 12 villages do not have a public primary

**Table 2** Primary school availability inside the village, by school type, 1997

Village	No. public boys' schools	No. public girls' schools	No. private boys' schools	No. private girls' schools	No. private mixed schools
Kotla Drigh	2	0	0	0	0
Feroza	2	1	0	0	0
Ram Garha	1	1	0	0	3
Dhadu Basra	1	1	0	0	1
Noorpur	2	1	0	0	0
Gadaiee	2	2	0	0	3
Islampur	1	1	1	0	0
Alah Bad	1	1	1	0	0
Daresh Khel	1	1	0	0	0
Mandawa	2	0	0	0	0
Kakul	1	1	0	0	3
Tarmuchian	0	0	0	0	0

school inside the village. Furthermore, none of these villages has a private school for girls. In one of the 12 villages, girls have a choice of two public primary schools, and in four villages girls have the option of attending a private mixed school. In the case of boys, one village has no public or private school for boys inside the village. In the other villages, choices for boys range from one to five schools, with six villages having private school options inside the village. Five villages have more than one public school option for boys; three villages have more than one private school option. Two villages have an all boys' private primary school; no such options exist for girls in these villages.

## SCHOOLING CHARACTERISTICS AND ENROLLMENT PATTERNS IN SAMPLE VILLAGES

### Primary school quality: Parental views and actual school characteristics

While the empirical analysis reported in this paper relies solely on detailed data on school and teacher characteristics, we first (1) acknowledge the difference between actual and observed school characteristics and parental perceptions and preferences; (2) evaluate the extent to which parental views of public and private schools are consistent

within the same village; and (3) present information on school and teacher characteristics by school type.

Public primary schools in Pakistan have always been single-sex. This is presumably based on the assumption that parents strongly prefer to send their children to single-sex schools with teachers of the same sex. But we observe from our own data on parental attitudes that, while both mothers and fathers express a preference for single-sex schools for both boys and girls as well as a strong preference for same-sex teachers, fathers (but not mothers) also express a slight preference for private schools (typically mixed) relative to public schools (always single-sex, see Table 3). While this might initially appear contradictory, it becomes clear that some elements of quality that parents care most about are more likely to be present in private than in public schools. These include better physical facilities and more-attentive teachers. The recent rapid growth in private schooling suggests that the issue of school type has become very salient in Pakistan as private schools are being created to respond to a shortfall in supply in the public sector.

The responses of parents to questions about primary-school quality in the in-depth interviews appear at first glance inconsistent, with residents of the same community often giving contradictory answers. It may be difficult for a parent who has never gone to school or only attended school for a few years a long time ago to assess quality. Fathers, who were much better educated than mothers in our sample, were more likely to talk about a decline in quality in comparison to an earlier time; mothers were more likely to see school quality as having improved. In addition to this “information gap” hypothesis, in a diverse village population characteristics of schools that are important to some parents may not be as important to others. This seems to be a weak explanation, however, because certain school characteristics seem to be valued by all. Finally, private schools may be viewed negatively by some parents who cannot afford private education for their children. We first summarize parental views (Appendix 1 lists selected quotations), then present our data on school characteristics by school type.

Parents’ views on school quality were affected by several criteria, including whether or not the teacher attended regularly and was properly supervised, the size of classes, type of facilities, and the standards expected for students (sometimes judged by

**Table 3** Parental views regarding the schooling of boys and girls (percent)

	Boys		Girls	
	Mother	Father	Mother	Father
Primary students learn better in single-sex (public) school	84	80	85	83
Primary students learn better in private school	51	65	47	64
Primary students learn better with teacher of same sex	79	68	80	85

Source: Sathar, Lloyd, and ul Haque 2000.

whether or not children could read or write). Many of the negative comments were related to absenteeism of teachers, large class sizes, poor physical facilities, teacher abuse of students in the form of punishments or inappropriate chores, and declining standards in terms of requirements for completion of a particular level. It was often clear from the context that these comments were directed largely at public schools. Often, schools were viewed positively because the teachers were regular in their attendance, set proper standards for children, and did not abuse their position by taking advantage of children. Finally, there was a sense that the advent of private schools had changed the environment within the communities by giving parents more choice and creating competition.

Parents were asked for their views about differences between private and public schools and between English-language and Urdu-language schools. While English was not always the medium of instruction in private schools, it was only in private schools that English textbooks were used. Therefore, it appeared clear that parents interpreted the questions to mean the same thing, namely comparing private to public schools and associating private schooling with English-language training. Putting aside the fact that private schools are often quite expensive and therefore not accessible to all, the majority view was that private schools were of better quality than public schools. Many reasons were given for the perceived better quality of private schooling, including better facilities, more attentive teachers, better discipline, and greater fluency in English. But some parents did not view private schools favorably, seeing them as simply being in business to make money and as having poorly qualified teachers (the latter confirmed by the school inventory assessment). Also, they saw public schools as being more committed to equal opportunity for both rich and poor students.

Table 4 shows the variation in school quality according to school type among the schools in our sample. School quality varies both by private and public and by girls' and boys' schools. Teachers in girls' schools have fewer years of teaching experience and are more likely to be absent than teachers in boys' schools. This is not surprising as girls' schools have been established more recently, and female teachers often must travel from outside the village, a difficulty given that they can travel less easily than men and are more likely to have to stay at home to meet family responsibilities. Differences between public and private schools are even more striking. Private schools have more amenities, smaller classes, more teachers with a lighter teaching load, a higher percentage of teachers residing in the community, and a lower teacher absentee rate. On the other hand, the teachers have much less experience and are much less likely to have a teaching certificate. Furthermore, private schools rarely have parent/teacher associations, a feature that is recognized in the school reform literature as increasingly important to school effectiveness. They are also much more likely to speak a nonlocal language, typically Urdu, and use textbooks printed in either English or Urdu—practices that are not considered ideal for effective learning in the early grades of primary school. From the qualitative material and from these objective measures of school characteristics, we can see that public and private schools each have distinct features that are valued by parents. The tradeoff for parents is between single-sex education and schools with proper physical facilities, teachers who are present, have time to pay attention to their students, and who introduce their children to a language that is not their own.

### **Public- and private-school enrollment by household and community characteristics**

The variability of enrollment and choice according to these background factors is illustrated in Table 5. A large majority of boys and girls with mothers who have at least primary schooling enroll in primary. Those with more-educated mothers are also more likely to attend private school, particularly in the case of boys. On the other hand, close to half of girls whose mothers had less than primary education never enrolled in school. Girls whose fathers are employed in agriculture are similarly disadvantaged in terms of

**Table 4** Selected indicators of primary-school quality according to school type (based on schools in sample villages)

	Public boys' school	Public girls' school	Private mixed school	Private boys' school
Material resources				
School amenities index (0–4) mean <sup>a</sup>	1.5	1.6	3.8	4.0
Teaching resources				
Teachers' years of schooling (mean)	11.3	11.6	11.5	10.9
Teachers with certificate (%)	99	96	9	31
Teachers' years of experience (mean)	12.2	8.8	2.8	3.6
Teachers residing in village (%)	34	31	80	45
Teachers present on day of visit (%)	80	66	94	97
Teachers teaching single class (%)	54	52	65	21
Teachers teaching single subject (%)	16	17	1	75
Time to learn				
Number of hours per day (mean)	5.4	5.7	5.4	5.0
Number of days per year (mean)	215	231	226	283
Other				
Presence of any parent/teacher association	44	60	0	50
Curriculum				
Textbooks in English (%)	0	0	30	100
Instruction in Urdu (%)	6	40	100	50
Total no. schools (N)	16	10	10	2

<sup>a</sup> The school amenities index can range from 0 to 4, with one point assigned for each of the following: any kind of toilet, electricity, drinking water, and at least some chairs and desks for students.

primary-school enrollment (47 percent never attend school vs. 25 percent with fathers in nonagriculture) while boys' enrollment is less sensitive to father's occupation. For boys, enrollment in public school is the same regardless of household consumption (at around 75 percent). Rising levels of household consumption are associated primarily with a rise in private-school enrollment. For girls, a shift from low to middle household consumption levels results in a rise in enrollment in public primary, whereas a shift from middle to higher income is associated with a shift to private school. The percentage of boys who are not enrolled in school is relatively high at 23 percent in the least-developed communities;<sup>4</sup> it is around 8 percent in the middle-ranking and most-developed communities. The percentage of girls who are not enrolled in school, however, declines dramatically by community development from about 72 percent to 18 percent.



**Table 5** Percent ever enrolled in primary school by sex and key background characteristics (ages 10–20) (sample size=1,136 [572 males, 564 females])

	Never in school	Public primary	Private primary
Mother's education			
Boys			
Less than primary	12.3	81.2	6.6
Primary or greater	4.4	59.1	36.5
Girls			
Less than primary	46.8	49.7	3.5
Primary or greater	6.3	72.1	21.6
Father's occupation			
Boys			
Agriculture	14.5	75.9	9.7
Nonagriculture	4.6	78.2	17.3
Girls			
Agriculture	46.7	46.9	6.4
Nonagriculture	25.2	66.5	8.3
Monthly household consumption			
Boys			
<25th percentile	18.2	75.5	6.3
25–75th percentile	9.4	77.1	13.5
>75th percentile	5.7	77.3	17.0
Girls			
<25th percentile	50.0	45.0	5.0
25–75th percentile	34.6	60.1	5.3
>75th percentile	36.2	51.1	12.8
Community development index <sup>a</sup>			
Boys			
0–1	23.3	75.6	1.1
2–3	8.4	85.6	6.0
4–6	8.1	64.5	27.4
Girls			
0–1	72.5	26.4	1.1
2–3	40.1	56.6	3.3
4–6	18.3	64.5	17.2

<sup>a</sup> See note 4 for a definition of the community development index.

## School costs

School costs are estimated separately for private and public schools using data on school fees, uniforms, and stationery/books as reported by parents whose children are currently enrolled in our sample schools. Unfortunately, we do not have data on school

**Table 6** Descriptive statistics for the estimation of school costs

	Public primary school		Private primary school	
	Mean	Standard deviation	Mean	Standard deviation
Total expenditure (monthly)	100.85	69.64	207.33	113.32
Component 1: school fee	10.92	28.69	88.68	98.45
Component 2: uniform	50.73	27.72	67.17	29.99
Component 3: stationery/books	39.19	36.13	51.49	26.10
Gender <sup>a</sup> (1 if male)	0.59	0.49	0.64	0.48
Father's occupation <sup>a</sup> (1 if agriculture or blue-collar)	0.58	0.49	0.51	0.50
Mother's schooling <sup>a</sup> (1 if attended primary school or more)	0.20	0.40	0.59	0.49
Monthly household consumption (rupees/1,000)	7.86	4.80	9.73	5.89
NWFP region dummy <sup>a</sup>	0.54	0.50	0.54	0.50
Community development index <sup>b</sup> (at time of survey)	3.48	1.68	4.57	1.21
No. observations	744		112	

<sup>a</sup> For a binary dummy variable with a mean of  $m$ , the standard deviation is  $(m[1-m])\text{exp}1/2$ .

<sup>b</sup> See note 4 for a definition of the community development index.

costs at the time of school entry and must make do with costs at the time of the survey. Table 6 presents descriptive statistics for the school-cost estimates. On average the cost of private schooling is roughly twice that of public schooling, with most of the difference attributable to higher school fees. Table 7 presents the OLS regression estimates of private and public school costs using gender, father's occupation, mother's schooling, monthly household consumption, the community development index, and a dummy for NWFP as independent variables.

School costs vary little by gender. Mother's schooling increases expenditures according to the public-school cost equation, but the estimated coefficient is insignificant in the private-school cost equation. Father's occupation is also not a good predictor of costs, but household consumption is. Private schooling costs more in NWFP, while public schooling costs slightly more in Punjab. Community development level is negatively correlated with public-school costs, a correlation for which we lack an explanation.

**Table 7** OLS regression results of monthly school costs

	School costs of those attending public primary school	School costs of those attending private primary school
Gender (1 if male)	4.07 (0.80)	26.45 (1.24)
Father's occupation (1 if agriculture or blue-collar)	-7.98 (1.54)	-14.84 (0.64)
Mother's schooling (1 if attended primary school or more)	34.51 (5.44)	-9.74 (0.47)
Monthly household consumption (rupees/1,000)	2.09 (4.03)	5.47 (2.93)
NWFP region dummy	-11.03 (2.02)	52.10 (2.16)
Community development index <sup>a</sup> (at time of survey)	-4.00 (2.57)	1.16 (0.12)
Constant	99.66 (11.57)	117.21 (2.14)
<i>F</i> -test ( <i>p</i> -value)	0.0000	0.0053
R-squared	0.09	0.16
No. observations	744	112

**Note:** |t| values are reported in parentheses.

<sup>a</sup> See note 4 for a definition of the community development index.

Values predicted from these regressions for each child in the sample and for private and public school separately are used instead of actual costs in the nested multinomial logit results reported next. Actual school costs cannot be used because they are only reported for children in school in the year prior to the survey. Furthermore, in modeling school choice, one must operate with some assumptions regarding the cost structure because even for those children who report school costs, they do so only for the type of school they attend.

## NESTED MULTINOMIAL LOGIT MODEL

### The estimation

Our goal is to model simultaneously the decision to enroll in school and the choice of school (public vs. private). The decision tree that is the basis for our estimation distinguishes between the enrollment choice in the first stage and public versus private school

choice in the second stage. The nested multinomial logit model is used for estimation.<sup>5</sup> Alderman, Orazem, and Paterno (2001) motivate the estimation by considering an underlying utility maximization model; we present the decision tree and nested multinomial logit formula in Appendix 2.

Family, household, and community characteristics enter in the first stage (the enrollment decision) but not in the second stage. Thus, we do not allow these variables to have a differential effect on the public versus private school decision. This restriction seems plausible, since when we experimented with separate public versus private school coefficients for these variables the differences were negligible (after controlling for the second-stage variables described next).<sup>6</sup> School availability, school costs, and school quality enter in the second stage as determinants of public versus private school choice. Obviously the changes in the values of these school variables would also have an impact on the predicted enrollment patterns, because the maximized likelihood function is composed of probability expressions for enrollment—school-type pairs (i.e., the probability of enrolling in primary school multiplied by the probability of choosing a certain school type conditional on enrollment). Recognizing that the same resources might be used more efficiently in private (or public) schools, we allow school availability and quality coefficients to vary between alternatives.

The analysis requires that we have data on the array of schooling opportunities in each community at the time those enrollment decisions were made. We focus our analysis on children ages 10–20 at the time of the survey in 1997. In addition to the 1,174 living children ages 10–20 at the time of the survey, we also include 13 children who were not alive at the time of the survey but who survived until age 10. Of these 1,187 cases, 51 contained missing values in at least one of the variables considered, resulting in a final sample size of 1,136, composed of 572 males and 564 females.

We choose age 10 as the lower bound to ensure that all children who could enter school have had a chance to do so. While our data suggest that the majority of children enter school by age 7 (93 percent of those who enroll in school), some continue to enter until age 10 (more than 99 percent of those who enrolled in school did so by this time; our data set contains only four children who enrolled in primary school after age 10). We choose age 20 as the upper age bound to minimize recall error. Because in a setting of

single-sex education girls and boys face very different schooling opportunities in terms of access, choice, and quality, we estimate separate models for boys and girls.

The data we collected in the villages allow us to backdate our information on school availability and school choice for each child to the year in which that child celebrated his or her tenth birthday, using the assumption that school-enrollment decisions were made no later than a child's tenth year. We have information on the date that each school was founded; we assumed that as new schools appear, the previous stock of old schools continues in operation. Similarly, the community development index used in the enrollment models captures the level of community development when the child was 10 years old.

Our data on school quality are based on school visits in 1997. In the absence of historical data on school quality, we assume that school quality has remained unchanged. A weaker and more plausible assumption would be that while school quality has changed it has not affected the rank order among schools on any particular indicator. In constructing indicators of school quality for private and public schools separately for boys and girls, we use data on schools located within the village only. If there is no school inside the village, the quality variable gets a value of zero even if children attend schools outside the village, because we are trying to capture a circumscribed measure of the supply of quality, independent of demand for schooling that may lead families to send children to school elsewhere. If there is only one school in a particular category, that school's quality captures the opportunity set whereas if there is more than one, the school-quality indicator is based on an unweighted average of values taken by each school in the village.

Even though the model specification is similar to that of Alderman, Orazem, and Paterno (2001), who based their analysis on data from urban Pakistan, certain independent variables are different, either to reflect rural Pakistan better or to capitalize on the strengths of our data. First, we not only estimate separate models for each sex but also use sex-specific measures of school availability and quality, recognizing that the availability and quality of schooling may be very different for boys and girls. Second, instead of defining household consumption as "household income minus school expenses of the child depending on the schooling decision," we use the actual amount spent on monthly household consumption directly from the consumption module of the survey and apply a separate school-cost variable that takes different values for each schooling alternative

for each household (as described in the previous section). We have good reasons for doing this. First, our survey does not allow us to create a household-income variable. Second, even though household survey data have many advantages, one disadvantage is that our sample of children attended school at different time periods. While we can adjust some of the variables to reflect the situation at the time the child attended school (see below), we cannot do so for household-consumption measures. As a result, with the household-consumption variable we seek to broadly control for household-consumption effects. Third, we introduce an additional variable, father's occupation, to explain school enrollment in the context of rural Pakistan.

### **Results: Alternative specifications**

The main results of the statistical analysis are presented in Tables 9 and 10. Table 8 presents the descriptive statistics. Model 1 (reported in the first two columns of Table 9 for boys and girls) considers only the availability of public and private schools inside the village to explain school choice. Model 2 (columns 3 and 4 in Table 9) introduces school costs to the relationship. For girls, the community development index, father's occupation (less likely to enroll in primary school if father's occupation is agriculture or blue-collar) and mother's schooling all come into play in the decision to enroll in school. For boys, only the community development index is consistently important. Once school costs are included, monthly household consumption, which was significant in Model 1, drops out as a significant variable. In Model 1 both private- and public-school availability are significant factors explaining enrollment and school choice (see Appendix 2 for an explanation of the model). Once school costs are controlled in Model 2, we can see that girls' enrollment is sensitive to school costs while boys' enrollment is not.

In addition to the variables included in Model 2, the specifications reported in Table 10 consider one school-quality indicator at a time. Two issues deserve attention. First, ideally we would like to have included a number of school-quality indicators together, but the number of villages in our sample does not allow many village-level indicators to coexist in the model because of limited degrees of freedom. Thus, we are simply trying to have a sense of basic relationships/correlations concerning school characteristics. Even if we were able to follow the first approach, it is not possible to make a convinc-

**Table 8** Descriptive statistics for the estimation of nested multinomial logit models of enrollment and school choice<sup>a</sup>

	Boys			Girls		
	Mean	Standard deviation	N	Mean	Standard deviation	N
Father's occupation (1 if agriculture or blue-collar)	0.62	0.49	572	0.63	0.48	564
Mother's schooling (1 if attended primary school or more)	0.20	0.40	572	0.20	0.39	564
Monthly household consumption (rupees/1,000)	8.00	5.14	572	7.67	4.75	564
Community development index <sup>b</sup> (when child was 10 years old)	2.98	1.52	572	2.84	1.50	564
Public school availability	0.80	0.40	572	0.61	0.49	564
Private school availability	0.32	0.47	572	0.20	0.40	564
Public school expenses (estimated)	102.8	20.3	572	98.3	20.0	564
Private school expenses (estimated)	207.9	43.1	572	179.4	42.2	564
Public school: school amenities index	1.52	1.13	460	1.59	0.77	343
Private school: school amenities index	3.82	0.16	183	3.66	0.35	114
Public school: teachers' years of schooling (mean)	11.6	0.94	460	11.5	1.18	343
Private school: teachers' years of schooling (mean)	11.3	0.53	183	11.5	0.89	114
Public school: teachers' years of experience (mean)	12.7	2.51	460	7.70	4.11	343
Private school: teachers' years of experience (mean)	3.82	0.82	183	3.03	1.62	114
Public school: share of teachers residing in village	0.33	0.23	460	0.31	0.30	343
Private school: share of teachers residing in village	0.57	0.14	183	0.76	0.25	114
Public school: share of teachers teaching single class	0.61	0.35	460	0.60	0.42	343
Private school: share of teachers teaching single class	0.49	0.07	183	0.68	0.14	114

<sup>a</sup> As mentioned in the text, for the estimation school/teacher characteristics variables are set to zero for school types that do not exist in the village. In this table we report school characteristics statistics for school types that exist in the village—this is why the sample sizes are different for school/teacher characteristics variables. Also note that these summary statistics are obtained at the child level. See Table 4 for easy-to-interpret descriptions of school/teacher characteristics by school type.

<sup>b</sup> See note 4 for a definition of the community development index.

ing case about causal effects in the absence of experimental data, so our loss may not be too great. Second, if a particular type of school (e.g., public or private) does not exist in the village at the time the child in question was 10 years old, then school-quality indicators for

**Table 9** Results of nested multinomial logit models: Base model

Variable	Model 1		Model 2	
	Boys	Girls	Boys	Girls
Stage 1: Enrollment versus no school attendance				
Father's occupation (1 if agriculture or blue-collar)	-0.48 (0.80)	-1.12** (3.72)	-0.32 (0.49)	-1.00** (3.58)
Mother's schooling (1 if attended primary school or more)	0.68 (1.19)	2.26** (5.26)	0.65 (0.66)	2.44** (4.81)
Monthly household consumption (rupees/1,000)	0.17* (2.38)	-0.03 (1.37)	0.15 (0.47)	0.01 (0.09)
Community development index <sup>a</sup>	0.35* (2.25)	0.32** (4.32)	0.41** (3.04)	0.37** (4.57)
Inclusive value parameter	0.11 (0.25)	0.17 (0.79)	-0.48 (0.18)	0.40 (1.24)
Stage 2: Public versus private school				
School costs	—	—	-0.015 (0.98)	-0.017* (2.07)
Public school alternative				
School availability	2.80** (4.02)	2.65** (4.07)	1.28 (0.45)	1.58 (1.58)
Private school alternative				
School availability	2.04* (2.48)	1.43 <sup>Δ</sup> (1.83)	2.02 (1.50)	1.37 <sup>Δ</sup> (1.85)
Log likelihood	-405.86	-473.68	-370.75	-437.98
Test of independence of irrelevant alternatives (prob > chi <sup>2</sup> )	0.0001	0.0001	0.0014	0.0202
No. observations	1,716	1,692	1,716	1,692

**Note:** |t| values are reported in parentheses.

\*\* Significant at 1% level

\* Significant at 5% level

<sup>Δ</sup> Significant at 10% level

<sup>a</sup> See note 4 for a definition of the community development index.

that type of school are set to zero. Thus, school-availability and school-quality variables need to be interpreted jointly when school characteristics are included. This is because some of the availability effects are also captured by quality variables in such cases. Simulations that follow in the next section clarify this issue.

Models 3–7 in Table 10 incorporate one school characteristic at a time. Teachers' residence in the village (Model 6) and share of teachers teaching a single class (Model 7) are the best predictors for both public and private school choice for both boys and girls.



**Table 10** Results of nested multinomial logit models: Model with school-quality variable included

	Model 3		Model 4		Model 5		Model 6		Model 7	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Stage 1: Enrollment vs. no school attendance										
Father's occupation (1 if agriculture or blue-collar)	-0.43 (0.52)	-0.96** (2.86)	-0.35 (1.52)	-0.99** (3.14)	-0.36 (0.12)	-0.93** (2.73)	-0.43 (1.48)	-1.05** (3.08)	-0.33 (1.34)	-0.90** (2.64)
Mother's schooling (1 if attended primary school or more)	0.62 (0.71)	2.46** (4.67)	0.73 (1.33)	2.51** (4.31)	0.54 (0.15)	2.51** (4.56)	0.74 (1.50)	2.39** (4.48)	0.72 (1.32)	2.45** (4.77)
Monthly household consumption (rupees/1,000)	0.13 (0.53)	0.03 (0.49)	0.17 (1.17)	0.02 (0.26)	0.13 (0.12)	0.04 (0.69)	0.18** (4.58)	0.039 (0.65)	0.17 (1.45)	0.04 (0.64)
Community development index <sup>a</sup>	0.40** (3.81)	0.37** (4.26)	0.39 <sup>A</sup> (1.82)	0.39** (3.48)	0.40** (2.72)	0.37** (4.01)	0.37** (4.08)	0.41** (3.88)	0.41 <sup>A</sup> (1.86)	0.32** (3.97)
Inclusive value parameter	-0.48 (0.32)	0.53 (1.52)	-0.09 (0.05)	0.51 (1.04)	-0.66 (0.09)	0.61 (1.74)	0.11 (0.76)	0.65 (1.62)	-0.18 (0.16)	0.55 <sup>A</sup> (1.74)
Stage 2: Public vs. private school										
School costs	-0.018 (1.44)	-0.019* (2.30)	-0.015 (0.97)	-0.018* (2.28)	-0.016 (0.52)	-0.019** (2.62)	-0.013 (1.63)	-0.019** (2.74)	-0.014 (1.08)	-0.019* (2.40)
Public school alternative										
School availability	1.11 (0.75)	-0.12 (0.12)	-0.13 (0.01)	-1.16 (0.29)	-0.46 (0.09)	0.01 (0.01)	0.55 (0.41)	0.42 (0.66)	0.99 (0.72)	0.52 (0.72)
School amenities index	-0.02 (0.07)	0.98** (2.71)	—	—	—	—	—	—	—	—
Teachers' years of schooling (mean)	—	—	0.14 (0.12)	0.22 (0.80)	—	—	—	—	—	—
Teachers' years of experience (mean)	—	—	—	—	0.13 (0.13)	0.20 (1.59)	—	—	—	—
Share of teachers residing in village	—	—	—	—	—	—	3.71** (3.96)	3.11* (2.54)	—	—
Share of teachers teaching single class	—	—	—	—	—	—	—	—	1.17 (0.62)	1.85** (2.61)

*continued*

**Table 10** *continued*

	Model 3		Model 4		Model 5		Model 6		Model 7	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Private school alternative										
School availability	25.3** (3.24)	6.96 <sup>A</sup> (1.89)	26.6** (3.79)	8.49 <sup>A</sup> (1.92)	-1.74 (0.63)	-0.90 (0.89)	-1.68 (0.99)	0.84 (0.60)	-0.77 (0.33)	-3.25* (2.06)
School amenities index	-6.11** (3.13)	-1.57 (1.63)	—	—	—	—	—	—	—	—
Teachers' years of schooling (mean)	—	—	-2.17** (3.56)	-0.64 (1.60)	—	—	—	—	—	—
Teachers' years of experience (mean)	—	—	—	—	0.98 <sup>A</sup> (1.91)	0.96* (2.43)	—	—	—	—
Share of teachers residing in village	—	—	—	—	—	—	6.28** (3.07)	1.29 (0.87)	—	—
Share of teachers teaching single class	—	—	—	—	—	—	—	—	6.56* (2.13)	7.44** (2.78)
Log likelihood	-353.8	-422.1	-356.7	-435.1	-362.4	-425.2	-352.1	-423.2	-365.2	-424.2
Test of independence of irrelevant alternatives (prob > $\chi^2$ )	— <sup>b</sup>	0.0567	0.265	0.0293	0.0018	0.0161	0.6006	0.4547	0.0046	0.0324
No. observations	1,716	1,692	1,716	1,692	1,716	1,692	1,716	1,692	1,716	1,692

**Note:** |t| values reported in parentheses.

\*\* Significant at 1% level

\* Significant at 5% level

<sup>A</sup> Significant at 10% level

<sup>a</sup> See note 4 for a definition of the community development index.

<sup>b</sup> The boys' sample for Model 3 did not meet the asymptotic assumptions of the Hausman test. As a result, independence of irrelevant alternatives was not tested.

But the coefficients on other school characteristics are not always as might be expected if we base our expectations on parents' opinions about the school characteristics that matter to them. The availability of public primary schools with more material amenities does provide significant encouragement to girls but is unimportant for boys. On the other hand, the availability of private primary schools with more material amenities appears to have a negative effect for boys' enrollment that is more than compensated by other characteristics of private-school availability that have a positive effect; school amenities for girls in the private sector appear unimportant, but the coefficient remains in an unexpected direction. Teachers' years of schooling does not have a statistically significant effect on enrollment for public schools (the signs are as expected), but is instead negatively correlated with enrollment for private schools. Teachers' years of experience is not related to public-school enrollment, but is significantly related to private-school enrollment in the expected direction.

### **Results: Simulations**

To understand the full effects of variables in the models on the outcomes of interest, we ran simulations of alternative scenarios (see Table 11). The base scenario for the projections in each case involves setting the independent variables to their medians. The base scenarios for boys and girls are developed separately, and Table 11 lists the explanatory variable values used for simulations. In the base scenario each village had one single-sex public school with average-quality characteristics. We use the results of Model 6 in Table 10 to illustrate a variety of scenarios.

If we first look at the effects of varying household and community characteristics in the absence of a private school, we see that having a mother who has completed primary school relative to having a mother who has not increases the probability of girls' enrolling in public school from 49 to 87 percent but makes relatively little difference for boys, whose primary enrollment rates are high in any case (from 82 to 88 percent). Increasing household-consumption levels from the 25th to the 75th percentile has relatively little effect on public school enrollment for either boys or girls. Girls whose fathers work in agriculture are much less likely to enroll in public school than those whose fathers do not (49 vs. 71 percent); father's occupation makes little differ-

ence to boys' enrollment. Living in a more-developed community has a positive effect on girls' enrollment in public primary school (58 vs. 39 percent) but far less difference for boys (85 vs. 77 percent).

Variations in the price of public school have a small impact on the primary enrollment of boys but a somewhat greater impact on the enrollment of girls. A rise in the price of public primary school from the 25th to the 75th percentile of the price range would lead to a decline in public school enrollment for girls from 53 to 45 percent. But variations in certain dimensions of school quality are potentially much more significant. For example, raising the share of public school teachers residing in the village from the 25th to the 75th percentile (12–57 percent of teachers residing for boys and 0–67 percent for girls) leads to a dramatic increase in overall enrollment for girls from 41 to 71 percent (with a slight decline in enrollment in private school and a huge increase in enrollment in public school) and little change in the overall enrollment of boys, with a rise in public school enrollment from 80 to 87 percent balanced by a decline in private school enrollment from 7 to 1 percent.

Relative to the base scenario, living in a village with no primary schools (as opposed to a public primary school in the base scenario) has a huge impact on the primary enrollment of girls but not on the enrollment of boys. In the case of boys a decline in enrollment in public school (from 82 to 70 percent) is entirely taken up by a rise in private-school enrollment (from 5 to 16 percent). For girls the decline in overall enrollment from 52 to 35 percent is primarily explained by a decline in enrollment in public primary from 49 to 29 percent. Parents are reluctant to send their daughters outside the village to school and appear to be less willing as well to seek out private-school alternatives for girls outside the village.

The addition of a private-school option in a village that already has a public school has little impact on overall enrollment rates (using the scenario of adding one private school that takes the median value for the share of teachers residing in the village). In the case of boys a decline from 82 to 61 percent in public-school enrollment is entirely taken up by a rise from 5 to 26 percent in private-school enrollment. For girls, there is a small increase in overall enrollment that is the result of a decline in public-school enrollment from 49 to 40 percent and a rise in private-school enrollment from 3 to 16 percent. Parents,

**Table 11** Estimated probabilities of enrollment based on scenarios of alternative school choice, cost, and quality

	Boys' estimated probabilities			Girls' estimated probabilities		
	No school	Public	Private	No school	Public	Private
Base scenario <sup>a</sup> (public school, no private school)	0.13	0.82	0.05	0.48	0.49	0.03
Community development index <sup>b</sup> at 25th percentile (2 for both girls and boys)	0.18	0.77	0.05	0.59	0.39	0.02
Community development index <sup>b</sup> at 75th percentile (4 for both girls and boys)	0.10	0.85	0.05	0.38	0.58	0.04
Mother attended or completed primary school	0.06	0.88	0.06	0.08	0.87	0.05
Monthly household consumption (rupees/1,000) at 25th percentile (4.9 for boys, 4.66 for girls)	0.17	0.78	0.05	0.50	0.47	0.03
Monthly household consumption (rupees/1,000) at 75th percentile (9.14 for boys, 9.04 for girls)	0.09	0.86	0.05	0.46	0.51	0.03
Father's occupation <i>not</i> in agriculture or blue-collar	0.09	0.86	0.05	0.25	0.71	0.04
Public school costs at 25th percentile (87.5 for boys, 82 for girls)	0.13	0.83	0.04	0.44	0.53	0.03
Public school costs at 75th percentile (114 for boys, 108.1 for girls)	0.13	0.81	0.06	0.52	0.45	0.03
Public school inside village, share of teachers residing in village at 25th percentile (0.125 for boys, 0 for girls)	0.13	0.80	0.07	0.59	0.36	0.05
Public school inside village, share of teachers residing in village at 75th percentile (0.571 for boys, 0.67 for girls)	0.12	0.87	0.01	0.29	0.70	0.01

*continued*

however, appear to be responsive to variations in the quality of private school, particularly in the case of boys. A rise in the percentage of teachers residing in the village from the 25th to the 75th percentile of the range leads to a rise in private-school enrollment among boys from 21 to 42 percent; a similar change for girls leads to an increase from 13 to 19 percent. Most of these changes result in a substitution of private for public schooling. Finally, changes in private school costs appear to have little impact on enrollment.

**Table 11** *continued*

	Boys'			Girls'		
	estimated probabilities			estimated probabilities		
	No school	Public	Private	No school	Public	Private
No public school (no private school)	0.14	0.70	0.16	0.65	0.29	0.06
Private school inside village, share of teachers residing in village at median (0.57 for boys, 0.81 for girls)	0.13	0.61	0.26	0.44	0.40	0.16
Private school inside village, share of teachers residing in village at 25th percentile (0.52 for boys, 0.58 for girls)	0.12	0.67	0.21	0.45	0.42	0.13
Private school inside village, share of teachers residing in village at 75th percentile (0.69 for boys, 1 for girls)	0.12	0.46	0.42	0.43	0.38	0.19
Private school costs at 25th percentile (170.6 for boys, 141 for girls)	0.13	0.79	0.08	0.47	0.47	0.06
Private school costs at 75th percentile (234 for boys, 207.9 for girls)	0.13	0.83	0.04	0.48	0.50	0.02

<sup>a</sup> In base scenarios all explanatory variables are at their median values.

For boys: Community development index 3, mother did not attend school, monthly household consumption/1,000 6.68, father's occupation agriculture or blue-collar, public school inside village, no private school inside village, monthly public school cost 100.2 rupees, monthly private school cost 208.1 rupees, share of public school teachers residing in village 0.2, share of private school teachers residing in village 0.57 (if a private school does not exist, this variable is set to zero, which is consistent with how model is estimated).

For girls: Community development index 3, mother did not attend school, monthly household consumption/1,000 6.66, father's occupation agriculture or blue-collar, public school inside village, no private school inside village, monthly public school cost 95.8 rupees, monthly private school cost 180 rupees, share of public school teachers residing in village 0.25, share of private school teachers residing in village 0.81 (if a private school does not exist, this variable is set to zero, which is consistent with how model is estimated).

<sup>b</sup> See note 4 for a definition of the community development index.

Our study explores the same set of questions using the same methodology for rural Punjab and NWFP as the recent Alderman, Orazem, and Paterno (2001) study does for low- and middle-income areas in urban Lahore, the second-largest city in Pakistan located in Punjab. Their most important conclusion is that parents are sensitive to school quality in making primary-school enrollment decisions—a conclusion with which we concur on the basis of the simulations discussed above. We extend their findings by making distinctions between boys and girls. This is very important in rural Pakistan given overall differences between boys and girls in school availability and school quality on the one hand and in enrollment patterns on the other. In Alderman et al.'s sample

58 percent of children are enrolled in private school, 32 percent in public school, and only 10 percent were never enrolled. Enrollment differences between boys and girls were minimal. In our rural sample, 11 percent are enrolled in private school, 65 percent are enrolled in public school, and 24 percent were never enrolled. However, gender differences are substantial, with 14 percent of boys enrolled in private school versus 9 percent of girls, and 75 percent of boys enrolled in public school versus 55 percent of girls.

Our findings suggest that parents are sensitive to variations in the quality of public schools for girls, but relatively less so for boys. On the other hand, parents are very sensitive to variations in the quality of private schools for boys. In general we agree with the conclusion of Alderman et al. that parents' responses to changes in school costs are relatively price-inelastic. But when we break down results separately for boys and girls, we find that parents are somewhat price-sensitive for girls.

## CONCLUSIONS

The findings of this study confirm the results of earlier research that girls' enrollment in rural Pakistan is highly responsive to the presence of an all-girls public school inside the village. But it is not only the presence of the school that matters; parents care about quality—at least certain elements of quality that are meaningful to them. Some minimal level of physical infrastructure, the regular presence of teachers, and their ability to give their students some direct attention (as reflected in teaching loads) all appear to be important factors in parents' decisions to enroll their daughters in school. When a teacher has to divide his or her attention between more than one class, students suffer in ways that matter to parents.

Policy interventions that seek to increase primary-school enrollment rates could potentially be more effective if vulnerable children (both at the household and community level) are targeted via easy-to-measure indicators. For this purpose, the payoffs to estimating separate models for boys and girls are visible throughout the paper. The impact of parental characteristics on enrollment, for example, varies significantly by sex: A girl is much less likely to enroll in school if her mother is not schooled or if her father's occupation is agricultural. For boys, while the signs of the parental characteristics coefficients are

the same in all models considered, the estimates are never statistically significant at the 10 percent level. Community development level, on the other hand, has a robust positive impact on the primary-school enrollment of both boys and girls.

Even though we detect substantial change in rural Pakistan because of the increased presence of private schools and we acknowledge the possibility of efficiency gains through private-sector involvement, our results are less enthusiastic than Alderman, Orazem, and Paterno (2001) on this front. First, while private schools rank better on some dimensions of school quality (such as school amenities), they fail in other dimensions, such as share of teachers with a teaching certificate. With the data at hand, we are not in a position to determine which characteristics are more important—this would require not only an analysis of enrollment but also a focus on duration of schooling and learning—but clearly private schools are not superior to public schools in all relevant dimensions. Second, we find little evidence that private-school availability increases overall enrollment in rural areas where a public school is already present. Instead, it appears that private schooling provides a preferred alternative to public schooling for some parents.

As a result of our findings, we question the generalizeability of the conclusion drawn by Alderman et al., which they base on an elaborate (primary-school enrollment) analysis of an urban Pakistan sample, suggesting “a substantial public return from increasing private-sector delivery of schooling services to poor families” (p. 306). This conclusion is particularly questionable in the case of a country like Pakistan, where no more than a third of the population is estimated to live in urban areas (United Nations 2001b), where parents prefer single-sex schools, and where basic enrollments for girls still lag substantially behind those for boys. Our results suggest instead that increasing the availability of public girls’ schools and improving their quality in villages where all-girls public schools already exist can have an enormously beneficial impact on the primary enrollment of girls.



## **Appendix 1** Quotes from parents about school quality and school choice

Examples of negative comments on school quality:

“The schools have buildings but no other facility is available there (for example, electricity, furniture, or rugs to sit on).” (male, age 47)

“Teachers try to teach well. But teachers are not local, and they come from far-flung villages, so they cannot get to school in time. They have to face great problems during rains.” (male, age 43)

“Teachers do not give proper attention to the children. Even though they come to school regularly, they do not teach properly. You see, just a month is left, but teachers have started no preparation for examinations. They do not teach throughout the year, and when examinations are close they start punishing children. What is the use of this punishment?” (female, age 31)

“Earlier, teachers taught with dedication and children worked hard as well. But now teachers pay no attention toward teaching, and consequently primary pass kids cannot even write a letter.” (female, age 33)

Examples of positive comments on school quality:

“I feel these days education is better as compared to [the] past. Earlier, there was no uniform but now children wear uniforms. Now children have to be punctual and regular at school.” (female, age 31)

“As both male and female teachers are regular so the students study, in [the] case of absence of [the] teacher how can students study. [The] female teacher resides in the same village, so they are regular.” (male, age 52)

“Earlier, teachers had to come from far-off areas and wanted to get themselves transferred. But now teachers come from nearby villages so the studies are getting better.” (male, age 52)

Several parents in districts with high enrollment rates commented on improvements in the quality of schooling in the community since the advent of private schools:

“Now, [the] standard of education has improved due to private schools. It has declined in government [public] schools.” (male, age 43)

“Now government schools concentrate on the education due to a sense of competition with private schools. Both try to show good results. This competition has brought a great change, and I like it.” (female, age 30)

Examples of positive comments on private schools:

“Because the private schools charge higher fees, the teachers teach with concentration and parents send their kids to the school regularly, as they pay a price for them.” (female, age 33)

“Government schools have more leaves [days off], and they are irregular as well. The private schools have fewer leaves, only on Sunday. In government schools, teachers, including the students, take unnecessary leaves, for instance on the events of birth and death. It causes irregularity.” (female, age 23)

“In private schools parents have contact with teachers, while in government schools parents rarely contact the teachers.” (male, age 35)

“I think private schools are successful due to the sense of competition. Private schools have both male and female teachers who compete with each other and try to show good results, so consequently the studies are better there.” (male, age 40)

“The child is happier in a private school because of good syllabus, environment, and teachers. The children are neat and clean there. Therefore, children are happier in that kind of environment.” (male, age 39)

“People prefer English education because in Pakistan, people who know English get a job quickly, and everywhere English is given preference.” (male, age 35)

Examples of negative comments on private schools:

“I think government teachers can fully devote themselves to the teaching if they are checked but teachers in private school are not checked, there is no one to ask them.” (male, age 39)

“I mean, if a Nawab [ruler] establishes a school, then it is for the Nawabs [elites]. While the government school is equal for all, including poor and well-off people.” (male, age 35)

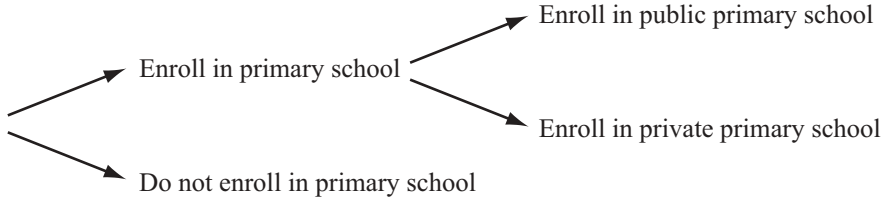
“Education is better in government schools because teachers concentrate on teaching. I feel the teachers of private schools are incompetent in their teaching . . . I teach in a government school. When the students of private schools come to us, they are incompetent. Parents just want their kids to learn English, so they enroll the kids in private school.” (female, age 40)

“I feel these days private schooling has become a business. They employ under-matric teachers [teachers who have not completed ten years of schooling] who are paid 500 rupees per month. These teachers do not know how to teach properly. Above all, they have a single English book while the rest of the books are in Urdu. They just display the board [curriculum] of English medium schools; otherwise studies are of no use. Government schools are better in terms of education, as they charge low fees and even the poor can educate their kids in those schools.” (female, age 37)

A few parents saw the flaws in both types of schools:

“Private schools are a source of earning. They charge higher fees, but do nothing. However, the situation in government schools is worse than in private ones. The only advantage in government schools is that education is free of cost there.” (male, age 37)

## Appendix 2 Decision tree and maximum likelihood function



### Maximum likelihood function

The estimation is carried out in Stata and the terminology used here is based on the way Stata sets up the model.

Probability of observing an enrollment (first-level choice, indicated as  $f$  below) – school choice (second-level choice, indicated as  $s$  below) outcome,  $P_{fs}$ , is

$$P_{fs} = P_{s/f}P_f$$

where  $P_f$  is the probability expression for school enrollment and  $P_{s/f}$  is public/private school choice conditional on school enrollment.

The formulas are

$$P_f = \frac{e^{\alpha'Y_f + \tau_f I_f}}{\sum_m e^{\alpha'Y_m + \tau_m I_m}} \quad P_{s/f} = \frac{e^{\beta'X_{fs}}}{\sum_n e^{\beta'X_{fn}}}$$

where inclusive value,  $I_f$ , is defined as

$$I_f = \ln\left(\sum_n e^{\beta'X_{fn}}\right)$$

Indexing children in the sample by  $i$ , the likelihood function to be maximized is

$$\prod_i P_{fsi}$$

## Notes

- 1 Ghost schools are schools that are registered and receive financial allocations but, in fact, do not exist.
- 2 Differences in private school enrollment between the two age cohorts are statistically significant.
- 3 We also visited 12 primary schools located outside the village perimeter that were attended by more than two children in the sample. These are not included in the analysis because our focus for this analysis was on the supply of physically proximate schools within the village.
- 4 Community development is measured with an index that awarded 1 point for the presence of each of seven elements within the primary sampling unit (PSU): (1) a paved road; (2) public transport within the PSU; (3) sewerage; (4) electricity; (5) telephone; (6) natural gas; and (7) paved streets. (No community had all seven elements. Scores ranged from 0 to 6, with 4 as the median.)
- 5 An alternative approach might have been estimating conditional logistic regressions—that rely on the independence of irrelevant alternatives (IIA) assumption—as opposed to nested multinomial logit model that does not require the IIA assumption. The IIA assumption is tested through comparing conditional logistic regressions for the full specification and for a model that leaves out the do-not-enroll category (Hausman and McFadden 1984). We have seven alternative specifications, and because each specification is run separately for boys and girls there are 14 sets of estimates. In nine of them the IIA assumption is rejected at the better than 5 percent level; in only three cases is the IIA assumption not rejected at the 10 percent level (the test statistics are reported in tables in which the estimates are presented).
- 6 Alderman, Orazem, and Paterno (2001) report the same result for their sample.

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