Determinants of Demand for Supplementary Tuitions: A Hurdle Model Analysis

Mirza Nazrana \mbox{Beg}^1 and Mohsin \mbox{Majeed}^2

Supplementary tutoring has undergone an exponential expansion globally. Studies on the demand for and patterns of private supplementary tuitions are becoming more widely available. However, due to the lack of adequate data, extant literature has been unable to fully examine the determinants of the supplementary tuitions in Jammu and Kashmir. This paper focuses on supplementary tutoring in Anantnag, Jammu and Kashmir. The primary objective of this paper is to analyse private supplementary tutoring received by students in the age-group of 6-18 as indicated by the primary survey. The paper uses a Hurdle model to analyse the determinants of demand for supplementary tuitions. The first stage is concerned with the binary decision of whether to take supplementary tuitions or not, and the second stage looks into the factors that influence tutoring expenditures conditional on positive spending. The paper concludes that area of residence, household size, gender of the student, age of the student, school type, satisfaction with academic performance, household income and parents' level of education significantly determine the likelihood of availing tutoring as well as the expenditure.

Key words:

Supplementary Tutoring, Hurdle model, Binary logistic, OLS regression, binary decision, likelihood.

Introduction:

Supplementary tuition is frequently provided outside of established educational frameworks and does not result in a recognised certification. Supplementary tuitions are also known as "shadow education" as it replicates and closely resembles the curriculum and instruction given in traditional school systems. Numerous "learning centre" enterprises offer supplementary tutoring and training to millions of kids throughout the

¹ Lecturer, J&K Higher Education Department

² Researcher, Department of Economics, Central University of Kashmir

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world. The most advanced secondary education markets are in Japan and Korea (Aurini et al., 2013). Many researchers claim that a number of other countries, including those as markedly different in terms of their economies and environments as Greece, Turkey, Kenya, Cambodia, and the United States, also have substantial and booming supplementary education sectors. Considerably large amount of children's after-school time and their parents' resources are consumed by supplementary education.

India has also experienced a surge in the proportion of the population taking supplementary tuitions in the recent years. Data shows that, even for young kids, in West Bengal, Bihar and Odisha taking supplementary tuitions is a common practice. It was reported that, in the year 2021, 60% children of school going age in Odisha and 70% in Bihar and West Bengal took some form of private supplementary tuitions (ASER Centre, 2021). Irrespective of the grade, type of school, or sex, the proportion of children who took supplementary tuitions has increased from 2018 to 2021. Almost 40% of kids today attend classrooms with paid supplementary tuitions (ASER Centre, 2021). In Jammu and Kashmir the proportion of enrolled children taking tuitions increased by 18.6% between 2018 and 2021. However, the studies documenting the incidence of private supplementary tuitions in the Union Territory of Jammu and Kashmir are scarce. Lack of publicly available data is one of the major obstacles to undertaking research on supplementary education. Few governments make an effort to monitor the growth of or look into the inner workings of supplementary sectors because they are usually private, unregulated, and infrequently legally recorded as being a part of the formal education system. The present study aims to fill this gap in literature.

The primary objective of this paper is to analyse private supplementary tutoring received by students in the age-group of 6-18 as indicated by the primary survey. The study examines the determinants of the supplementary tutoring expenditure and focuses particularly on the demographics of students and their parents.

The first step in Hurdle model, i.e. the Probit model, examines the factors which determine whether or not the students take supplementary private tuitions (i.e. whether to spend anything on supplementary tuitions or not) and the second step analyses the

factors which determine the expenditures on supplementary tuitions conditional on spending a positive amount on private tuitions.

Review of Literature:

In order to supplement formal education and to overcome school inadequacies, there exists a system called "private tuition" (PT henceforth) which runs parallel to the formal system of education like a 'shadow' (Mark Bray, 1999). It is an act by the parents to hire private tutors to provide the better education to their children aimed to achieve excellent learning outcomes and higher future incomes. Literature shows that there is a rise in shadow education across the world (Mark Bray & Kwok, 2003). Knowledge has become a commercialized product, and the choice for availing this is predominantly made keeping in view the financial status (Panagiotis, 2022). The providers of shadow education are evolving and becoming part of the educational capital market (Feng, 2021). Employing the double-hurdle model estimation procedure, the study of Pallegedara & Mottaleb (2018) reveals that the likelihood of purchasing supplementary tutoring has been increasing over the years. The demand for supplementary tuition has increased so much in recent years that it seems that the expenditure on PT has changed from a luxury commodity to a necessity commodity (Pallegedara, 2011). In India as well Supplementary tuition has turned to be a booming industry. (Ministry of Human Resource Development, 2016) in one of its reports conclude that for many households in India, supplementary tuition is regarded as a necessity.

The footprints of PT are found in East Asian countries where shadow education is deeply embedded in the culture itself (Bray 2009). It is believed that Asian cultures, particularly those influenced by Confucian ideas, give more stress on tutoring (Silova, 2009). Supplementary tutoring has got mixed responses from policymakers. In some countries, it is totally ignored; in others, it is actively controlled by the state (Dang & Rogers, 2016). In fact in some countries like Oman and China, it is totally banned because it is believed that PT widens social inequalities and disturbs the public education system (Arab News, 2018; China Briefing, 2021).

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Despite being deeply rooted in the learning process, The study of supplementary tutoring received little attention in the literature (Mark Bray et al., 2014). Lack of official data and documentation on the subject matter are some reasons for the neglect of the studies in this area. (Tansel & Bircan, 2006)

There are both demand-side factors as well as supply-side factors which determine the supplementary tuitions. Since our study is from the students' perception, we have confined ourselves to demand-side factors only. Studies have shown different reasons which prompt students to opt for PT. Broadly these factors are socio-economic and cultural in nature. The demand for PT is largely influenced by the quality of school, family background and individual factors of the student (Mark Bray et al., 2014). Increasing competitiveness, desire to excel in job markets and to have a better and prosperous life for their wards, parents are desperate to supplement the school work with supplementary tutoring (Hajar, 2018, Stevenson & Baker, 1992, Doherty & Dooley, 2017, Dang, 2007); which Baker & Gerald (2010) calls as "enrichment strategy". Parents who hire tutors aren't always busy parents. It is aimed at obtaining educational advantages (Davies, 2004). It supplements formal education rather than substituting it (Khan & Shaikh, 2013)

Studies show that the facility of supplementary tuition is not accessible to all students (Silova, 2009). There are a number of factors that are involved. The accessibility is broadly influenced by the regional factors, family factors and institutional factors (Parveen et al., 2022). Bray (2020) also mentions 'the political factors responsible for availing private tuition.

Studies show that economically sound and highly educated parents in urban areas spent comparatively more on supplementary tuition (Liu, 2019, Ha & Harpham, 2005, Kim & Lee, 2002). Households with better standards of cultural capital and higher levels of social capital are more likely to hire shadow education compared to households with lower levels of capital (Southgate, 2009). Another study (Tansel & Bircan, 2006) identifies parents' education as the main factor determining the expenditures on supplementary tutoring with larger influence of mother's level of education. Mother's

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education level appears to be a significant predictor of demand for supplementary tutoring (De Castro & De Guzman, 2010, Alhawarin & Abu Kharki, 2012). Whereas Fakih et al. (2022) find that being a male student or a child of an employed mother declines the requirement of hiring a private tutor. Due to the overloaded curriculum, coupled with high aspirations of the parents, the teaching at school is sometimes inadequate to cover the stipulated syllabuses within the given timeframe, which again push parents to look for complementary tutoring (Marimuthu et al., 1991). Kenayathulla (2013), by applying hurdle regression models finds that household head's level of education, total household expenditures, gender of the household, number of schoolgoing children, and home ownership as important determinants of supplementary tutoring expenditures in Malaysia. Ubbudari (2017) suggests that ethnicity and quality of school provider as important determinants for students' participation in supplementary tutoring. Dang (2007) expresses that spending on supplementary tutoring would fall significantly if the qualifications of primary school teachers are increased. Whereas, Chung (2018) finds that students with better performance are more likely to enroll in supplementary tutoring irrespective of the quality of school inputs. Subject choice also determines expenditure on PT. students of the science stream are likely to allocate more resources towards supplementary tutoring (Alhawarin & Abu Kharki, 2012). Liao and Huang (2018) find students' interest in Science a significant factor affecting the possibility of participating in supplementary tuition. Gender has always been a strong determinant when it comes to the allocation of family resources among children. In the case of supplementary tutoring, there are mixed findings. (Laskar, 2016) (Kugler & Kumar, 2017) finds that most household resources are directed towards boys as compared to girls. Whereas (Safarzyńska, 2013) finds more girls enrolled in supplementary tuition as compared to boy students.(Assaad & El-Badawy, 2007) finds no gender bias at all. If we look at the students' point of view, Exam stress, inadequate classroom teaching, peer culture, pressure from parents and indirect pressure from their teachers are some major reasons behind receiving supplementary tuition (Subedi, 2018). In some countries where English is not spoken frequently, Parents prefer to hire private tutors for their children (Alotaibi, 2014). It also holds mostly true in the case of learning any foreign language. It is also a fact that family resources become scarce as the number of children increases (Downey, 1995; Tfaily, 2016). Fewer siblings increase the likelihood for supplementary tutoring and higher levels of expenditure on it (Y. Zhang & Xie, 2016). Damayanthi (2018) Believes that parents, by overcoming the weaknesses of the current formal education system, are actually widening the inequality in education. The same view is shared by (Entrich, 2017). Sometimes it becomes a matter of social pride to enrol the ward in the supplementary tuition centre (Sujatha, 2014).

3 Research Methodology:

3.1 Research Questions:

The study focuses on answering two questions:

- 1) What factors determine whether or not to spend anything on supplementary tuitions?
- 2) How much to spend on supplementary tuitions conditional on spending a positive amount?

3.2 Data Source:

The study is based on primary data which was collected through structured interview schedules in the summer of the year 2022. The study follows multistage sampling technique. Administratively, district Anantnag is divided into 8 community development blocks and has 1 municipal council and 8 municipal committees. Out of these 8 blocks, one block viz Achabal was selected randomly. Achabal Block has a total population of 112,743 persons, out of which 83,217 people live in rural areas while as 29,526 people in urban areas. The data for this study was collected from the rural areas of Achabal. Achabal has 42 villages with 11994 households.

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Achabal has 3 uninhabited villages and 6 villages where the number of households is less than 100. The villages where the number of households is less than 100 were excluded from the list. The final selection of 12 villages³ was, thus, done from the reduced sample of 34 villages. With the confidence level of 95%, margin of error at 5% and population proportion of 20%, a sample size of 240 rural households was calculated as appropriate for the purpose of the study. From each village 20 households having children in the age group of 6-18 years were selected purposively.

The data for urban area was collected from the wards falling under the jurisdiction of the municipal council of Anantnag. There are 25 wards under the jurisdiction of the municipal council of Anantnag with a total population of 107865 persons and 12065 number of households. With the confidence level of 95%, margin of error at 5% and population proportion of 20%, a sample size of 240 urban households was calculated as appropriate for the purpose of the study. Out of the 25 wards falling under the jurisdiction of Municipal Council of Anantnag, 12 wards were selected randomly. From each ward 20 households having children in the age group of 6-18 years were selected purposively. Thus, a total sample size of 480 households was selected for the purpose of the study.

Table 1: Descriptive statistics of the sampled students					
Characteristics	Ν	%			
Gender					
Boys	563	47.95			
Girls	611	52.04			
Area					
Rural	528	44.97			
Urban	646	55.02			

The descriptive statistics for the sample are given in Table 1

³ Selected randomly

Age-group		
4 to 9		
10 to 16		
Enrolment by School Type:		
Government school	33	19.0
Private school	141	81.0
Average Household Size	5	
Average Annual Household Income (in Rupees)	Rs. 645089.97	
Household Head's Average Years of Schooling (in years)	10.09	

3.3 Model:

Since the dependent variable is a dichotomous variable with values of 0 and 1, the most popular method for tackling the first research question about the likelihood of students participating in supplementary tutoring is binary logistic regression model regression. Spending on supplementary tutoring is the dependent variable for the second research question. The dependent variable is censored at zero since only students who received supplementary tutoring incurred positive expenditures, while students who did not receive tutoring spent nothing. The present study uses the Hurdle model which has two steps-first step is the binary outcome equation which models the likelihood of spending a positive amount and the second step uses linear regression model to analyse the decision of how much to spend conditional on spending a positive amount. The present study follows Liu & Bray's (2017) methodology. Simple Hurdle model is expressed as:

$$P(w = 0 | x) = 1 - \phi(x\gamma)$$
 (1)

$$Log(w) | x, w > 0 \sim Normal(x\beta, \sigma^2)$$
(2)

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where,

W is the expenditure on supplementary tuitions, x is the vector of independent variables, γ and β are parameters to be calculated while σ is the standard deviation of w. Equation 1 shows the probability that w is positive or zero, and equation 2 shows that conditional on w > 0, $w \mid x$ follows lognormal distribution. γ can be obtained from probit using w = 0 versus w > 0 as the binary response. Alternately we can use binary logistic regression (see equation 3) and then linear regression model to estimate the parameters of decision on supplementary tuitions expenditure (see equation 4). In most cases, parents and students must make two independent decisions: first, they must determine whether or not to pay for tutoring, and separate modelling of the decision of whether to spend money on something from the decision of how much to spend on it, subject to incurring positive expenditures. The variables used in the analysis are:

$$Ln\left[\frac{\mathrm{Ei}}{1-\mathrm{Ei}}\right] = \alpha_{i} + \Sigma \beta_{i} \ln \mathrm{Dem}_{i} + \Sigma \phi_{i} \ln \mathrm{Pp}_{i} + \Sigma \partial_{i} \operatorname{PFac}_{i} + \varepsilon$$
(3)

$$Ln Y_i = \alpha_i + \Sigma \beta_i ln Dem_i + \Sigma \phi_i ln Pp_i + \Sigma \partial_i PFac_i + \mu$$
(4)

- E*i* in equation (3) is the probability of student *i* receiving supplementary tutoring in last 365 days.
- *Y_i* in Equation (4) is the expenditure incurred on an individual student receiving supplementary tuitions in the last 365 days.
- Σ lnDem_i the set of students' demographic characteristics, including gender (dummy variable, female = 0), area (dummy variable, rural status = 0), household size, age of the student, type of school in which the student is enrolled.
- $\Sigma \ln Pp_i$ is the set of each student's personal perspectives, including four variables:
 - Expected years of education
 - Academic Pressure
 - Satisfaction with performance in academics

- $\Sigma PFac_i$ is the set of parental factors, including two variables:
 - Annual household income (Natural log)
 - Parent's years of education: the years of education of the parent with the higher level of education.

4. Data Analysis and Results:

The survey indicated that 65.3% of the sampled students had received supplementary tutoring during the previous year while 34.7% didn't. Among the 65.3% of the students who had received supplementary tuitions the average annual expenditure on tutoring was \gtrless 16309.09.

The following sections analyse the determinants of a) receiving supplementary tutoring through binary logistic regression (table 2, Step 1) and b) expenditure on supplementary tuitions through linear regression (table 2, Step 2).

Table 2: Model Results about determinants of likelihood and expenditure for Supplementary tutoring						
	Step 1			Step 2		
	Probability of	Probability of receiving Supplementary Tutoring			Ln (Supplementary Tutoring	
				1	Expenditure)	
Independent	Coefficient*	Robust	z	Odds Ratio	Coefficient	Robust SE
Variables		SE				
Area	.075034***	.178652	0.42	1.077920	.2509932 [*]	.0319224
Household Size	185775 [*]	.049147	-3.78	1.204151	1253340 [*]	.0133944
Gender	.067639**	.173435	0.39	1.069979	.0768541**	.0288001
Age of the student	.041194*	.061761	6.67	1.042054	.0551154	.0114894
School Type	046547*	.2873318	162	1.047647	0519448*	.408285
Expected years of	.069832	.303618	0.23	1.072328	.0622143	.0133568
education						
Academic pressure	.365684	.0621912	1.88	1.011761	.0057022	.0045501
Satisfaction about	225160***	.1062077	-2.12	1.252523	0124347*	.032557
academic						
performance						
Ln(Annual	.194912**	.113321	1.72	1.215204	.08376131**	.0387889
Household Income)						
Parent's Years of	.155429***	.030962	5.02	1.168159	.0.1322109*	.0164553
Education						

4.1. Determinants of Probability of receiving supplementary tutoring:

Pseudo R ² /R	ĺ	0.1829
X²/F		267.83***
Number	of	1174
Observations		
Log Likelihood		-598.45688
*p< .1		

p<.05 *p<.01

4.1.1. Demographic characteristics of Students:

The odds of receiving supplementary tutoring differed according to the area in which the students lived. The odds of receiving supplementary tuitions in urban area increased by 7.8% approximately. The OLS (Table 2, step 2) shows confirms that the expenditure on private tuitions in urban areas is greater compared to rural areas by an amount of 25% approximately. The incidence of higher demand for supplementary tuitions in urban areas could be attributed to the the availability of more educational opportunities in urban areas (Andreou, 2012). In their research, (Glewwe & Patrinos, 1999) found that households in urban areas spend more money compared to rural households on educating their children. Andreou (2012), Acar, Günalp, & Cilasun (2016), Iddrisu, Danquah, & Quartey (2017), Acerenza & Gandelman (2017) also find that, relative to rural households, urban households spend considerably more on education.

The education of children is the only solution for the rising and aspiring middle class who seek greater chances and an improvement in their level of well-being. Parents turn to supplementary tuitions to improve their children's academic performance and help them perform well in entrance and competitive examinations which the households might consider as "high stakes decision points". The demand for supplementary tuitions may also be influenced by other factors including peer pressure etc (Lakshmanasamy, 2017). The rural-urban stratification gives rise to inequality in availing supplementary tuitions.

Household size was found to have a negative impact on the odds of availing supplementary tuitions considerably. The results in Table 2 show that if the household size increases by one member, the odds of availing private tuitions decrease by 20% and

the expenditure on private tuitions decreases by 12.5%. Decrease in expenditure on private tuitions can be attributed to the increase in the "demographic burden" on the households. When the demographic burden for households increases, the demand for resources for alternative uses may decrease households' spending on education in general. Hence the negative impact of the household size on the supplementary private tuitions expenditure is expected.

As far as gender of the child is concerned, the analysis shows that the odds of receiving supplementary tuitions increase, approximately, by 7% in favour of boys. This points towards the existence of gender-based disparity in taking the first decision i.e. whether or not to spend anything on supplementary tuitions. Additionally, the results of OLS regression shows that the supplementary tuitions expenditure on boys is 7.7% more compared to boys. Literature shows that the gender of a child influences a household's decisions in many ways. Also, many studies have shown that when it comes to human capital investment, a household treats boys and girls differently. According to (Karbownik & Myck, 2017), the process considered to be responsible for household decisions involve either gender-biased preferences or an optimisation mechanism that reflects different costs of investment in boys and girls or differential returns from such investments.

Further, with reference to the age of the students, the results show that the odds of availing supplementary tuitions increases by 4.2% and the expenditure on supplementary private tuitions increases by 5.5%. Tilak (2002) found that as the level of education of the student increases, a household has to spend a higher amount on their education. The higher demand for supplementary private tutoring can be attributed to this. Bray and Kwok (2003) ascribe the increase in expenditure to the massive dependence on private tuitions required to pass the secondary level examination for university entrance. According to a report published by the Ministry of Human Resource Development (2016), there is an increase of 0.4 standard deviations in the supplementary private tuitions expenditure for every one year increase in the age of the

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student. With the increase in the age students have transition from lower levels of education to higher levels which also involves taking board exams. Taking board exams (from Class 8th right up to Class 12th) puts high pressure on the students and their parents. It is possible that the stress which "high-stakes" board exams put on students is responsible for higher rates of taking supplementary private tuitions (Guill & Lintorf, 2019). This would contribute to increasing the expenditure on supplementary tutoring.

Enrolment in private or government schools also determine the likelihood and the magnitude of expenditure on supplementary private tuitions. Analysis shows that if the child is enrolled in a private school, the odds of taking supplementary tuitions decreases by 4.7% and the expenditure decreases by 5.2%, approximately. One of the plausible explanation behind this finding could be that the quality of education provided in private schools is considered to be better compared to the government schools which reduces the dependence on private tuitions.

4.1.2. Personal Perspectives of the Students:

The logistic regression supported the hypothesis regarding the positive influence of educational expectations and the negative influence of satisfaction with academic performance among the three variables for students' personal viewpoints. Although the results are not statistically significant, when students' expected years of education increase by 1.0, the odds of availing private tuitions increase by 7.2%. It was assumed that students who experienced more academic pressure would be more inclined to avail supplementary private tutoring. Although the logistic regression indicated a favourable effect, it was not statistically significant. Thus, perceived academic pressure was not a reliable predictor of participation in supplementary tutoring. Furthermore, the results show that when students' satisfaction about performance in academics increased by 1.0, the odds of taking supplementary private tuitions decreased by 25.2%.

5.1.3 Parental Factors:

In agreement with prior empirical investigations (Zhang, 2013, Bray et al., 2014; Liu & Bray, 2017;), the likelihood of receiving private tutoring was considerably positively influenced by both household income and the educational attainment of the parents. The results of both the logistic regression indicates that when annual household income increases by 1.0, the odds of availing supplementary private tuitions increase by 21.5% and the expenditure increases by 8.3%. Similarly, when the parents' years of education increases by 1.0, the odds of taking supplementary tutoring increases by 16.8% and the expenditure increases by 13.2%.

Conclusions:

Although more Chinese students are taking advantage of private tutoring, neither government statistics nor independent studies have adequately evaluated the subject. The current paper adds to the literature based on a representative sample survey. It investigates the likelihood of receiving supplementary tutoring as well as examines the determinants of expenditure on private tutoring.

The study finds a pattern of differentiated demand between students with urban or rural status. This could be possible due to difference in the incomes of the parents living in rural and urban areas. It is also quite possible that there are limited opportunities in rural areas as far as supplementary tuitions are concerned. The results also show household size to have a significant impact on both the likelihood of taking supplementary tutoring and on the expenditure.

The finding of significant gender-based difference in demand for private tutoring is a cause of concern. Parents would have an incentive to favour boys in educational investments if household resources were constrained and labour markets returns to education differed based on gender, in a way that prioritised boys. This puts girls at a greater disadvantage since they face inferior educational outcomes compared to boys.

These patterns of demand indicate that supplementary tutoring may have an unfavourable influence on equity.

Age of the student was found to have a significant impact on the likelihood of availing tutoring but not on the expenditure. Similarly, enrolment in private schools was found to have a negative influence on the likelihood of availing private tuitions as well as on the expenditure. Additionally, expected years of education and academic pressure was found to have an insignificant impact on the likelihood of availing private tuitions and on expenditure. The study shows that students who are not content with their academic performance are more likely to turn to private tutoring for assistance. Although there is less demand for private tutoring, students who are content with their academic performance, will probably pay more for tutoring if they do chose to do so.

The findings about the influence of household income and parental educational level on demand for private tutoring are consistent with the existing literature. These two factors have a positive impact on the probability of availing tutoring and on expenditures on tutoring. Further, students from high-income families are more likely to avail tutoring and to spend more on it than students from lower-income families. These patterns show the importance of policymakers addressing the phenomenon.

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