# The Puzzle of Private School Enrollment in India: Insights on the Perceived Quality of Education

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#### Abstract

This study delves into a perplexing enrollment phenomenon within India's education landscape. Despite the nation's lackluster public schooling infrastructure, a distinctive enrollment trend emerges, resembling a "Canyon" structure: a consistent decline in the share of private school enrolment till around grade eight, followed by its remarkable resurgence. Existing theories such as increased private school supply, englishmedium preference, or superior quality of private school fail to satisfactorily elucidate this trend. To address this enigma, we introduce a model spotlighting parental choices driven by cost of schooling and perceived quality of education. Model calibration and empirical analysis reveal the pivotal role of relative perceived quality, particularly at the secondary level, in explaining the surge in private school enrollment at the secondary level which is grade eight and thereafter. This underscores that India's burgeoning attraction toward private schools is not solely driven by tangible factors but hinges significantly on parental perceptions of educational quality, particularly in the higher academic tiers.

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## **1** Introduction

India has a rich history of offering education through both private and public educational institutions. However, in comparison to some developed nations, the quality of India's public educational infrastructure at the school level is not particularly high. Consequently, the number of students attending private schools, despite the associated higher expenses, has been steadily increasing. This rise in private school attendance is attributed to the anticipation of better educational quality compared to public schools.

Numerous researchers have endeavored to explain the growing share of students in private schools. Harma (2011) and Kumar and Choudhury (2021) argue that increasing per capita income has removed financial barriers for many households, allowing them to opt for private schooling. Another group of researchers, including Kingdon (2020) and Kumar and Choudhury (2021), suggests that greater accessibility to private schools is driving the surge in enrollment. Kingdon (2020) demonstrated that low-fee private schools in India have expanded access for households previously unable to afford private education.

Over the last decade in India, a remarkable phenomenon has emerged in the enrollment share at private schools. This phenomenon entails a decline in private school enrollment as students progress through grades, hitting its lowest point at grade eight, before making a remarkable turnaround. This trend continues through grade 10, resulting in a distinctive "Canyon"-shaped structure. This pattern becomes perplexing when considered alongside the constant increase in the cost of private schooling as students advance. While the aforementioned studies have attempted to elucidate the rise in enrollment share in private schools, none, to the best of our knowledge, have endeavored to solve this particular puzzle in India.

One could argue that this apparent puzzle is simply the outcome of a rising supply of private schools relative to public schools at each academic tier. Another plausible explanation could be the preference among Indian parents for English-medium schools (Kumar and Choudhury, 2021), which may drive this phenomenon. Some might suggest that since private schools offer a superior quality of education, they become the obvious choice for parents, leading to an increase in enrollment share in private schools. However, if all these hypotheses were true, the rise in enrollment share should occur at every grade. Instead, we observe a unique pattern where enrollment rates start to rise beyond grade 8 following a steady decline. Does this suggest a link between the increased supply of private schools at the secondary level and the rising enrollment share at private schools? Or do parents prefer English-medium schools at higher grades? Or do private schools genuinely provide better education at higher grades?

In this paper, we strive to unravel this puzzle by exploring the aforementioned questions. Upon a thorough examination of these hypotheses, we find that none can comprehensively account for this phenomenon. If these factors fall short in explaining the observed trend, there must be other unexplored

factors at play. To shed light on this unknown element, we propose a model within the "Hotelling Framework" where parents' decisions regarding their children's schooling depend on the cost of education and their perception of educational quality, which may differ from actual school quality. Our model suggests that the share of enrollment in private schools depends on the costs of private and public schooling and the relative perceived quality of education (measured by the ratio of perceived quality at private schools to perceived quality at public schools). We calibrated our model using data from the National Sample Survey  $75^{th}$  round to estimate relative perceived quality, as this is the only unknown in our model for which we lack direct estimates. Our model calibration indicates that relative perceived quality must remain constant at the primary and upper primary levels and then substantially increase thereafter to generate the "Canyon"-shaped enrollment share structure at private schools, given the cost of education at public and private schools.

One might inquire whether there is empirical evidence to support the existence of rising relative perceived quality. To investigate this, we estimated our structural equation derived from the model. The main challenge in estimating this structural equation is the lack of data on the perceived quality of education. Nonetheless, we attempted to obtain indirect estimates of relative perceived quality by introducing academic level fixed effects (there are three academic levels: primary, upper primary, and secondary) while controlling for all possible factors that may affect enrollment decisions. These academic level fixed effects capture unobserved factors specific to each academic level, and the coefficients corresponding to different academic levels represent the outcome of relative perceived quality, which varies across different grades. Our regression analysis suggests that the coefficient corresponding to the upper primary level is statistically insignificant, while the coefficient corresponding to the secondary level is both significant and of substantial magnitude, with the primary level serving as the reference point. Our regression findings align with the results of the model calibration.

In conclusion, our analysis reveals that the rise in enrollment share at private schools in India is not primarily driven by an increase in the supply of private schools, a preference for English-medium instruction, or the actual quality of private schools. Instead, it is predominantly influenced by parental beliefs regarding private schooling.

This paper is structured as follows: Section 2 presents an overview of private schooling in India, with subsections providing evidence for the aforementioned hypotheses. Section 3 introduces our model, followed by model calibration in Section 3.1. Section 4 presents empirical evidence, and we conclude our paper in Section 5, titled "Discussion and Conclusion." The bibliography section lists our references.

## 2 The Phenomenon of Private Schooling in India

The Indian educational landscape exhibits a nuanced categorization comprising four principal tiers: primary education (encompassing grades 1 to 5), upper primary education (spanning grades 6 to 8), secondary education (encompassing grades 9 to 10), and higher secondary education (covering grades 11 to 12). Pupils have the option to pursue their academic endeavours within the ambit of either government-operated institutions or privately managed establishments endorsed by the government.

Over the temporal expanse, a discernible trend emerges in the distribution of students across educational modalities, particularly in the private schooling sector. Notably, there has been a notable ascent in the proportion of students enrolled in private schools, a surge that is evident across all tiers of education, with an aggregate increase of 10 percentage points up to grade 6. However, this growth trajectory displays a moderating trajectory, dwindling by 6 percentage points between grades 8, further receding to 3 percentage points by grade 10.

The escalating prevalence of enrolment in private educational institutions across all grade levels finds its rationale in multifaceted determinants. The escalating trajectory of per capita income within the Indian demographic landscape stands as a pivotal catalyst, a trend substantiated by Harma (2011) and corroborated by the investigations of Kumar and Choudhury (2021). This phenomenon is further underscored by an array of complementary factors, notably the augmented accessibility of private schooling establishments, a facet expounded upon by Kingdon (2020) and further elucidated by Kumar and Choudhury (2021). Moreover, the mounting proclivity towards teacher absenteeism within public schools, as expounded upon by Kumar and Choudhury (2021), contributes significantly to this evolving educational paradigm.

Nonetheless, a facet not hitherto expounded upon in the antecedent paragraph is the conspicuous trend characterizing the distribution of enrolment shares within private schools across different grade levels, spanning from grade 1 to 10. The trajectory of enrolment shares in private schools demonstrates a discernible pattern wherein it experiences a decremental trend up to grade 8, followed by a subsequent ascendant trajectory leading up to grade 10. This distinct and recurring pattern, akin to a "Canyon," has been consistently observed over the course of the past decade, as visually depicted in Figure 1. As school-change decisions tend to occur at various academic stages, we have opted to reevaluate our analysis by examining enrollment distribution across distinct academic tiers rather than focusing solely on different grades. To this end, we have reconfigured Figure 1 to represent enrollment patterns at three academic levels: primary, upper primary, and secondary. Remarkably, Figure 2 reaffirms the consistent trend initially observed in Figure 1, illustrating a noteworthy phenomenon. Specifically, the enrollment rate in private schools experiences a decline during the transition from primary to upper primary levels, only to rebound with an upward trajectory as students progress into secondary education.



Figure 1: Enrolment Rate in Private Schools Over a decade. Source: Author's estimation and UDISE+ Report

Kingdon's (2020) scholarly discourse emphasizes that the proliferation of economical private schools, marked by nominal fee structures, constitutes a central impetus fuelling the escalating enrolment shares within this sector. This perspective offers a macroscopic view of the dynamics governing private school enrolment. Nevertheless, what remains conspicuously absent from these scholarly analyses is the consideration of elevating tuition fees across successive grades within private schools. One would intuitively anticipate that as grade levels advance, the imposition of augmented course fees should ideally translate into a commensurate diminution in enrolment shares.

In a rather intriguing turn, the observed phenomenon aligns seamlessly with this theoretical projection until grade 8, where an augmented cost of schooling coincides with a diminishing enrolment share, as anticipated. However, a perplexing enigma materializes upon reaching grade 9. In this instance, an escalation in the cost of private education precipitates an unexpected surge in enrolment share, a trend that perseveres into grade 10. The intricacies of this paradoxical occurrence have, to the best of our comprehension, eluded comprehensive explication within existing scholarship.

We attempted to understand this complex issue by examining multiple supply-side factors, most notably the availability of private schools at various grade levels. Notably, the number of private schools in India has increased significantly. The following figure depicts the percentage prevalence of private schools within the Indian educational landscape. Figure 3 depicts a perceptible increase in the relative abundance of private schools (measured as the number of private schools per 100 government schools) across all levels, compared to the elementary level. According to the diagram, the ratio of private primary schools to government primary schools was roughly 20 to 100 in 2012. In comparison, this ratio



Figure 2: Enrolment Rate in Private Schools Over a decade across different academic level. Source: Author's estimation and UDISE+ Report

increased to 36 to 100 in upper elementary schools and 52 to 100 in senior schools. These proportions have gradually increased over time, but their relative position has not changed.

Figure 4 appears to show a possible link between the increased relative availability of private schools and the contemporaneous spike in enrollment shares in the upper elementary and secondary education sectors. Notably, while the relative predominance of private schools has increased at the upper primary and secondary levels compared to the elementary tier, a noteworthy result occurs when the absolute number of private schools is considered. Private school supply is considerably inferior to that of government schools at all levels.

As a result, a critical question arises: Is the reported increase in private school supply truly connected to the increasing share of enrolment in private educational institutions?

#### 2.1 Does Supply of Private School Matters?

In order to address the above question, we looked into the NSS 75th round data for Education. Before, we get into the analysis, we must make sure that enrolment trend NSS data also resonate with the trend demonstrated in figure 1. Figure 4 demonstrate that NSS data indeed demonstrates the similarity in enrolment trend in private schools. NSS 75th round collected data of school/college going individual aged between 5 to 35, however, it does not have any information regarding the supply of school. Therefore, to establish an association between supply of private schools and enrolment in private school, we must use to some close proxy for supply of private schools.

Although NSS does not collect any data on supply of private or government schools, but they gathered



Figure 3: Private School cost (at 2017-18 Prices). Source: Author's estimation and National Sample Survey  $75^{th}$  round (India). Note: School cost includes course fees, transport cost and stationary cost

the following information: Whether you are currently studying any private institution and if yes, then what are the reason for attending the private schools. Among all other reason, one reason was "*private school located nearby*". Almost 26.2% students studying in private school responded that they attended private school because of the greater availability as compared to government schools. Does this figure vary from grade 1 to grade 10. Figure 5 demonstrate that rising proportion of students attended private schools at the higher grades due to the greater availability of private schools as compared to government schools as compared to government schools in the similar category which commensurate with our earlier hypothesis that greater supply of private school may lead to rising enrolment share in private schools.

To answer the aforementioned question, we dug into data from the 75th round of the National Sample Survey (NSS) on education. Prior to beginning our study, we must check that the enrollment trends gathered from the NSS data correspond to those depicted in figure 1. The NSS data, as shown in Figure 5, firmly indicates a consistent enrolment pattern among private schools. Furthermore, we have reconstructed Figure 5 to encompass various academic levels, and its depiction aligns cohesively with the observed pattern delineated in Figure 2. The NSS 75th round collected data from persons aged 5 to 35 who are currently attending an educational institution, but it sadly lacks insights into the supply of educational institutions. As a result, in order to demonstrate a link between private school supply and enrollment, a proximal indicator for private school supply is required.

Although the NSS does not explicitly collect information on the availability of private or public schools, it does collect essential facts. Respondents were asked if they attended private institutions and, if so, what motivated them to do so. One prominent aspect surfaced among the many reasons: "*proximity of private* 



Figure 4: Relative Supply of Schools (Number of Private schools per 100 govt schools). Source: Author's estimation and UDISE+ Report

*school.*" Surprisingly, roughly 26.2% of students attending private schools reported higher accessibility as a determinant of their decision. It has to be seen whether this fraction varies across grade levels ranging from 1 to 10.

Figure 5 depicts a perceptible increase in the proportion of students attending private schools in higher grades as a result of the increased availability of private educational establishments in comparison to government schools in the same category. This data is consistent with our first hypothesis, which states that a rise in the supply of private schools may actually correlate to an increase in the proportion of enrolment in private educational institutions.

When the insights from Figures 3, 5, and 7 are combined, a discernible link appears, implying a plausible association between the availability of private schools and the growing share of enrollment in private educational institutions during the advanced academic levels. A thorough examination, however, is required to establish a clear relationship between the supply of private schools and the increased enrollment share in the later grades. This includes estimating a regression equation that connects the share of students enrolled in private schools to the percentage of students who choose private schools owing to proximity. This assessment involves the careful control of a number of extraneous variables that may have an impact on the enrollment share in private schools.

#### 2.1.1 Data and Methodology

The following analysis is based on data from the 75th round of the National Sample Survey (NSS) on education. To achieve our goals, we used a regression framework to model the connection. Due to low



Figure 5: Enrolment Rate in Private Schools obtained from NSS 75th Education Round. Source: National Sample Survey  $75^{th}$  round (India)

frequency of the data at every class in a village in the NSS 75th round of data, we have combined class level information into different academic level. From class I to V is considered as primary level, VI to VIII is upper level and IX to X is secondary level. Our dependent variable includes the percentage of students enrolled in private schools at various educational levels (primary, upper primary and secondary). The main independent variables in our model are the proportion of students who choose private schools based on proximity, as well as an interaction term involving various grade levels and the aforementioned proximity-driven decision. We arrived at a more refined estimate by using this model and accounted for many external factors that may impact the proportion of enrolment in private schools.

$$SP_{vld} = \alpha + \beta_1 (SD)_{vlt} + \beta_2 Q_l (SD)_{vlt} + \beta_i \sum_{i=3}^n X^i_{vld} + Q_l + \gamma_d + \epsilon_{vld}$$
(1)

Where,  $SP_{vld}$  stands for share of enrolment at private schools from village v academic level l and district d. SD stands for share of students joined private schools due to proximity.  $Q_l$  and  $\gamma_d$  are the academic level and district fixed effect.  $X^i$  is the set of all other explanatory variables. In this estimation, our focus centers on the coefficients denoted by  $\beta_2$ . If the estimated coefficients of the interaction term show an ascending trend with the progression of educational levels while controlling for various extraneous factors, it would imply that the increasing supply of private schools played a significant role in explaining the increased enrollment rates at advanced educational stages.

Table 1 shows the results of the calculated coefficients. Specifically, Model 2 in the table reflects the most stringent specification. The findings indicate that the proximity of private schools has no substan-



Figure 6: Enrolment Rate in Private Schools across different academic level.: National Sample Survey  $75^{th}$  round (India)

tial impact on the increase in enrolment in private educational institutions. Furthermore, the coefficients associated with grade-fixed effects and the proximity of private schools are statistically insignificant, implying that the increased enrollment share in private schools is not susceptible to changes in supply. Despite the fact that Figure 7 supports the supply-side theory, our efforts to show a statistically significant association between the expanding supply of private schools and the increasing enrollment share in private institutions throughout advanced academic levels have been futile.

Conversely, an alternative perspective (Kumar and Choudhury, 2021) posits that English-medium private schools serve as a pivotal factor behind the swelling enrollment numbers in India's private education sector. Our analysis substantiates this viewpoint, showing an escalating preference for English-medium private schools leading to an augmented enrollment rate in private institutions. However, our interest lies in ascertaining whether this effect amplifies in tandem with the progression of educational levels. Our analysis does not reveal any such observable trend. The interaction term between grade-fixed effects and the affinity for English-medium private schools fails to exhibit such a correlation.

Other factors, however, are consistent with theoretical predictions. Per capita expenditure has a positive link with private school enrollment rates, although the average cost of private schooling has an inverse relationship. Similarly, when the expense of government education rises, so do enrollment rates at private colleges. It is crucial to note that we have not given the findings for additional control variables such as sector (rural/urban), Muslim population proportion, and scheduled tribes and castes distribution; these can be found in the appendix, encompassing the complete specification.

Table 1: Regression Results

VARIABLES	Model 1	Model 2
Log (Per Capita Expenditure)	0.093***	0.091***
	(0.006)	(0.008)
log(Avg. Pvt Schooling Cost)	-0.062***	-0.064***
	(0.003)	(0.003)
log(Avg. Govt. Schooling Cost)	0.009***	0.015***
	(0.002)	(0.003)
Pvt School Near	0.001	0.001
	(0.010)	(0.010)
Primary*Pvt School Near	Base	Base
Upper Primary*Pvt School Near	-0.006	-0.004
	(0.014)	(0.014)
Secondary*Pvt School Near	-0.009	-0.006
	(0.014)	(0.014)
Affinity for English Medium	0.017**	0.022**
	(0.009)	(0.009)
Primary*Affinity for English Medium	Base	Base
Upper Primary*Affinity for English Medium	0.011	0.009
	(0.012)	(0.013)
Secondary*Affinity for English Medium	-0.021*	-0.020
	(0.013)	(0.013)
Primary	Base	Base
Upper Primary	0.004	-0.002
	(0.010)	(0.010)
Secondary	0.039***	0.027***
	(0.010)	(0.011)
Constant	0.274***	0.365***
	(0.046)	(0.104)
Other Control Variables	Yes	Yes
District Fixed Effect	No	Yes
Observations	5,551	5,551
R-squared	0.151	0.265
Standard Errors are clustered at the Village level and reported in parenthesis.		
*** p<0.01, ** p<0.05, * p<0.1		



Figure 7: Share of private school going student attended private school due to the availability of private school in the locality by grades. Source: National Sample Survey  $75^{th}$  round (India)

### 2.2 Actual Quality Hypothesis

A thread has evolved within the body of academic research emphasizing the greater educational quality provided by private schools over their public counterparts. Pioneering studies in this field found that pupils enrolling in private schools outperform their public school peers across many developing countries (Jimenez and Lockheed, 1995; Jimenez et al., 1991). Desai et al. (2008) observed that pupils aged 8 to 10 attending private schools outperformed their government school counterparts using data from the 2004-05 Indian Human Development Survey (IHDS). Chudgar and Quin (2012) agreed, claiming that Indian private school pupils outperform government school students in terms of academic achievement. They also claimed that students attending low-cost private schools might not outperform their public school peers.

Kingdon (2020) contributed by demonstrating that a significant majority of private schools in various states may be categorized as 'low-fee,' when state per capita income, government school per-pupil spending, and the officially required rural minimum wage for daily labour are all taken into account. Endow (2018) investigated these low-cost private schools, which are mostly attended by economically disadvantaged households, using a primary survey performed in Delhi and India's National Capital Region (NCR). Her findings suggest that primary-level pupils attending such schools have a learning disadvantage in English. Importantly, when pupils go through the elementary level, this learning gap remains hidden. Furthermore, the repercussions of this poor English competence extend to other non-language courses, because English serves as the medium of teaching, textbook language, and test answer media for these subjects.



Figure 8: Ratio of Private schools and Public schools test score in Mathematics and Reading. Source: Author's estimation and National Achievement Survey-2021 (India)

From the previous discussion, it is unclear if pupils at private schools continuously outperform their public school peers, especially given India's expanding number of low-fee private schools. Similarly, there is little evidence that the performance of private schools improves in parallel with academic achievement. Given these difficulties, a rigorous evaluation of current data is required to identify any genuine discrepancies in performance between private and public schools. To that purpose, we look at two different datasets: the National Achievement Survey (NAS) 2021 and the Annual Status of Education Report (ASER) 2018.

Figures 6 and 7 show the test score ratios between private and public schools for several courses in NAS-2021 and ASER-2018, respectively. Figure 6 depicts a ratio that is close to unity, indicating that public schools have a minor advantage over private schools at lower grade levels, while private schools slightly outperform public schools at higher grade levels. Despite these observations, there are no significant disparities in achievement between public and private schools.

ASER-2018, on the other hand, provides a somewhat different picture. Figure 7 shows that, at lower grade levels, private schools outperform public schools, although this pattern fades as academic levels rise. The evidence so given plainly demonstrates that private schools do not perform much better than public schools. Furthermore, even when private schools outperform public schools, the pattern tends to converge as academic levels rise, which may not completely explain the escalating enrolment rates observed in private schools at advanced grade levels, as delineated in Figure 1.



Figure 9: Ratio of Private schools and Public schools test score in Mathematics and Reading. Source: Author's estimation and ASER-2021

## 3 Model

We present a simple model to generate the U-shaped enrolment pattern in private schools. In our modelling framework, rational parents choose to send their kids to either private or public schools. Parental choice depends on the (perceived) quality and cost of education in the private school compared to the government school.

Consider an individual parent who is deciding between private and public schools for her ward. She is located in a Hotelling line at point  $x \in (0, 1)$  and the two extreme points of the line indicate the location of a private school (point 0) and a public school (point 1). We assume a uniform distribution of students across the unit length of the line. The cost of schooling is  $c_p$  and  $c_g$  for private and public schools respectively. We consider the aggregate of all possible costs to be included in the cost parameter,  $c_i$  for i = p, g. The unit transportation cost is assumed to be a. A student located at point x spends an amount  $c_p + ax$  to attend grade one in a private school and an amount  $c_q + a(1 - x)$  for public school.

The utility comes from the quality of schooling (denoted by  $q_i$ ) and consumption of a numeraire good. Assuming a quasi-linear structure, we write the utility of a representative agent j as follows.

$$u_{j} = \begin{cases} \alpha lnq_{p} + y_{j} - c_{p} - ax, & \text{if attending private school.} \\ \alpha lnq_{g} + y_{j} - c_{g} - a(1 - x), & \text{if attending public school.} \end{cases}$$
(2)

Here,  $\alpha$  is a (relative) weight parameter and  $y_j$  is the income of a representative agent j for j = 1, 2, 3, ..., n.

Parent j decides to put her ward in private school if and only if

$$\alpha lnq_p + y_j - c_p - ax \ge \alpha lnq_q + y_j - c_q - a(1 - x)$$

or,

$$x \le \frac{1}{2} + \frac{\ln(\frac{q_p}{q_g})^{\alpha} - (c_p - c_g)}{2a}.$$
(3)

Denoting the share of enrolment in a private school in grade t as  $s_{pt}$ , inequality 3 solves for the following private school enrolment share.

$$s_{pt} = \frac{1}{2} + \frac{\ln(\frac{q_{pt}}{q_{gt}})^{\alpha} - (c_{pt} - c_{gt})}{2a}.$$
(4)

Equation constitutes our structural model, serving as the framework for our analysis. Our primary objective is to measure the relative perceived quality, leveraging the information available in equation (4). We possess data pertaining to the costs associated with both private and government schooling, as well as the share of enrollment at private schools at each academic level. These elements collectively contribute to our endeavour to assess the relative perceived quality.

#### 3.1 Model Calibration

To calibrate the relative perceived quality, we set initial quality at unity at grade  $t = t_0$  (where  $t_0$  refers to the primary level), i.e.,  $\frac{q_{pt_0}}{q_{gt_0}} = 1$ . Then at academic level  $t_0$ , equation (4) becomes

$$s_{pt_0} = \frac{1}{2} + \frac{c_{gt_0} - c_{pt_0}}{2a}.$$
(5)

Table 2: Initial values for the calibration initial year 2017-18 (unit in Rupees)

Data for the year 2017 (unit in Rupees)			
Enrolment share at primary level	Cost of Private schooling	Cost of Public schooling	
0.38	14538.00	1010.00	

We have the data on the aggregate cost of both private and public schools for the year 2017-18. As given in Table 2, we set enrollment share in primary grade for the year 2017 as  $s_{pt_{2017}} = 0.38$ , cost of public schooling in primary grade as  $c_{gt_{2017}} = 1010.00$  and the cost of private schooling in primary grade as  $c_{pt_{2017}} = 14538.00$ . Using these values in (5), we solve for *a* as

$$a = 54858.07.$$
 (6)

Plugging the solution of a from equation (6), we can rewrite equation (4) as follows.

$$s_{pt} = \frac{1}{2} + \frac{\ln(\frac{q_{pt}}{q_{gt}})^{\alpha} - (c_{pt} - c_{gt})}{109716.14}; \quad \text{for all } t.$$
(7)

From equation (7), given the data of enrolment share and cost of schooling, we can solve for the relative quality of private schooling at any given grade level. To do this, we set  $\alpha = 1$ , i.e., we set the relative weight of education for parents in the utility specification as equal to unity. Under this assumption, equation (7) solves for the following expression of the relative quality of private schooling.

$$ln\left(\frac{q_{pt}}{q_{gt}}\right) = c_{pt} - c_{gt} + 54858.07(2s_{pt} - 1).$$
(8)

We set the initial (relative) quality level at unity for the primary grade level. Given this, we can calibrate the relative quality at the other two grade levels, namely, upper primary and secondary using equation (8). The calibrated solutions are given in Table 3 and are depicted in Figure 10.

Table 3: Calibrated values of the relative quality of private schooling  $(ln \frac{q_{pt}}{q_{nt}})$ 

Grade level	Relative quality of private schooling
Primary	1
Upper primary	-66.11
Secondary	3026.49

Note that the cost differential between private and public schooling does not change much across grades, i.e., the term  $(c_{pt} - c_{gt})$  in equation (8) remains (almost) constant for all *t*. Therefore, any observed change in the enrolment share in private schools is explained only by the change in the perceived quality of schooling. Figure 10, therefore, reflects similar curvature as observed in enrolment share data in Figure 6.

Figure 10 portrays a consistent trend where the relative perceived quality remains somewhat constant during both the primary and upper primary phases. However, a substantial upswing becomes evident as we progress to the secondary education level. This substantial enhancement in relative perceived quality directly corresponds to a noteworthy surge in private school enrollment rates at the secondary level.

## 4 Empirical Evidence

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Our model calibration demonstrates that the relative perceived quality remains nearly identical at both the primary and upper primary levels. The immediate question that arises is whether empirical evidence can substantiate this assertion. To address this query, we undertake the task of estimating our structural



Figure 10: Estimated value of relative perceived quality. This diagram is obtained from equation 8

equation, wherein the enrollment share is modelled as a function of both the cost of private and public schooling and relative perceived quality. Our formulation posits that the cost of private schooling is inversely proportional to the enrollment share in private schools, while the cost of government schooling is directly proportional to the enrolment share in private schools. Additionally, relative perceived quality is directly proportionate. Through this specification, we aim to discern whether the perceived quality of private education indeed adheres to the prediction of our model calibration.

$$SP_l = \alpha + \delta_1 C_{pl} + \delta_2 C_{gl} + \delta_3 (ln \frac{q_{pl}}{q_{pl}}) + \epsilon_l \tag{9}$$

Within the context of the regression equation (9), the estimated coefficient  $\delta_1$  is anticipated to exhibit a negative sign, while  $\delta_2$  is expected to be positive and  $\delta_3$  is also expected to be positive  $[SP_l]$  stands for the enrolment share at private schools at academic level I]. A fundamental limitation of this specification arises due to the absence of accessible data pertaining to the relative perceived quality of education within India. Consequently, establishing a direct relationship between the perceived quality of private schooling and the enrollment share in private schools becomes unfeasible. Notwithstanding this limitation, we propose an alternative approach that entails estimating the subsequent regression equation. In this revised equation, we account for a comprehensive array of potential factors that might impact the decision to opt for private schooling, while also introducing an academic-level fixed effect  $(A_i)$ . The academic level fixed effect enables us to derive indirect estimations of the relative perceived quality. Given that the academic level fixed effect comprehensively encompasses all latent variables pertinent to each academic tier, any discernible consistent pattern attributable to this fixed effect is a direct reflection of the relative perceived quality. This is achieved by controlling for all other relevant factors within our analysis. If our model-based calibration holds true, we anticipate that the estimated coefficient pertaining to "Upper primary" will exhibit a minor negative effect or be exceedingly close to zero, rendering it statistically insignificant. Conversely, we expect the coefficient corresponding to "Secondary" to be substantial in magnitude and statistically significant.

$$SP_{vld} = \alpha + \delta_1 C p_{vld} + \delta_2 C g_{vld} + \beta_i \sum_{i=1}^n X^i_{vld} + A_l + \gamma_d + \epsilon_{vld}$$
(10)

Hence, the estimation of equation (10) is tantamount to the estimation of equation (1), a task we have already undertaken earlier. In this context, our specific focus centers on the academic-level fixed effects represented by the coefficients corresponding to the variables "Upper primary" and "Secondary," with "Primary" serving as the baseline category. Consequently, the estimated coefficients for "Upper primary" and "Secondary" are rendered relative to the primary level. Across all the model specifications delineated in Table 1, the observed sign of the estimated coefficients for "Upper primary" and "Secondary" is as expected i.e., the coefficient corresponds to "Upper primary" is negative, very small in magnitude and statistically insignificant, while coefficient corresponds to "Secondary" is positive, high in magnitude and statistically significant. This unequivocally illustrates that the influence of relative perceived quality as gauged by the academic level fixed effect, becomes more pronounced with the advancement of academic levels. Such an effect can only materialize if there is a commensurate increase in the magnitude of relative perceived quality as academic levels rise, a finding that aligns harmoniously with our model-based calibration.

# **5** Discussion and Conclusion

In India over the past decade, a distinctive enrollment pattern in private schools has emerged. This pattern reveals that private school enrollment rates gradually decline until grade 8 and then take an unexpected turn, surging upward. Concurrently, the cost of private education steadily rises as students progress through higher academic levels. This juxtaposition of increasing enrollment rates and escalating educational costs presents a perplexing puzzle.

The most straightforward explanation for this puzzle suggests that the relative availability of private schools significantly increases with higher academic levels. To investigate this, we utilized data from the *NSS*75<sup>th</sup> round and conducted a regression analysis of private school enrollment shares against the proportion of individuals choosing private schools due to proximity. Surprisingly, our results (see Table 1) indicate that the supply of private schools does not play a substantial role in the rising enrollment share at private schools. Another common argument in India, as posited by Kumar and Choudhury

(2021), revolves around the preference for English-medium instruction in private schools. We tested this hypothesis in an attempt to unravel the aforementioned puzzle. As expected, Indian parents with an inclination toward English-medium private schools tend to enrol their children in such institutions. However, we observed no academic level-specific impact of this preference on the enrollment share at private schools. If neither the expanding supply of private schools nor the preference for English-medium education can account for the rising enrollment share at the secondary level, then the quality of education provided by private schools becomes a focal point. If private schools indeed offer superior education compared to public schools, parents may be inclined to choose them even at a higher cost. To support this hypothesis, we examined data from the National Achievement Survey (NAS) and the Annual Status of Education Report (ASER), both of which suggest that private schools do not substantially outperform public schools (NAS), or that the gap between them diminishes as academic levels increase (ASER), which could explain the increasing enrollment share in private schools. However, none of these hypotheses, even when combined, can satisfactorily solve this complex puzzle. Therefore, there must be unidentified factors at play, eluding capture by well-established hypotheses.

To delve into this enigma, we proposed a "Hotelling Framework" model in which individuals derive utility from the perceived quality of education and consumption of a numeraire good. Our model posits that the share of enrollment in private schools is determined by the relative perceived quality of education and the costs of private and public schooling. Our model calibration indicates that if the relative perceived quality, measured by log(Perceived Quality at private schools/Perceived Quality at government schools), remains constant at the primary and upper primary levels but substantially increases thereafter, it can explain the rising share of enrollment in private schools at the secondary level.

To test the validity of our model prediction, we estimated our structural equation 4 or the modified equation 9. However, the main challenge in estimating 9 lies in the unavailability of data on the perceived quality of education. Therefore, we adopted an indirect approach by introducing academic-level fixed effects into the regression equation. The coefficients associated with different academic levels would provide indirect estimates of the impact of relative perceived quality on the enrollment share at private schools. Given that the academic level fixed effect encompasses all relevant variables for each academic tier, any consistent pattern attributed to this fixed effect directly reflects the relative perceived quality. This analysis indicates that the coefficients related to different academic levels align with our model prediction.

Thus, if our model's prediction substantiated by empirical evidence is correct, the rise in enrollment share at the secondary level in private schools can be attributed not to an increase in the supply of private schools or a preference for English-medium instruction but to parental beliefs. Parents believe that private schools offer better education than government schools at higher academic levels, leading to an increase in enrollment share at the secondary level in private schools.

## **Bibliography**

Desai, S., Dubey, A., Vanneman, R., & Banerji, R. (2008). Private schooling in India: A new educational landscape, India human development survey. *Working Paper No. 11*.

Chudgar, A., & Quin, E. (2012). Relationship between private schooling and achievement: Results from rural and urban India. *Economics of Education Review*, 31(4), 376-390.

Jimenez, Emanuel and Marlaine E. Lockheed. 1995. "Public and Private Secondary Education in Developing Countries: A Comparative Study." In World Bank Discussion Paper 309. Washington, D.C.: *The World Bank.* 

Jimenez, Emanuel, Marlaine E. Lockheed, and Vincente Paqueo. 1991. "The Relative Efficiency of Private and Public Schools in Developing Countries." *The World Bank Research Observer* 6 (2): 205–18.

Endow, T. (2018). Inferior outcomes: Learning in low-cost English-medium private schools—A survey in Delhi and National Capital Region. *Indian Journal of Human Development*, 12(1), 1-19.

Kumar, D., & Choudhury, P. K. (2021). Do private schools really produce more learning than public schools in India? Accounting for student's school absenteeism and the time spent on homework. *International Journal of Educational Development*, 83, 102395.

Kingdon, G. G. (2020). The private schooling phenomenon in India: A review. *The Journal of Development Studies*, 56(10), 1795-1817.