How does demand for private schooling vary across locations with different private school supply? Analysis of data from Rural India

Amita Chudgar[1] and Benjamin Creed[2]
College of Education
Michigan State University

Working paper: version February 2014

Abstract

The literature argues that families who exercise their ability to choose private schools tend to be better off, more educated, and more informed. There is also some evidence that private schooling may be demanded disproportionately for male children in the Indian context. As more private schools become available across India, will these differences in family attributes and child demographics of those who do and those who do not access private school diminish? Using a nationally representative dataset from rural India, we find that these gaps in private school access, especially at the lower-primary level, may persist or in some cases even widen.

[1] Associate Professor, Educational Administration, College of Education, 620 Farm Lane, 408, Michigan State University, East Lansing, MI 48824, USA. amitac@msu.edu

[2] Doctoral candidate in Education Policy and IES Economics of Education doctoral fellow, Creed's work on the paper was supported by a Pre-Doctoral Training Grant from the Institute of Education Sciences, U.S. Department of Education (Award #R305B090011) to Michigan State University. The opinions expressed here are those of the authors and do not represent the views of the Institute or the U.S. Department of Education.

1. INTRODUCTION

The private school sector in India has grown rapidly in the last decade or so (e.g., Mehta, 2011; Srivastava, Noronha, & Fennell, 2013). The Right to Education bill enacted by Parliament in 2009 is meant to further increase the private school choices available to Indian parents. The literature argues that families who exercise their ability to choose are systematically different from those who do not. Families who exercise their choice tend to be better off, more educated, and more informed. There is also some evidence that private schooling may be demanded disproportionately for male children in the Indian context. As more private schooling options become available across the country, will these differences in family attributes and child demographics of those who do and those who do not enroll in private school diminish? In other words, do gaps between the rich and poor or between male and female students in private school enrollment diminish with greater availability of private schools? This is the question we hope to explore.

The ideal dataset to answer this question is longitudinal in nature, where the growth over time in the availability of private schools can be observed alongside the changing demand for private schools. To our knowledge, only one longitudinal dataset from India—*Young Lives*—is currently available, but it is limited by its focus on one Indian state. Therefore, we decided to use a nationally representative cross-sectional dataset in this study. We utilize the existing variation in private school presence across more than a thousand villages to observe how the gaps between rich and poor or male and female in private school enrollment across such villages are different. There is one additional challenge this analysis must contend with however: literature indicates that the supply of private schools may not be random. We address this concern by conducting a two-step analysis where we first predict village private school supply using a series of village covariates and then use this predicted value of private school availability to understand variations in private school demand for different subgroups.

2. RELEVANT BACKGROUND AND LITERATURE

School enrollment in India has increased tremendously in recent years, moving from nearly 25 million non-enrolled children in 2003 to less than 8 million in 2009 (World Bank, 2011). According to more recent official reports at the primary school level, India might have reduced these numbers even more drastically to about 1.37 million non-enrolled as of 2012 (National University of Educational Planning and Administration [NUEPA], 2013). As more

students enroll, greater pressure is exerted on the government-run system to absorb the influx. Private schools that may be accessible to the broader population and not just the most affluent have at the same time increasingly emerged as an alternative to the government system. Researchers argue that the growth in private schools reflects at least in part the parents' demand for greater choice as they grow increasingly dissatisfied with the government school systems (Kingdon, 2007; Muralidharan & Kremer, 2006).

In the brief review of the literature below, we explore several related aspects of this dynamic context. We begin by discussing the private school sector in India, the inherent heterogeneity in this sector, and its recent growth. Next, we discuss the Right to Education (RTE) Act and its potential implications for increasing the supply of private schools to provide the reader with some additional relevant context. We note that even though RTE might have made more private school seats available, not all families are benefiting equally from this growth. Following on that, we turn to a brief discussion of who enrolls in private schools. Finally, we note that just as the decision to enroll in private school is non-random, so too is the private school's decision to locate in a particular village or location. It is at the intersection of these two non-random phenomena that our study is situated, and that is where we conclude the literature review.

(a) Private schools in India

The private school sector in India is heterogeneous, incorporating a few different arrangements under the broad umbrella term (Mehta, 2005, 2011; Pal & Kingdon, 2010; Srivastava et al., 2013 provide more detailed discussions of these differences). There are private schools that receive government funding, also known as "aided" schools. There are private schools that do not receive any government support; these are the "unaided" schools. The unaided schools may further be "recognized" or "unrecognized." Schools are granted the "recognized" status when they meet certain basic infrastructural, curricular, and teaching norms. Finally, cutting across both recognized and unrecognized unaided private schools are "low-fee private schools" which are also growing in popularity (Tooley & Dixon, 2003). Nationally, around 17 percent of all schools are private unaided schools and 5 percent are private aided schools (NUEPA, 2013). The private unaided schools enroll 27.48% and the private aided schools enroll 5.53% of the total student population (NUEPA, 2013).

A recent comparison of India's National Statistical Survey Organization data from 1995–1996 to 2007–2008 shows how private enrollment numbers have grown in the recent years (Srivastava et al., 2013). In rural areas, for instance, at the primary level 20 percent of boys are likely to be enrolled in private schools, an increase of 12 percentage points since 1995–1996. In comparison, close to 16 percent of girls are likely to be enrolled in private schools, an increase of 8 percentage points over the same time period. Similarly, in urban areas, there was a 40 percentage point increase in boys' private school participation; now 60 percent of urban boys are enrolled in private schools at the primary levels. For girls, the increase is 36 percentage points and now 57 percent of urban girls are enrolled in private schools, compared to 21 percent in 1995–1996. Especially relevant to this paper, these data also reveal that in spite of a general increase in private enrollment, girls and rural children are less likely to enroll in private schools compared to boys and urban children.

(b) Right to Education Act: Important but unrealized promise?

The recent passage of the Right to Education (RTE) Act is likely to further change the landscape of this competition. Indian parliament passed the Right to Education (RTE) bill in August of 2009. This bill is the first national law to provide specific legislation giving children ages 6–14 the right to free and compulsory education at a neighborhood school up to the 8th grade. Relevant to this paper is the RTE mandate about school choice. According to Section 12 of the bill, all private schools (regardless of their funding) must reserve at least 25% of their seats for disadvantaged children in their local community. The bill notes that these schools "shall admit in class I, to the extent of at least twenty-five per cent of the strength of that class, children belonging to weaker section and disadvantaged group in the neighbourhood and provide free and compulsory education till its completion" (Ministry of Law and Justice [MoLJ], 2009, Section 12, subsection c). Essentially RTE provides vouchers to the disadvantaged students who apply for and are granted a seat in the private schools. These vouchers are funded by the state and central governments; they cover private school tuition as well as some school supplies for the disadvantaged or scheduled caste/tribe children (MoLJ, 2009).

Given that private schools are not accessed equally across different social groups, in theory the idea of increasing private school supply for disadvantaged children is equity-enhancing and desirable. Yet, in practice it is far from clear how private schools are responding to the new mandate and how the disadvantaged parents are exercising their choice. There are

some not so surprising indications that the elite private schools are not happy with the new act (for instance, Bhatty, 2013; Singh, 2013; TNN, 2012) and this has even led to largely unsuccessful litigations from private schools (for example, Mahapatra, 2012). A recent article in *The Indian Express* (Singh, 2013) noted that private schools are finding ways around the 25% seat reservation clause. March 31st, 2013, marked the first major deadline laid out in RTE—the goals laid out in the bill were to have been met by this date. However, as of that date, only 18 out of 28 states had submitted reports claiming to have met the goals; experts have substantial skepticism about the validity of the submitted reports (Bhatty, 2013).

Other recent newspaper headlines further indicate that the act may fail the children and parents it was intended to benefit as "many below poverty line families (are) unaware of Right To Education provisions" (Saini, 2012). These newspapers also note that a large number of private schools seats made available due to RTE are actually lying unclaimed by these disadvantaged parents (*The Financial Express*, 07 May 2012). While the response of private schools is easier to understand, it is more intriguing to note that families are still not uniformly able to benefit from greater choice. So we next turn to understanding who currently demands private schooling.

(c) Private school demand: Who enrolls in a private school?

While parents may overall increasingly choose private schools, in the discussion thus far we have also noted that gaps between, for instance, male and female private enrollment have persisted. Similarly, the mere passage of RTE has not ensured that the poorest are now accessing private schools. Here we briefly discuss the evidence with regard to who traditionally chooses private schools.

(i) Families who select private schools tend to be better-off

In a recent paper utilizing a nationally representative data from India, Chudgar and Quin (2012) illustrated the systematic differences between families who enroll in private schools, across urban and rural India. For instance, they noted that rural families who enrolled their children in government schools had a household income of around 35,000 rupees, which was half that of families with students in private unaided schools. Similarly, the highest adult education levels or asset levels were all almost twice as much in private school families. A similar pattern was noted in urban areas, indicating wide socioeconomic disparities between these two types of families. Woodhead, Frost, and James (2013) provided support to these

observations using the longitudinal *Young Lives'* data, which followed two cohorts of students, born in 2001–2002 and 1994–1995, from the state Andhra Pradesh.

In fact, the gaps between public and private school families seem to persist even when focusing on families of children who attend the less expensive, "low-fee" private schools. In a survey of 250 households and 26 school visits in rural Uttar Pradesh, Harma (2009) noted that parents of different backgrounds indicated a similar preference for low-fee private schools; however, low-fee private schools remained out of reach for the poorest and those from scheduled castes. Evidence from the same household survey and school visits also indicated that enrollment in low-fee private school is related to parental occupation, parental education levels, and aspirations. Overall then, these families who are choosing private schools—and yet are clearly price conscious—tend to be comparatively more educated and wealthier than families who send their children to government schools (Harma, 2009, 2010, 2011).

Chudgar and Quin (2012) found similar evidence in their nationally representative data. In both the rural and the urban contexts, they created a proxy for low-fee private schools based on the maximum cost of attending a government school in the district. The results confirmed that these less expensive private schools were patronized by families who were much better off than families whose children attended government schools.

(ii) Potential male bias in private school enrollment

Within families who exercise choice, data indicated a potential, systematic bias in favor of the male child (e.g., Azam & Kingdon, 2013; Maitra, Pal, & Sharma, 2011; Pratham, 2012; Woodhead et al., 2013). Researchers have explored this male bias in a few different ways in the literature. Studies like the ASER report provide a descriptive national sense of private school enrollment across rural India, which indicate that girls are less likely to enroll in private schools (Pratham, 2012). Woodhead et al. (2013) also provided descriptive evidence, but because of the unique longitudinal nature of their data, they were able to offer several additional insights. They found that at younger ages, private school enrollment of boys and girls looks similar. But as children get older, around age 10 or as they leave primary school, gender gaps begin to appear and widen in urban areas. In rural areas, the gender gap begins and remains persistent through younger ages, but like the urban area it widens as the children get older. In fact, they noted that in the younger cohort, the gender-based differences in private school enrollment may have increased. Maitra, Pal, and Sharma (2011) used a nationally representative dataset and found

that the female disadvantage in private school enrollment continues even after accounting for differences in the home background and the school enrollment decision.

Similarly, scholars have found indirect evidence of female disadvantage in terms of differences in educational expenditure on male versus female children. Azam and Kingdon (2013) used a nationally representative dataset and applied a hurdle model to study enrollment and expenditure decisions for male versus female children. They found that at primary and middle school age groups, the key difference between boys and girls appeared to be not in terms of enrollment decision, but in terms of expenditure decisions. They noted that disproportionate enrollment of boys in private school may be key in explaining these patterns. Bhatkal (2012) added a further nuance to these patterns. She found not only a widening male-female private enrollment gap but also a male-female educational expenditures gap, even after a female was enrolled in a private school.

(d) Private school supply may be uneven and non-random

Just as "who" chooses private school is a non-random phenomenon, there is some evidence that the choice of "where" may also be non-random. For instance, Pal (2010) used data from five northern Indian states from the PROBE survey to determine if the development level of a village correlates with private school establishment. She found that villages that have a better infrastructure—such as concrete roads, piped water, electricity, phone lines, and postal services—and low quality government schools are more likely to have private schools. Using ASER 2009 data from rural India, Chudgar (2012) also found that the presence of private schools is associated with higher levels of public infrastructure, greater availability of both private and government services, better roads, better access to electricity, and somewhat surprisingly a stronger government school system. Andrabi, Das, and Khwaja (2008) discussed the association between private school establishment and village characteristics using data from Pakistan. They also suggested that private schools locate in larger villages, with better infrastructure. They further noted that these are likely to be villages where previous investments were made in girls' secondary education, which in turn provides a pool of potentially inexpensive teachers for private schools today.

Contrary to these studies that focused on villages, Rangaraju, Tooley, and Dixon (2012) argued that private schools are geographically available to all residents of the city of Patna, in Bihar, India. They conducted a street by street survey of Patna, collecting GPS data on the

location of both government and private schools, and found that nearly all government schools had at least 10 private schools within a one kilometer radius. This suggests that the unevenness described in the above studies is likely more relevant in the more rural contexts of India, where our study is situated.

Through the data, we see that socioeconomic and male-female gaps in private school enrollments are present and persistent in India. It is thus informative to understand how these gaps may diminish (or widen) with an increase in the supply of private schools. In this paper, we examine this question by studying what has tended to happen in villages with varying levels of private school presence. This question is interesting in its own right, and especially interesting in light of the recent passage of RTE bill. The findings from this paper cannot and should not be seen as an attempt to evaluate RTE; the data we use are pre-RTE, so any such claim is plainly infeasible, yet the results may have some potential to inform the RTE conversation.

3. DATA & VARIABLES

We utilized the India Human Development Survey I (2004–2005), a nationally representative survey of 41,554 households. The sample covered 384 districts from 33 states and union territories in India and provides data from both rural and urban India. In these data, villages and urban blocks formed the primary sampling unit, from which households were selected. In addition to collecting extensive information on the individuals within the surveyed household, the data provided detailed information on 1,503 villages. The availability of individual data from the household allows us to model family decisions to enroll their children in private school. The presence of extensive village covariates, including the availability of schools in the village, allows us to model the presence of private schools. Unfortunately, we do not have similar data for urban blocks, and thus our analysis is limited to rural India. Overall, these data compare well with other national surveys—including the census—in terms of various demographic, social, and religious groups represented (NCAER & University of Maryland, 2011). Researchers have used these data for several related studies on India in the recent years, including four studies cited by us in this paper (Azam & Kingdon, 2013; Chudgar & Quin, 2012; Maitra et al., 2011; Pal et al., 2013).

For our analysis, we decided to focus on children in lower primary and upper primary groups, as defined by the respective states. According to the National University of Educational Planning and Administration (2013), 11states in our dataset treat grades 1–4 as lower primary

and grades 5–7 as upper primary. In 22 other states, grades 1–5 are treated as lower primary and grades 7–8 are treated as upper primary. For each state in our sample, we identified children who were in either upper or lower primary as defined by the state. Our final sample included 16,456 children in lower primary and 7,067 children in upper primary as defined by their states from 1,279 villages.

(a) Variables from the individual dataset

The various analyses conducted for this paper included analysis of a series of variables from the individual and the village dataset. In Table 1, we provide details on the individual variables.

(i) Defining private school demand

Private school demand or simply private school enrollment data were obtained from the individual dataset on the 23,523 children who are the focus of this study. As we have noted earlier, private schools may be unaided or aided. A case can therefore be made for treating private aided schools as fundamentally different from private unaided schools when comparing public and private schools (e.g., Kingdon, 2007). With this in mind, we created two categorical enrollment variables.

One variable groups the schools available into private and public (private=1 and public=0), where private includes the children in private unaided school (including a very small fraction of children who attend convent schools) and 500 or so children from private aided schools. The public category includes children in government schools, including a very small fraction of children who report enrolling in government-run education guarantee scheme (EGS) schools. We identify this variable as PVTDD throughout this study. We use this approach to define demand primarily because it likely aligns better with our private supply variable discussed below. We also define an alternate demand variable where the private category does not include children from private aided category. We call this variable PVTDD-NAP.

(ii) Child and home variables used to explain variation in private school demand

In order to account for individual attributes of the child, we take into account the child's gender, age, and the current grade in which the child is enrolled. We also include information on the caste of the child, identifying if the child belongs to the Other Backward Caste (OBC), or the Dalit and Adivasi (Scheduled Caste and Scheduled Tribe) group. The dataset offers a series of variables on the child's family as well. For this analysis, we included variables that are

associated with the household's economic well-being and education levels as two key correlates of school choice. We include information on household assets (as a measure of household wealth), a variable indicating household income. We accounted for the education level of the head of the household, a categorical variable that indicated if the head had no education (since a significant portion of the household heads in our sample have no education), less than 5 years of education, more than 5 years but less than 10 years of education, or more than 10 years of education. We also included a variable that indicated if the head of the household spoke any English (little to fluent) as an additional proxy measure of the family's socioeconomic status. In addition, we use a variable available in IHDS indicating the highest level of education attained by a woman over the age of 21 in the household. Finally, we include measures of household size and the number of dependents by accounting for the number of adults and children in the family.

(b) Variables from the village dataset

We utilized a range of village variables for the analysis to predict variation in private school supply. Details on these variables are in Table 2.

(i) Defining private school supply

Private school supply or simply a variable indicating the presence of private school in the village was obtained from the village-level dataset. The IHDS survey reports on the discrete number of private lower primary (or primary) schools and private upper primary (or middle school) schools in each village. Thus for each village we had two count variables PVTSS-L, or private school supply lower primary and PVTSS-U, private school supply upper primary. These village-level data do not distinguish between private aided and unaided schools.

(ii) Village attributes used to predict variation in private school supply

The variables used to capture the village information can be grouped into five general categories: village education levels, overall village infrastructure, government infrastructure, private infrastructure, and public schools available. Based on the literature reviewed earlier, these variables seemed suitable to provide a representation of the village circumstances that may facilitate the establishment of private schools. The measure of average male and female adult education in the village served as an overall indicator of village mean level of education. The overall village infrastructure measures included various measures of ease of transportation and access including, the availability of a pacca (drivable) road, availability of bus stops and railway stations, and the frequency of bus stops in the town. Under this measure we also included

variables indicating the percentage of families with electricity, landline phones, and the town's overall access to mobile phones and telephone lines. Finally, under this umbrella we included the number of total households in the village as an additional measure likely associated with the infrastructure available and we also accounted for the presence of a non-governmental organization (NGO) in town.

We identified a separate set of village indicators as "government infrastructure" variables. These consisted of the presence of a postal services, a police station, a fair price shop, a mahila mandal (a women's group), a public anganwadi (early child care center), and a public primary health center. The presence of a bank, long distance calling booth, a market or a general market, a private early child care center, and a private health clinic made up the private infrastructure of a village. We also included the presence of public lower and upper primary schools, as well as the presence of government girls' schools, to account for the overall presence of the government in the education sector.

4. METHODS

The analysis of primary interest to this paper is estimating variation in private school demand for different subgroups, given varying levels of private school presence. We begin by analyzing a straightforward probit model where private school demand is modeled as a function of relevant covariates and given private school supply in the village.

$$(PVTDD) = f(\mathbf{CF}, PVTSS) \quad (1)$$

In equation (1) **CF** is a matrix of the child and family covariates listed in Table 1. By estimating equation (1) at different grade levels (PVTSS-L and PVTSS-U) and using the two different private school demand measures (PVTDD and PVTDD-NAP), we generate different estimates of the relationship between private school supply and demand. Each of these models corrected for clustering of children within village to generate robust standard errors and used appropriate sample weight to generate these estimates. For the ease of exposition, going forward we refer to this as the "baseline" approach.

The challenge with the "baseline" approach is that the coefficient estimating the relationship between private school demand and supply is likely to be biased. As we discussed earlier, private school supply is itself non-random. Villages with higher income levels, overall wealth, higher levels of male and female education, or a greater proportion of English-speaking adults may both invite more private school establishment and may also be the types of villages

where private school demand is high. Given the potential endogeneity issue, we could employ a two-step estimation technique—two-stage least squares. In other words, we would first estimate equation (2) separately for PVTSS-L and PVTSS-U, where **VILLAGE** is a matrix of village

$$(PVTSS) = f(\boldsymbol{VILLAGE}) \quad (2)$$

covariates listed in Table 2. We would then use the predicted private school supply values from equation (2) in the private school demand equation (1) as an instrument. However, given the categorical and count nature of our dependent variables, or the non-linearity of the outcomes in both equations (1) and (2), the usual interpretations of linear 2SLS will not apply (Cameron & Trivedi, 2005, p. 199). Unable to use the standard instrumental variable approach, we analyze the data in two different ways, where each approach has its own limitation. While neither of these approaches allows us to argue causality they each provide some improvement over the "baseline" analysis.

(a) Private school supply linear and private school demand non-linear, Control Function approach

In the first approach, we treat private school supply (the endogenous regressor) as non-discrete or linear. This then allows us to use the "control function" approach to estimate school demand using binomial probit models (Lewbel, Dong, & Yang, 2012, p. 8). Using ordinary least square (OLS) regression we estimate private school supply equation (2) as a linear function of the village covariates. We use the residual from this regression, along with the given private school supply, to estimate equation (1) as a probit model. For this approach, we calculated the bootstrapped standard errors as recommended by Wooldridge (2010, p. 157–160).

(a) Private school supply non-linear and private school demand-linear

In the second approach, we used a count model to predict private school supply in equation (2) (Cameron and Trivedi, 2005, p. 193). We treated private school demand as a linear function and estimated equation (1) using OLS with correction for clustering of children within village and appropriate sample weights. This is essentially estimating a Linear Probability Model (LPM) with an instrumental variable (Lewbel, Dong, & Yang, 2012, p. 1). The LPM has some important limitations, yet, to "approximate the partial effects of the explanatory variables" (Wooldridge, 2010, p. 563) or to estimate "marginal effects" (Angrist & Pishke, 2009, p. 107) the LPM approach seems to work adequately.

To select an appropriate count model for equation (2) in this approach, we estimated both Poisson (PRM) and Negative binomial regression (NBRG) models. NBRG, unlike PRM, allows for over-dispersion, or for the mean to be larger than the variance for the private school supply variable. We compared the fit for both these approaches using "estimates table" and "countfit" in Stata as recommended by Long and Freese (2006). The "estimates table" approach showed that z-values associated with the estimates produced by NBRG were smaller, indicating over-dispersion in the data. Similarly, various tests and fit statistics generated by the "countfit" approach also indicated a "very strong" preference for NBRG in favor of PRM. Thus we concluded that NBRG models provided a better fit for our data. For the ease of exposition, we refer to this as the "NBRG-LPM" approach.

(b) How does demand for private schooling vary across different subgroups when private school presence varies?

Each of the approaches described above, the "baseline" approach, the "control function" approach, and the "NBRG-LPM" approach will provide coefficients that quantify the relationship between private school supply and demand with varying assumptions. However, a final step remains, which is to understand how the relationship will vary across different sub-groups. In order to answer this question, we decided at the outset to focus on the following sub-group comparisons; male-female private enrollment, private enrollment of children from highest and lowest wealth quartile, private enrollment of children belonging to different caste groups, private enrollment for children of highly educated parents and for children of parents with no education, and finally we also compared private enrollment of children whose household head does and does not speak English.

The baseline and control function approaches both estimate a probit demand model. Therefore, in these cases we are able to use the intuitively more straightforward option of generating the predicted probability of private school enrollment for different subgroups using the "prgen" command in Stata. This command allowed us to calculate predicted probabilities of private school enrollment or private demand for different subgroups at different levels of private school supply. We allowed the private school supply to range from 0–4. Since 97.3% and 98.9% of all villages have between 0 and 4 private lower and upper primary schools, respectively this range of private school supply seemed appropriate. (In fact, a more conservative range simply from 0-2 might have also been appropriate for this analysis as nearly 92 to 97% villages

have two or fewer lower and upper primary private schools respectively). For the NBRG-LPM approach where private demand is calculated using the LPM, calculating predicted probabilities made limited sense since probabilities calculated by LPM may exceed the bounds of 0–1; in this case we relied on interaction terms to identify significant interactions between private school supply and different sub-groups.

5. RESULTS

(a) Descriptive analysis

In Tables 1 and 2, we present the descriptive data for the individual and village-level variables, respectively, used in the analyses. In the first two columns of Table 1, we find the means or frequencies of students enrolled at government or private unaided schools (and convent) in lower primary or upper primary schools. Columns 3 and 4 include the same statistics but also include private unaided students. Including students who attend private aided schools increases our sample by 555 students, but overall the data remain similar across these two definitions of the dependent variable. Table 1 reveals that students who make it to upper primary school are from smaller, more educated, and better-off households where the household heads are more likely to speak some English. While the overall occurrence of female-headed households is low, 3.1% and 2.5% for the two levels, upper primary school students are slightly less likely to come from such a household. In summary, those who enroll in any upper primary schools are a systematically different subset of families who enroll in lower primary school.

Table 2 contains the mean characteristics and available infrastructure for the 1,279 village in our sample. On average, villages are likely to have more government schools than private schools at both lower and upper primary levels which is not unexpected. Villages typically have more than one lower primary government school; in fact, only 55 villages do not have a lower primary government school in our data. However, government upper primary school availability is not at the same level. The supply of lower primary private schools ranges from 0 to 15 and upper primary private schools from 0 to 7. Looking at Table 2, we can see that the average village education level of adult males is nearly twice that of females. Overall, a fair number of villages either have access to or are within 5km of a number of resources as well as public and private infrastructure. Yet it is also worth noting that basic facilities such as healthcare, electricity, or modes of communications are not universally available across all Indian villages.

(b) Estimating private school supply

As we noted earlier, we estimated private school supply using linear (OLS) and a non-linear (NBRG) models. These results are provided in Table 3. The first two columns contain the OLS results and the last two the NBRG results. For the NBRG results, confirming what was discussed above, we see that our likelihood-ratio test has a large, statistically significant χ^2 statistic indicating that the data are over-dispersed and better described using a NBRG model than a PRM.

The results from both estimation approaches confirm the non-random presence of private schools. There are some differences between the OLS and NBRG models in terms of significance, but overall the two approaches are in agreement. They indicate that private primary schools do not establish randomly and are in fact associated with various village characteristics. Overall, it also appears that the establishment of upper primary schools may be somewhat more sensitive to the presence or absence of village characteristics than are private lower primary schools. Both upper and lower primary private schools are more likely to be found in villages with access to drivable roads, mobile phone connections, public health clinics, and general markets. The presence of early child care centers, long distance phone booths, post-office, general markets, home phones, and frequency of bus connection to the village are also significantly and positively associated with private school supply in different specifications.

Larger villages with many households, villages with more educated men, and villages with government girls' schools and government upper primary schools also enjoy greater private school supply. Interestingly, the only village attributes that are negatively associated with private school presence are the average female education of a village and the presence of a women's group (mahila mandal). We are estimating the "impact" of these variables after accounting for an extensive range of village variables, so it is hard to tease out the nature and extent of these relationships; nonetheless, at first-glance these associations are counter-intuitive and deserve further exploration.

(c) Estimating private school demand

For the sake of simplicity, we focus this discussion on PVTDD; the results using PVTDD-NAP as the outcome variables are similar and are presented in the appendix. Table 4 contains the results of estimating private school demand using the three approaches at lower and upper primary levels. As the note below the table indicates, the key difference in each approach

is how private school supply has been measured or obtained. In addition, we estimated private demand using a probit model to generate the baseline and control function approaches in columns 1–4. For the NBRG-LPM approach in columns 5 and 6, we treat private demand as linear. The first four columns thus contain the probit regression coefficients for the independent variables and the last two contain the point estimates.

The results from Table 4 overall are as expected, based on the literature. The results from all of our models are remarkably consistent in terms of statistical significance and the direction of the relationship. An increase in private school supply is associated with increased private school demand. Not surprisingly, villages with more private schools have more children enrolling in private schools. Being female or from a scheduled caste or tribe (Dalit or Adivasi) is consistently associated with a lower likelihood of enrollment in private school at any level, all else equal. Through the CF approach, we also find a negative association between belonging to the Other Backward Caste (OBC) group and enrollment in private elementary school. Households where the head has more than 10 years of education, or where the head can speak little to fluent English, are also more likely to enroll their children in private schools. Similarly the education level of the highest adult female in the household is also positively associated with greater likelihood of enrollment in private elementary schools.

Increases in income and assets are associated with a greater likelihood of enrollment in private schools as well, thus confirming the importance of income and wealth in private school decisions. Families with more children are more likely face greater resource constraints and appear to be less able to enroll their children in private schools. For lower private primary education, both the CF and LPM approaches indicate that older children are more likely to be enrolled in private schools; the pattern does not hold for upper primary students. Overall, the table confirms the patterns observed elsewhere in the literature. Private school enrollments differ by gender, income, wealth, caste, and education level of the household head as well as the ability of the household head to converse in English, where such ability may be seen as a proxy measure for a family's social status, connections, and access to information. How do these private school enrollment differences change across villages with more and less availability of private schools? That is the question to which we now turn.

(d) How does demand for private schooling vary across different subgroups when private school presence varies?

As we noted in the methods section, we address this question by estimating interaction effects in the NBRG-LPM approach and by estimating predicted probabilities in the baseline and control function approach. We ultimately prefer the control function specification as it both corrects for non-random allocation of private schools (which the baseline approach does not) and allows for a more intuitive exploration of the results (which the NBRG-LPM approach does not).

For the sake of completeness, we discuss the NBRG-LPM and the baseline approach briefly and then turn our attention to the results from the control function approach. In Table 5, we can see the results of various interaction effects estimations. In particular, we ask if private school supply interacts with a child's gender, caste, head's English-speaking ability, head's education level, and wealth of the family. Per the data in Table 5, at the lower primary level, interactions between head's English-speaking ability and private school supply and between the head's education level and private school supply are both significant and positive. This indicates that for a child whose parent is more educated or fluent in English, an increase in private school supply will disproportionately increase their chances of private school enrollment.

We note a similar significant positive interaction between the head's English-speaking ability and private school supply as well as the family's wealth and private school supply at the upper primary level. This once again indicates that as private school supply increases, children from better-off families will be disproportionately more likely to enroll in private schools. Finally, we note a negative interaction between the caste group Dalit/Adivasi and private school supply at the upper primary level. This indicates that an increase in private school supply will actually further widen the gap between the Dalit/Adivasi caste group and the reference group. Overall then, reviewing the results of these interaction effects based on the NBRG-LPM approach we might infer that an increase in private school supply may either leave gaps between different demographics unchanged, or in some cases—such an increase in private school supply—further widen these gaps between more and less privileged children.

In Figures 1 and 2, we present the results from the baseline approach for lower and upper primary school levels respectively. In each graph, we present two sets of predicted probabilities for private school enrollment at varying levels of private school supply. These two sets of predicted probabilities represent the likelihood of private school enrollment for the children being compared (male vs. female, Dalit/Adivasi vs. other castes, top vs. bottom wealth quartile, etc.). In each graph, we also provide two sets of 95% confidence intervals in addition to these

two predicted probabilities, so we may judge if the differences in the predicted probabilities are statistically significant. Finally, the sixth graph in each figure shows our estimates of the predicted probability for a hypothetical case, where an "advantaged" child is compared to a "disadvantaged" child. An "advantaged" child is a male, from the top wealth quartile, with a highly educated, English-speaking parent who belongs to the other caste group. A "disadvantaged" child is a female, from the lowest wealth quartile, with an uneducated, non-English-speaking parent who belongs to the Dalit/Adivasi caste groups.

The results from the baseline approach show that as private school supply increases, the gap between several demographic groups may become statistically insignificant especially at the upper primary levels. Yet the results also reveal that as private school supply increases, the gaps between children from the top and bottom wealth quartile, and the gaps between "advantaged" and "disadvantaged" children do not diminish. In the latter case, they in fact appear to widen. Yet these results are based on an analysis that does not account for the non-random presence of private schools. So we finally turn to Figures 3 and 4, where we present the results from the control function approach which we believe is the most robust of the three approaches in this study.

In Figures 3 and 4, we highlight several interesting patterns. First, the demographic differences in school enrollment appear to be much more sensitive to lower primary private school supply than to upper primary private school supply. At the upper primary level, differences in private school enrollment by child's gender, caste, parent education, and English-speaking ability seem to be a non-issue if the village has more than one private school. In other words, if the village has more than one upper primary private school supply, we may not observe these demographic differences, all else equal. The gaps in private school enrollment of wealthy and non-wealthy children however do not seem to attenuate at the upper primary level, until the private school supply in the village exceeds three. As we noted previously however, close to 97% villages have two or less than two private schools at the upper primary level. In other words, a fairly large presence of private school supply may be necessary to completely erase these differences between children from different economic strata. The potential differences in private school enrollment of the advantaged vs. disadvantaged children are the widest and most stark. This gap remains wide and does not appear anywhere close to diminishing even when

upper primary private school supply exceeds four per village, a scenario that is unlikely to obtain under the current circumstances.

The lower primary school figures exhibit the same patterns, but they are far stronger than the upper primary results, especially if we take into account the relative improbability of finding villages with three or more lower primary private schools. The male-female gap and the gaps between children of more and less educated parents do not seem to bridge until a point where private school supply in the village reaches three to four schools per village. Even in a situation where the private school supply is as high as four schools per village, the gaps between different caste groups do not seem to attenuate. Like in the upper primary case, the wealth gaps and the gaps between advantaged vs. disadvantaged children seem to persist and widen as private school supply increases. These results overall indicate that a mere increase in private school supply, in some cases large increases in private school supply, may not be associated with diminishing demographic gaps in private school enrollments. These gaps seem to especially persist across the wealth divide and, in certain circumstances, these gap may actually widen.

6. LIMITATIONS, CONCLUSION AND DISCUSSION

Using nationally representative, cross-sectional data, this study aimed to understand if gaps between the rich and poor or between male and female students in private school enrollment diminish with greater availability of private schools in India. This question is interesting from an equity perspective, and it is currently also interesting from a policy perspective in light of the RTE act in India. Yet, as we have noted above the study cannot and should not be seen as an attempt to evaluate RTE; the data we use are pre-RTE, so any such claim is plainly infeasible.

We must also acknowledge several limitations of our analysis. First, our data limit us to rural India. As discussed above, the relative availability of private schools may systematically differ between rural and urban settings (e.g. Rangaraju et al., 2012). Other scholars have also noted the importance of studying the rural and urban context separately (e.g. Chudgar and Quin, 2012). Thus, our findings are not generalizable to urban India, where private school supply and demand patterns may be different. The other key limitation of our study is the lack of longitudinal data. We are able to exhibit what may happen at a particular point in time, all else equal. But this may be quite different when a series of events unfold over time and where both parents and the providers have the time to adjust their behaviors over longer time horizons. We hope data for such analysis will be available in the future. Finally, our systematic effort to model

the process notwithstanding, we acknowledge that establishing causality in what may inherently be a recursive process is challenging. Thus this study is unable to make causal claims.

These caveats acknowledged, the results of our analysis indicate that in rural India private school establishment responds to a variety of factors. As earlier research has pointed out we do not find that private school availability across Indian village is equitable. Such schools are more likely to establish and expand in better off, more connected, more resourced villages with an already strong presence of private and public institutions. The results thus also indicate that growth in private school supply, at least in this initial phase may not be a response to a failing public system. In fact, private schools to function may actually need a thriving public system. These strong and systematic associations also offer a note of caution against any policy measure that hopes to increase private school access for India's rural children by simply increasing the number of seats in "existing" private schools. Such schools are likely to be systematically absent from areas most in need.

The study offers another note of caution against the potential equity implications of merely increasing private school supply without commensurate changes to support and inform parental decisions. Based on this cross-sectional data analysis we find that girls, children from traditionally disadvantaged caste groups, children from poor and less educated families are less likely to enroll in private schools. This is especially true for initial, or "lower primary" private school enrollment, indicating that these gaps are especially a cause for concern as children first enter the school system. Even when private school supply is hypothetically increased, it does not immediately help to close these gaps. With more private school supply, many more girls are sent to these schools and more poor children then were previously enrolling, enroll in these schools. But, at the same time, a greater number of males and children from richer family also enroll in private schools. This keeps the overall gaps between these various groups intact or even widens these gaps. Perhaps the most telling are the gaps between a hypothetical "advantaged" child or a male, from the top wealth quartile, with a highly educated, English-speaking parent who belongs to the other caste group and a "disadvantaged" child or a female, from the lowest wealth quartile, with an uneducated, non-English-speaking parent who belongs to the Dalit/Adivasi caste groups. The gaps between these two sections of the society in terms of private school enrollment may be far from diminishing.

These results indicate that even in the relatively better-off villages where private schools may establish, the mere establishment of such a school will not change deep-seated attitudes of discriminating against a female child. Nor will such a growth result in bridging social and economic disparities in access to opportunities for all children. Why might parents continue to make different enrollment decisions, even when the seeming availability of private schools is not a problem? All else equal, the gaps between high and low wealth groups, caste groups, and families where parents do and don't speak English point to the lack of financial and social capital of these parents. In order for markets to function efficiently it is essential that both the consumers and producers enjoy "perfect information" to allow utility maximizing choices. The data we analyze here reveal that either such perfect information is not available to many Indian parents, or in spite of such information and perhaps the desire to enroll their child in a private school they are excluded from the private market for economic or social reasons. The discrimination in educational investment in a male and female child does not fit within this framework as neatly. But it does add more evidence to an already well-documented phenomenon of uneven treatment reserved for Indian female children.

In summary, these findings together raise important equity considerations as India and other developing countries consider the implications of increased private school supply. Based on these results that indicate that private school supply is not random and that even in the presence of greater private school supply, traditionally disadvantaged children do not access private schools, especially lower-primary private schools, at the same level, we must remain cautious about the promises and limitations of private schools to bridge persistent social, cultural, and economic gaps in school access in India and across the developing world. More systematic research is needed to both understand the patterns of private school establishment, and contingent upon their availability to understand how families make school choice decisions. While policymakers may not be able to orchestrate where private schools locate, to the extent that a family's ability to exercise choice is limited by lack of economic or social capital, efforts to educate and inform parents may prove fruitful.

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Table 1: Variables Means (SD) or Frequency , Individual data by grade levels

Variable name and Description	Lower Primary (PVTDD)	Upper Primary (PVTDD)	Lower Primary (PVTDD-NAP)	Upper Primary (PVTDD-NAP)
PVTDD	0.225 (.417)	0.205 (.404)		
PVTDD-NAP			0.210 (.408)	0.163 (.369)
Child age	8.400 (2.489)	12.539 (1.867)	8.407 (2.485)	12.563 (1.875)
Current grade enrolled in	2.552 (1.466)	6.600 (.947)	2.557 (1.464)	6.605 (.948)
Household Income (in INR)	41517.96 (68813.82)	45263.85 (70329.69)	41544.06 (69252.65)	45300.26 (70739.26)
Household Asset (range) [a]	8.993 (4.743)	10.124 (4.795)	8.964 (4.733)	10.055 (4.780)
%Female	0.467	0.463	0.469	0.463
% OBC	0.382	0.392	0.382	0.391
% Dalit or Adivasi	0.330	0.311	0.329	0.314
Household head's education[b]	4.344	4.890 (4.421)	4.320 (4.434)	4.855 (4.431)
% no education	0.409	0.339	0.412	0.343
% 1-5 years	0.223	0.239	0.223	0.24
% 5-10 years	0.283	0.330	0.280	0.324
% 10 years or more	0.085	0.092	0.085	0.093
% Head speak little to fluent English	0.143	0.173	0.144	0.176
% Female head	0.031	0.025	0.031	0.025
Number of children in the household	3.477 (1.694)	2.799 (1.694)	3.481 (1.680)	2.800 (1.673)
Number of adults in the household	3.140 (1.608)	3.034 (1.576)	3.141 (1.606)	3.028 (1.567)
Highest education level in the household-Female[b]	2.920 (4.025)	3.362 (4.143)	2.882 (4.006)	3.272 (4.098)
Highest education level in the household-Male[b]	5.823 (4.778)	6.307 (4.725)	5.803 (4.780)	6.268 (4.726)
Sample size	**16,456**	**7,067**	**16,170**	**6,798**

[a] The observed range for household assets are 0 - 29 for all categories.

[b] The highest education level is measured in standards completed.

Table 2: Variables Means (SD) or Frequency and Source, Village data, Sample size = 1279

Variable name and Description	Mean	Range	
		Min	Max
PVTSS-L	0.707	0	15
PVTSS-U	0.363	0	7
Average adult male (age 18 and over) education level	5.641	0	13.33333
Average adult female (age 18 and over) education level	2.984	0	15
Frequency of bus stopping in the village (times per day)	8.965	0	90
% of homes with electricity	67.5%	0	100
% of homes with telephones in them	13.1%	0	100
% village with the following in the village			
Mahila Mandal	46.9%	0	100
Motorable road	67.2%	0	100
NGO	13.1%	0	100
Private child care center	2.3%	0	100
Private Health clinic	24.0%	0	100
Public early child care center	92.1%	0	100
Public Health clinic	14.5%	0	100
With access to mobile phone service	63.5%	0	100
With access to land telephone line	81.5%	0	100
% village with the following within 5km of the village			
Bank	68.3%	0	100
Bus stop	89.4%	0	100
Fair price shop	95.9%	0	100
Long distance phone booth	85.8%	0	100
General Market	82.6%	0	100
Market	53.9%	0	100
Post office	94.6%	0	100
Police station	36.7%	0	100
railway station	18.5%	0	100
Number in the village			
Government girls school	0.109	0	2
Government lower primary school	1.698	0	18
Government upper primary school	0.742	0	6

Note: We lose two observations when we estimate private school supply at the upper primary level

Table 3: Ordinary Least Square and Negative binomial regressions estimates private school supply

	OLS		NBRG	
	Lower	**Upper**	**Lower**	**Upper**
Average adult male (age 18 and over) education level	0.061**	0.051***	0.098***	0.155***
	(0.026)	(0.016)	(0.034)	(0.044)
Average adult female (age 18 and over) education level	-0.065**	-0.051***	-0.101***	-0.134***
	(0.029)	(0.018)	(0.037)	(0.045)
Motorable road	0.182**	0.104**	0.415***	0.786***
	(0.080)	(0.050)	(0.125)	(0.179)
Frequency of bus stopping in the village (times per day)	0.004	0.003**	0.004	0.006*
	(0.002)	(0.002)	(0.003)	(0.003)
% of homes with electricity	0.000	-0.001	0.002	-0.003
	(0.001)	(0.001)	(0.002)	(0.002)
% of homes with telephones in them	0.004	0.003**	0.003	0.005*
	(0.002)	(0.001)	(0.002)	(0.003)
NGO	0.037	0.071	-0.076	0.063
	(0.103)	(0.064)	(0.133)	(0.156)
Bus stop	-0.097	-0.048	-0.170	-0.167
	(0.120)	(0.075)	(0.181)	(0.248)
Railway station	-0.064	0.011	-0.066	0.093
	(0.091)	(0.057)	(0.115)	(0.142)
With access to land telelphone line	-0.010	-0.044	0.104	0.097
	(0.102)	(0.063)	(0.171)	(0.237)
With access to mobile phone service	0.170**	0.061	0.381***	0.422***
	(0.077)	(0.048)	(0.114)	(0.151)
Post Office	0.024	0.047	0.435	1.510**
	(0.158)	(0.098)	(0.322)	(0.732)
Police station	0.006	0.013	-0.042	-0.021
	(0.085)	(0.053)	(0.111)	(0.141)
Fair price shop	-0.002	-0.120	0.275	-0.307
	(0.177)	(0.110)	(0.302)	(0.357)
Mahila Mandal	-0.262***	-0.033	-0.438***	-0.142
	(0.074)	(0.046)	(0.101)	(0.127)
Public early child care center	0.134	0.056	0.568**	0.755**
	(0.129)	(0.080)	(0.238)	(0.363)
Public Health clinic	0.327***	0.147**	0.283**	0.346**
	(0.107)	(0.067)	(0.122)	(0.147)
Long distance phone booth	0.126	-0.007	0.613***	0.244
	(0.110)	(0.068)	(0.218)	(0.285)
Bank	0.025	0.023	0.213	0.298
	(0.091)	(0.057)	(0.135)	(0.183)
Market	0.085	-0.038	0.109	-0.173
	(0.086)	(0.054)	(0.119)	(0.152)
General market	0.176*	0.166***	0.298*	0.680***
	(0.099)	(0.061)	(0.157)	(0.223)
Private child care center	0.007	0.255*	-0.373	0.151
	(0.231)	(0.144)	(0.274)	(0.287)
Private Health clinic	0.170*	0.041	0.199*	0.149
	(0.088)	(0.055)	(0.107)	(0.132)
Government girls school	0.781***	0.319***	0.633***	0.468***
	(0.110)	(0.068)	(0.117)	(0.138)
Government lower primary schools	-0.011	-0.028*	0.009	-0.014
	(0.026)	(0.016)	(0.032)	(0.037)
Government upper primary schools	0.204***	0.161***	0.221***	0.284***
	(0.056)	(0.035)	(0.071)	(0.076)
Total households in village	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-0.561**	-0.259	-4.160***	-5.928***
	(0.257)	(0.160)	(0.515)	(0.906)

Table 4: Estimating private school demand (PVTDD) using three different approaches

	Baseline Approach		Control Function Approach		NBRG-LPM approach	
	Lower	Upper	Lower	Upper	Lower	Upper
Female	-0.228***	-0.139***	-0.223***	-0.218***	-0.055***	-0.043***
	(0.033)	(0.050)	(0.026)	(0.040)	(0.009)	(0.013)
Child age	0.054***	0.007	0.038***	-0.017	0.015***	-0.001
	(0.012)	(0.018)	(0.009)	(0.011)	(0.003)	(0.005)
Current grade enrolled in	-0.176***	0.055	-0.155***	0.084***	-0.045***	0.020**
	(0.019)	(0.035)	(0.013)	(0.027)	(0.005)	(0.009)
Other backward caste	-0.037	-0.076	-0.083***	-0.113**	-0.004	-0.028
	(0.060)	(0.069)	(0.024)	(0.048)	(0.017)	(0.022)
Dalit or Adivasi	-0.156**	-0.335***	-0.324***	-0.276***	-0.032*	-0.079***
	(0.077)	(0.081)	(0.027)	(0.053)	(0.019)	(0.021)
Household head's education 1 - 5 years	0.003	0.004	0.004	-0.003	-0.017	-0.012
	(0.074)	(0.088)	(0.032)	(0.052)	(0.017)	(0.022)
Household head's education 5 - 10 years	0.066	0.126	0.064**	0.108**	0.009	0.036
	(0.061)	(0.089)	(0.031)	(0.054)	(0.016)	(0.025)
Household head's education more than 10 years	0.274***	0.279*	0.219***	0.250***	0.072**	0.085*
	(0.104)	(0.143)	(0.054)	(0.090)	(0.033)	(0.047)
Female head of household	0.056	0.114	0.028	0.115	-0.004	0.007
	(0.081)	(0.132)	(0.049)	(0.075)	(0.021)	(0.027)
Head speaks little to fluent English	0.169**	0.185**	0.256***	0.185***	0.067***	0.060*
	(0.075)	(0.094)	(0.046)	(0.057)	(0.025)	(0.033)
Highest education level in the household-Female	0.032***	0.016**	0.030***	0.028***	0.009***	0.005*
	(0.007)	(0.008)	(0.004)	(0.006)	(0.002)	(0.003)
Second quartile of assets	0.237***	0.060	0.189***	0.040	0.046***	0.013
	(0.065)	(0.098)	(0.039)	(0.053)	(0.014)	(0.023)
Third quartile of assets	0.628***	0.176**	0.462***	0.199***	0.160***	0.047**
	(0.091)	(0.088)	(0.038)	(0.061)	(0.025)	(0.024)
Top asset quartile	0.941***	0.462***	0.827***	0.472***	0.285***	0.126***
	(0.097)	(0.091)	(0.042)	(0.065)	(0.031)	(0.026)
Income	0.000***	0.000**	0.000***	0.000***	0.000***	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of children in the household	-0.041**	0.004	-0.036***	-0.024**	-0.009**	0.002
	(0.018)	(0.021)	(0.008)	(0.010)	(0.004)	(0.006)
Number of adults in the household	0.003	-0.004	-0.003	-0.019	-0.002	-0.002
	(0.017)	(0.021)	(0.008)	(0.014)	(0.005)	(0.007)
PVTSS-L	0.168***		0.276***		0.057***	
	(0.027)		(0.019)		(0.010)	
PVTSS-L residuals			-0.092***			
			(0.023)			
PVTSS-U		0.225***		0.261***		0.081***
		(0.038)		(0.037)		(0.018)
PVTSS-U residuals				0.021		
				(0.045)		
Constant	-1.294***	-1.599***	-1.185***	-1.462***	0.096***	0.023
	(0.127)	(0.258)	(0.060)	(0.184)	(0.033)	(0.068)
Observations	17,113	7,439	15,160	6,585	15,160	6,594

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

PVTSS and PVTSS residual using OLS estimation in columns (3) and (4) and, predicted PVTSS using NBRG count models in columns (5) and (6)

b Reference category , Other (not traditionally disadvantaged) caste group, household head with no education, and family in lowest wealth quartile.

Table 5: Intearcting private school supply with select background variables to estimate changes in private school demand (PVTDD)

	Lower Primary					Upper Primary				
	Female	Head Eng	Head more than 10yrEd	Asset	Caste (DalitAdv/OBC)	Female	Head Eng	Head more than 10yrEd	Asset	Caste (DalitAdv/OBC)
main effect	-0.058***	0.029	0.029	0.026***	-0.018	-0.050***	0.042	0.040	0.012***	-0.048**
	(0.010)	(0.027)	(0.036)	(0.002)	(0.020)	(0.016)	(0.034)	(0.043)	(0.002)	(0.024)
					-0.008					-0.027
					(0.020)					(0.026)
PVTSS	0.053***	0.049***	0.052***	0.065***	0.054***	0.068***	0.062***	0.072***	0.007	0.093***
	(0.013)	(0.011)	(0.011)	(0.023)	(0.013)	(0.021)	(0.019)	(0.019)	(0.037)	(0.024)
Interaction effect	0.004	**0.048****	**0.040***	-0.001	-0.010	0.018	**0.074***	0.034	**0.005****	**-0.066****
	(0.010)	**(0.023)**	**(0.023)**	(0.001)	(0.019)	(0.027)	**(0.039)**	(0.026)	**(0.002)**	**(0.030)**
					0.008					0.009
					(0.014)					(0.032)
Observations	15,160	15,160	15,160	15,160	15,160	6,594	6,594	6,594	6,594	6,594
R-squared	0.207	0.208	0.207	0.207	0.207	0.105	0.106	0.105	0.106	0.106

*** p<0.01, ** p<0.05, * p<0.1

Robust standard errors in parentheses

Note: Column titles specify the child or home background variable private school supply was interacted with

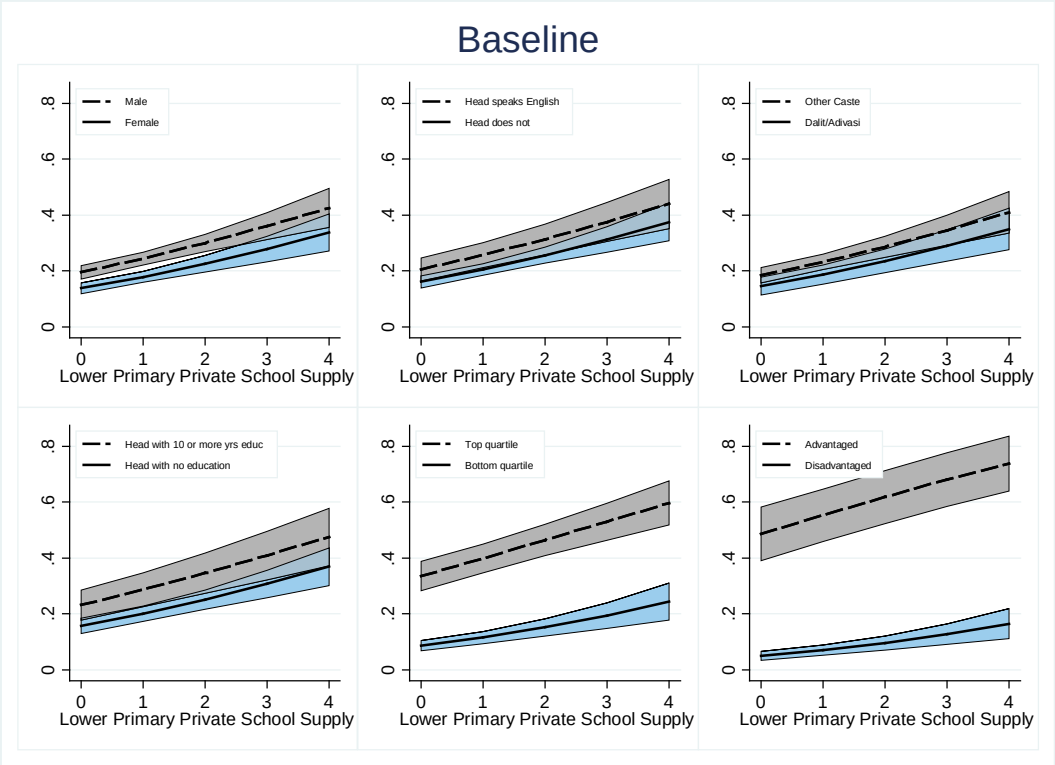

Figure 1: Lower-primary private school demand with varying private school supply for different demographics, baseline approach

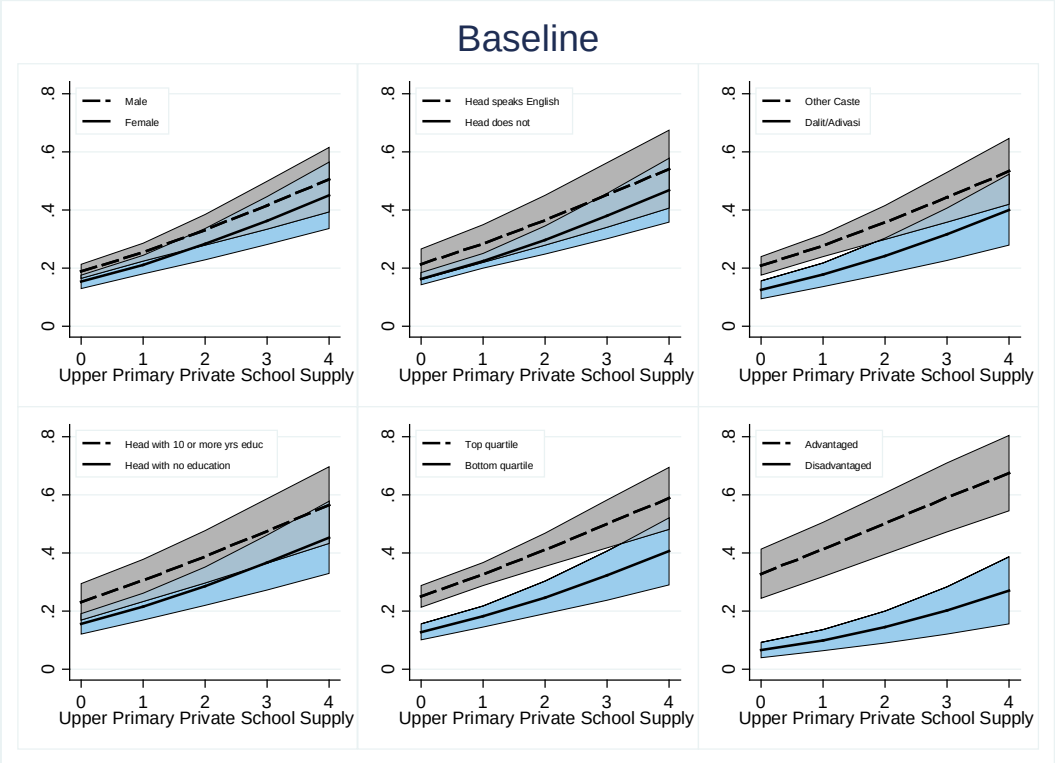

Figure 2: Upper-primary private school demand with varying private school supply for different demographics, baseline approach

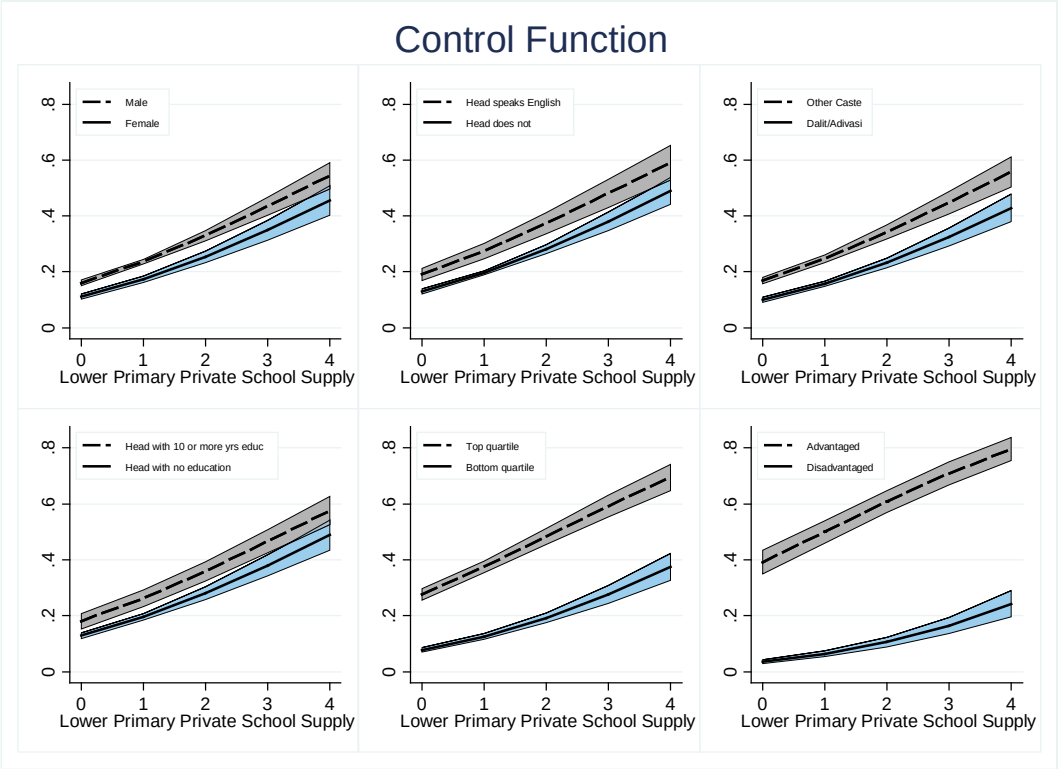

Figure 3: Lower-primary private school demand with varying private school supply for different demographics, control function approach

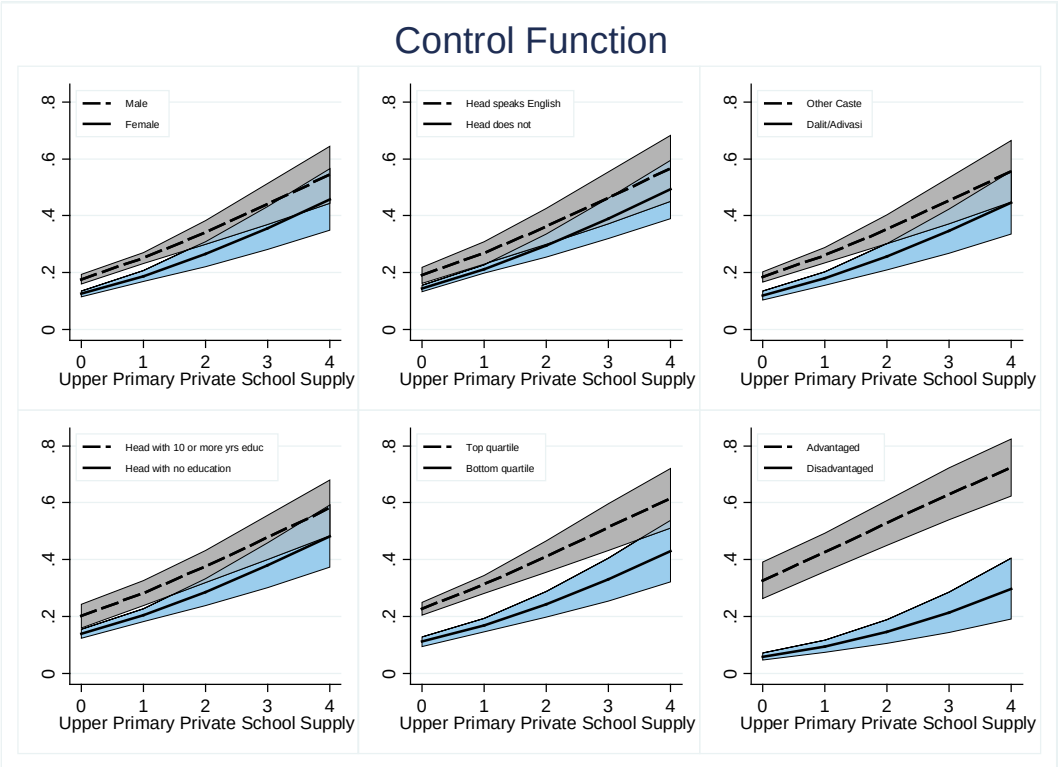

Figure 4: Upper-primary private school demand with varying private school supply for different demographics, control function approach

Table A1: Estimating private school demand (PVTDD-NAP) using three different approaches

	Baseline Approach		Control Function Approach		NBRG-LPM approach	
	Lower	Upper	Lower	Upper	Lower	Upper
Female	-0.222***	-0.159***	-0.233***	-0.240***	-0.052***	-0.042***
	(0.032)	(0.056)	(0.028)	(0.037)	(0.008)	(0.012)
Child age	0.054***	0.028	0.039***	-0.004	0.015***	0.002
	(0.013)	(0.022)	(0.008)	(0.012)	(0.003)	(0.005)
Current grade enrolled in	-0.178***	0.067	-0.164***	0.097***	-0.044***	0.019**
	(0.019)	(0.041)	(0.013)	(0.023)	(0.005)	(0.009)
Other backward caste	-0.056	-0.100	-0.082***	-0.109**	-0.009	-0.032
	(0.063)	(0.073)	(0.032)	(0.047)	(0.017)	(0.021)
Dalit or Adivasi	-0.232***	-0.439***	-0.371***	-0.294***	-0.042**	-0.084***
	(0.079)	(0.085)	(0.035)	(0.046)	(0.018)	(0.020)
Household head's education 1 - 5 years	-0.025	0.031	-0.015	-0.005	-0.020	-0.007
	(0.073)	(0.079)	(0.040)	(0.055)	(0.016)	(0.016)
Household head's education 5 - 10 years	0.042	0.111	0.062*	0.073	0.006	0.020
	(0.065)	(0.091)	(0.033)	(0.059)	(0.017)	(0.021)
Household head's education more than 10 years	0.271***	0.360**	0.206***	0.255***	0.075**	0.102**
	(0.104)	(0.149)	(0.050)	(0.073)	(0.033)	(0.046)
Female head of household	0.058	0.159	0.047	0.151**	0.001	0.013
	(0.082)	(0.145)	(0.038)	(0.069)	(0.020)	(0.024)
Head speaks little to fluent English	0.205***	0.320***	0.283***	0.285***	0.073***	0.092***
	(0.075)	(0.104)	(0.040)	(0.057)	(0.026)	(0.034)
Highest education level in the household-Female	0.028***	0.005	0.028***	0.018***	0.008***	0.001
	(0.007)	(0.009)	(0.003)	(0.006)	(0.002)	(0.003)
Second quartile of assets	0.275***	-0.089	0.218***	-0.022	0.048***	-0.021
	(0.067)	(0.089)	(0.036)	(0.084)	(0.013)	(0.015)
Third quartile of assets	0.681***	0.211**	0.500***	0.246***	0.162***	0.046**
	(0.093)	(0.091)	(0.037)	(0.075)	(0.025)	(0.022)
Top asset quartile	0.964***	0.413***	0.864***	0.509***	0.280***	0.096***
	(0.095)	(0.104)	(0.037)	(0.068)	(0.030)	(0.027)
Income	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of children in the household	-0.050***	0.004	-0.048***	-0.031**	-0.010**	0.001
	(0.019)	(0.023)	(0.008)	(0.014)	(0.004)	(0.006)
Number of adults in the household	0.011	0.000	0.002	-0.013	-0.001	-0.001
	(0.018)	(0.023)	(0.008)	(0.016)	(0.005)	(0.007)
PVTSS-L	0.173***		0.281***		0.056***	
	(0.028)		(0.021)		(0.010)	
PVTSS-L residuals			-0.090***			
			(0.024)			
PVTSS-U		0.228***		0.205***		0.071***
		(0.039)		(0.053)		(0.018)
PVTSS-U residuals				0.108*		
				(0.058)		
Constant	-1.335***	-2.084***	-1.217***	-1.811***	0.094***	-0.035
	(0.132)	(0.280)	(0.089)	(0.187)	(0.033)	(0.062)
Observations	16,803	7,153	14,936	6,335	14,936	6,344

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Variables PVTSS-L and PVTSS-U represent the given PVTSS values in columns (1) and (2), given PVTSS and PVTSS residual using OLS estimation in columns (3) and (4) and, predicted PVTSS using NBRG count models in columns (5) and (6)

b Reference category , Other (not traditionally disadvantaged) caste group, household head with no education, and family in lowest wealth quartile.

Table A2: Inteacting private school supply with select background variables to estimate changes in private school demand (PVTDD-NAP)

	Lower Primary					Upper Primary				
	Female	**Head Eng**	**Head more than 10yrEd**	**Asset**	**Caste (DalitAdv/OBC)**	**Female**	**Head Eng**	**Head more than 10yrEd**	**Asset**	**Caste (DalitAdv/OBC)**
main effect	-0.056***	0.034	0.035	0.025***	-0.030	-0.051***	0.059*	0.061	0.011***	-0.052**
	(0.010)	(0.027)	(0.036)	(0.002)	(0.019)	(0.015)	(0.035)	(0.044)	(0.002)	(0.023)
					-0.013					-0.029
					(0.020)					(0.024)
PVTSS	0.051***	0.047***	0.050***	0.064***	0.051***	0.055**	0.048***	0.060***	-0.007	0.086***
	(0.012)	(0.010)	(0.010)	(0.024)	(0.013)	(0.023)	(0.017)	(0.018)	(0.035)	(0.028)
Interaction effect	0.006	**0.048****	**0.040***	-0.001	-0.006	0.025	**0.094****	0.046	**0.006****	**-0.066****
	(0.010)	**(0.024)**	**(0.023)**	(0.001)	(0.019)	(0.032)	**(0.044)**	(0.028)	**(0.002)**	**(0.032)**
					0.009					0.006
					(0.016)					(0.037)
Observations	14,936	14,936	14,936	14,936	14,936	6,344	6,344	6,344	6,344	6,344
R-squared	0.209	0.210	0.210	0.209	0.209	0.120	0.122	0.120	0.121	0.121

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Column titles specify the child or home background variable private school supply was interacted with

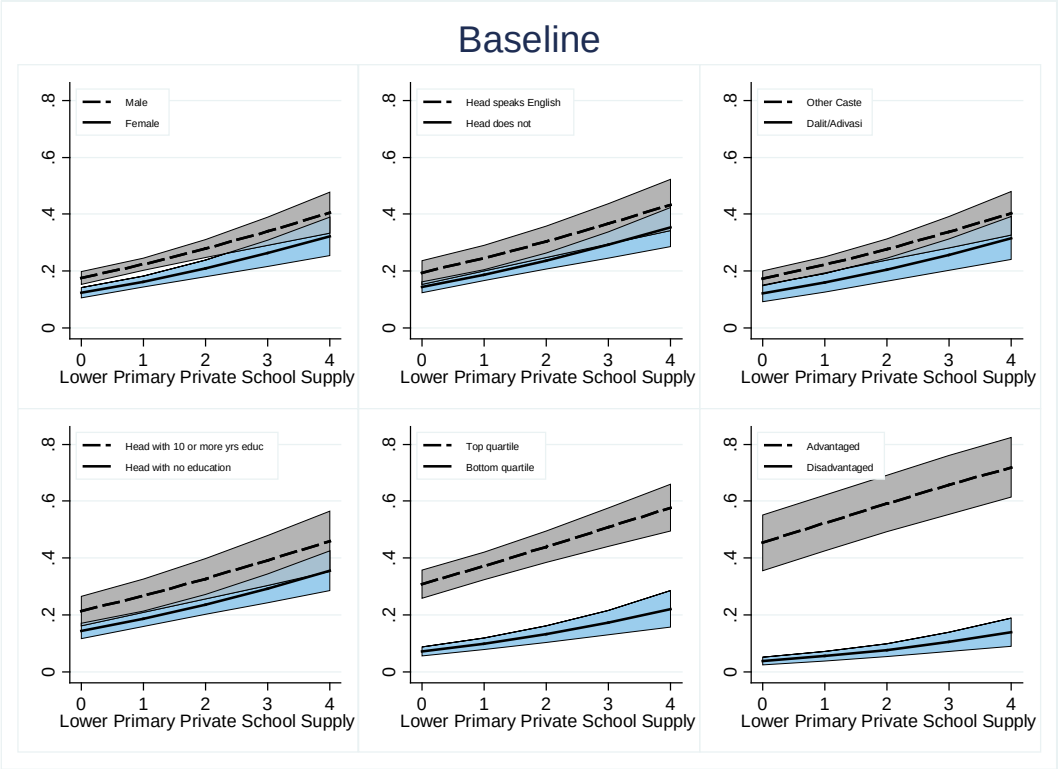

Figure 1a: Lower-primary private school demand-NAP with varying private school supply for different demographics, baseline approach

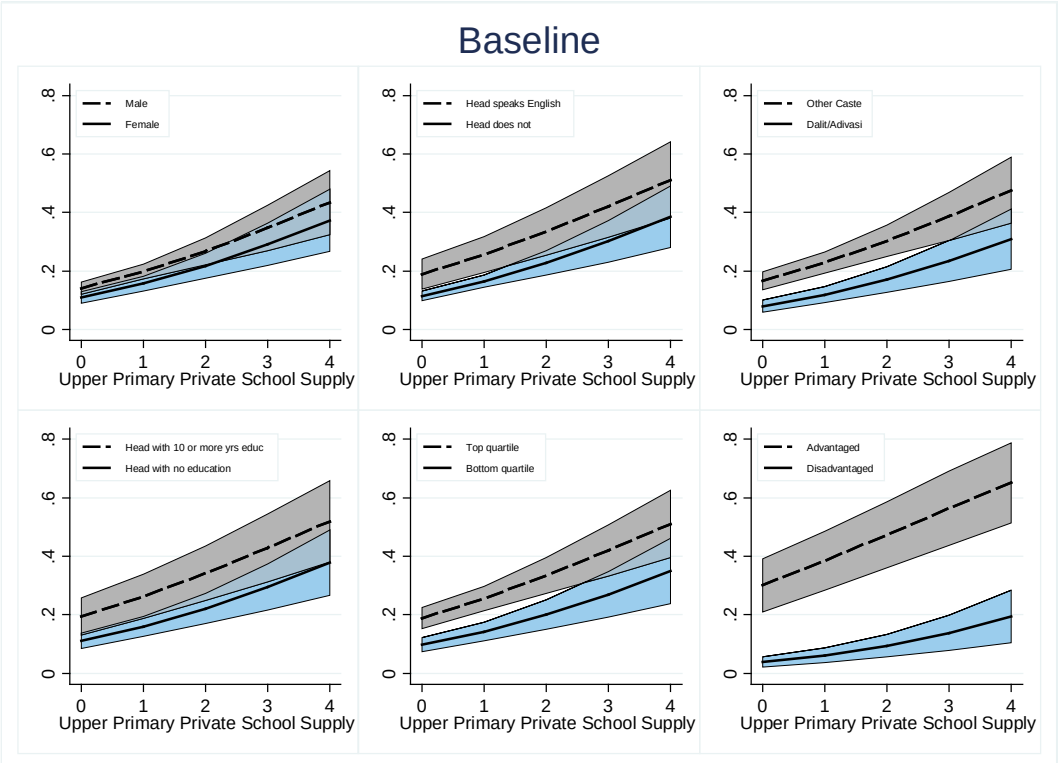

Figure 2a: Upper-primary private school demand-NAP with varying private school supply for different demographics, baseline approach

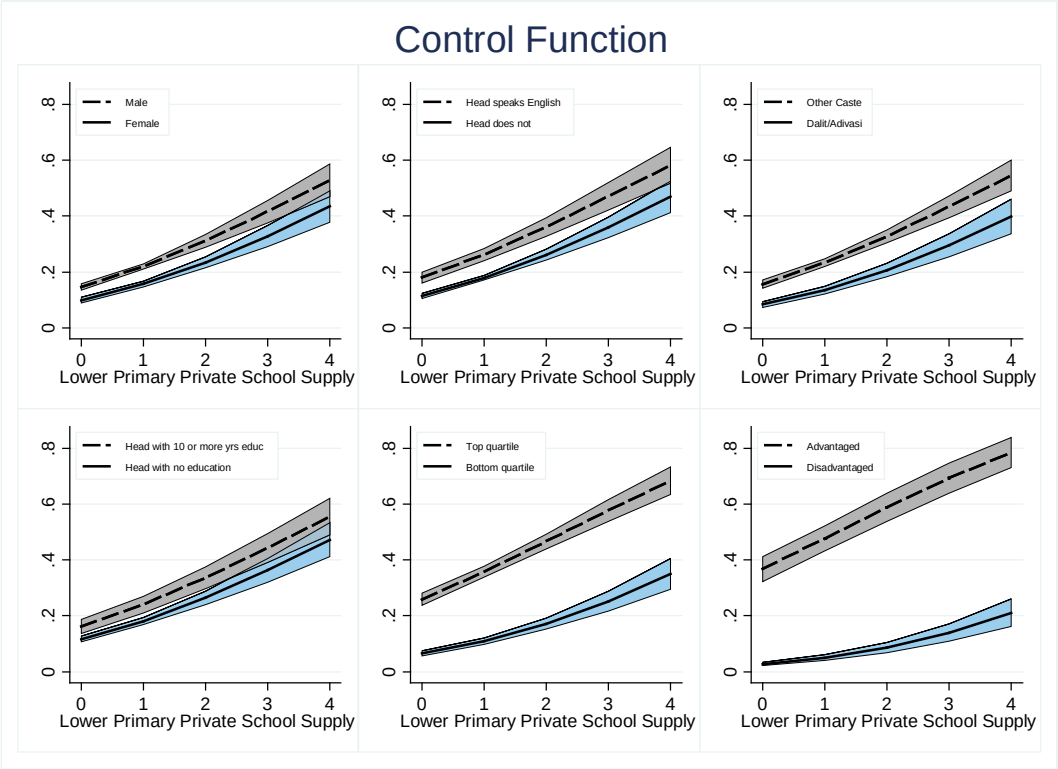

Figure 3a: Lower-primary private school demand-NAP with varying private school supply for different demographics, control function approach

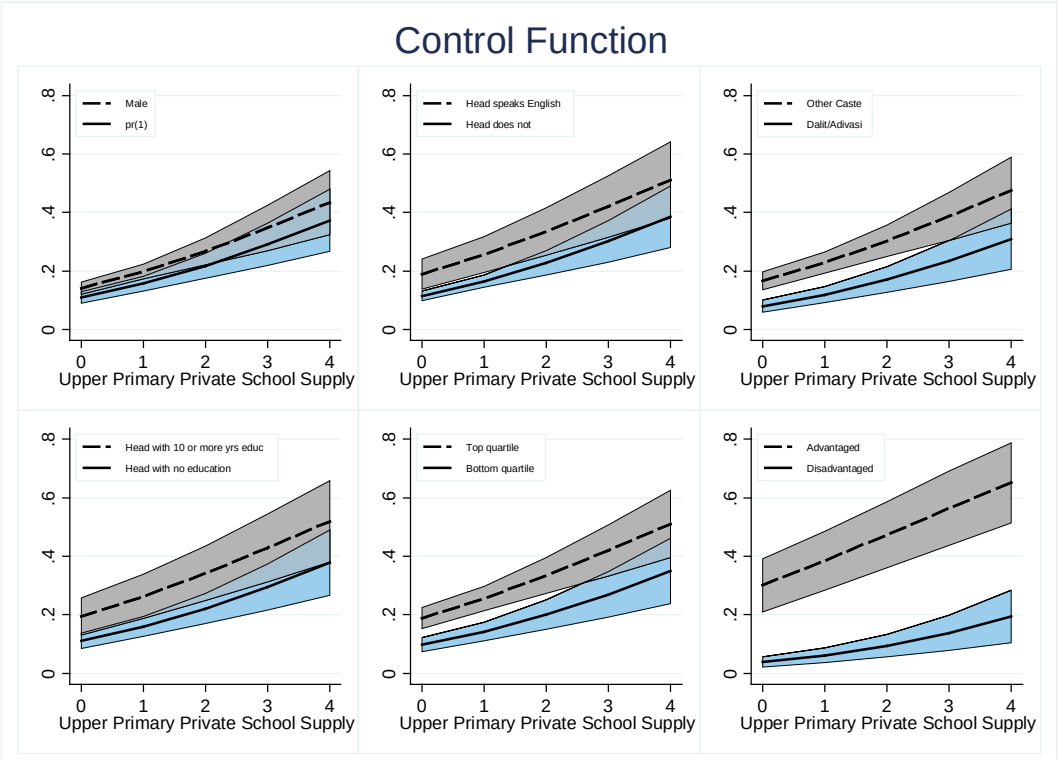

Figure 4a: Upper-primary private school demand-NAP with varying private school supply for different demographics, control function approach