NATIONAL COUNCIL OF APPLIED ECONOMIC RESEARCH

Working Paper No. : 117

Enrolment of girl children in secondary schools in Rajasthan- A district level analysis

Anushree Sinha
Astha Sen
Rajesh Kumar Jaiswal

May 2019

National Council of Applied Economic Research

Enrolment of girl children in secondary schools in Rajasthan - A district level analysis

Anushree Sinha, Astha Sen, and Rajesh Kumar Jaiswal[1]

Abstract[2]

In comparison to the rest of India, Rajasthan continues to suffer from disturbingly low female literacy rate, poor enrolment and retention rates of girls in schools mostly the in rural areas, but also in the small urban towns. First, this research informs the design of a cash transfer policy intended to improve enrolment levels of 13-15-year-old girls in secondary schools in Dhaulpur, a district of Rajasthan. We use the household-level survey data to observe the true demand for cash transfer that would incentivize the majority of the parents in a sample of households selected for a research study to enrol their daughters in school[3]. Second, we statistically identify non-monetary factors contributing towards parents' decision of enrolling their daughters in secondary education, in the presence of a large enough cash grant. We find that a negative social attitude towards girl education, a girl child's involvement in domestic housework and a girl's prospects of early marriage significantly hinder school enrolment. These observations emphasize the need for government policies that would address the above non-monetary obstacles, in addition to disbursement of cash grants. Furthermore, we statistically investigate attributes that influence the size of the cash grant chosen by parents for enroling their daughters in secondary school. Caste, level of education acquired by parent/s and concerns regarding the safety of girls' determine the choice of a cash grant.

Keywords: Cash transfers, secondary education, school enrolments, rural, Rajasthan, direct costs girl education, education costs, opportunity cost, and policy-making

JEL codes: C81, I38, I22, O15

---

[1]Anushree Sinha is a Professor at the National Council of Applied Economic Research (NCAER), New Delhi, Astha Sen is an Assistant Professor at Sonoma State University in California and Rajesh Jaiswal is a Fellow at NCAER, New Delhi.

[2] A version of this paper is submitted for publication the Contemporary South Asia, a Journal of the Taylor & Francis Group.

[3] The paper draws heavily from the Report titled "Demand Curve Analysis and Pilot Design to Improve Performance of the Pre-Matric Scholarship Scheme for Keeping Girls in Secondary Education in Dhaulpur (Rajasthan)" prepared by NCAER and sponsored by IPE Global on behalf of the Rajasthan Government. Concurrence has been taken from IPE Global for publishing the findings of the study sponsored by them.

1. Introduction

Female education and retention of young girls in schools continue to remain a challenge in India in general. Average female literacy rate for the world is 79.7% (as per UNESCO Institute for Statistics, 2010) whereas female literacy rate in India is 65% (as per 2011 Census of India). As per 2015 statistics, more than 3.5 million girls in India were out of school,[4] the third highest number in the world. In rural areas, girls receive an average of less than four years of education (Jain et. al. 2017). Among the literate women in India, 59% hold primary education or less.

Problems related to girls' education and their retention in schools are much more pronounced in the state of Rajasthan. According to the 2011 Census, Rajasthan has the 33rd worst literacy rate across India as per Centre for Education Innovations (CEI) report on Rajasthan, November 2013. Moreover, the report states that the female literacy rate is way below the national average and is about 47%. Further, the report points out girls' enrolment in primary schools are much lower than that of boys and with substantial dropouts during and before secondary schooling. As per the ASER report of 2011, the number of girls not enrolled in schools in the state of Rajasthan has been increasing. In 2011, 8.9% of girls aged 11-14 years were not enrolled in schools in rural areas of Rajasthan. This percentage has increased to 11 in just a year. As per 2011 census, Rajasthan has nearly 7.4 million adolescent girls, in the age group of 10-19 years. Of these girls, 1.1 million girls are married before the legal age of 18 years. Given these grim statistics, there is an indispensable need to improve the state of girls' education in Rajasthan. Increasing girl enrolments and improving educational outcomes could substantially contribute towards greater gender equity and ultimately economic growth. A World Bank 2013 report highlights that completion of secondary education among girls reduces fertility and mortality rates and enhances economic growth. Referring to data from 100 countries, the report demonstrates that a one per cent increase in secondary education of girls results in an annual income increase of 0.3 per cent per capita (UNGEI and GPE 2014; World Bank 2013). Moreover, UNGEI and GPE 2014 report recognizes various long-term benefits from girls' education. For instance, an extra year of secondary schooling of girls can increase their future wages by 10 to 20 percent and women

[4] http://www.wise-qatar.org/edhub/educate-girls

with secondary education, on an average, have 1.5 fewer children than those with primary schooling.

This article is drawn from a research study which aims to investigate the primary causes of poor enrolments of girls in secondary education in Dhaulpur district of Rajasthan. It is widely accepted that an understanding of elemental causes of the low enrolment levels can help inform effective policy-making. In this paper, we pursue this question for Dhaulpur district of Rajasthan**.** Recently, education-based cash grants (conditional and unconditional) have been popularly used as a valuable policy tool in south Asian countries (such as Bangladesh, Nepal, and Pakistan) and in few states of India (such as West Bengal, Haryana, Bihar, and Chhattisgarh) to improve secondary education of girls. Previous research documents the positive impact of such cash transfers on enrolment and retention of young girls in school. Sekher and Ram (2015) provide evidence on the impact of the Central Government's Dhanalakshmi scheme in Chhattisgarh. The authors find that the probability of being in school increased by 10 percent for those who received the above centrally funded conditional cash grant. A female stipend program in rural Bangladesh for girls' in grades 6 to 10, significantly increased girls' enrolment in secondary education. More specifically, one year of cash subsidy, increased female secondary enrollments by 8 % in rural areas (see Khandker, S., Pitt, M., & Fuwa, N. (2003)). One of the most recent conditional cash transfer in India is the Kanyashree Prakalpa (KP) program. The government of West Bengal introduced it in 2013. A rapid assessment of the program indicates a 4% increase in school enrolment of girls (aged 13-18 years) between years 2013 to 2014 (WCD 2015). The evidence cited here shows that education based cash grants (also referred to as scholarship amount in this study) exert positive impacts on school enrolments and retention of girls. Additionally, the cash grant research cited above and other recent research (such as Ayse et al. 2006, Roelen 2014) point out that direct costs of education and financial need are not the only causes of poor school enrolments among girls. Non-monetary factors contribute towards parents' enrolment decision of their daughters. Such factors include (but are not limited to) social and cultural factors, conservative beliefs, insensitivity of caregivers, child labor, quality of education, gender discrimination at school, availability of inadequate facilities in schools for girls, early marriage of girls of school-going age and the practice of dowry. For example, the KP program report points to the high

statistical correlation between girls' early marriage and dropout rates from education (see WCD 2014 and 2015).

The above-mentioned reasons pose two important questions. One, what factors (monetary and non-monetary) tend to matter the most towards forming the parents' decision of enrolling their daughters in school, predominantly in rural and underdeveloped areas of India. Second, how big should be the size of a cash grant that would satisfactorily compensate parents for their average monetary (direct educational expense such as tuition fee) and non-monetary (such as girl's earnings from a full-time job) costs. If the size of the cash grant is large enough, it could incentivize most of the parents to enrol their daughters in school. We attempt to answer both of these questions using survey data from a sample of 300 households in the district of Dhaulpur, Rajasthan.

First, we design a unique set of iterative questions to unfold the actual cash grants parents' demand for enrolment of their daughters in secondary education. Using this information, we determine an optimal cash grant amount that would maximize girl enrolments for our sample of households. The enrolment maximizing grant identified in this research could inform the size of cash transfer schemes designed for rural and semi-rural areas of Rajasthan to boost enrolment levels of girls in secondary education. Next, we statistically model the choice of enrolment decisions and level of cash grants demanded by the households in our sample. These analyses help to isolate non-monetary factors that statistically and significantly influence parents' enrolment decision of their daughters in secondary education. The government can pay attention to these factors, in addition to the cash transfers, while designing policies that aim to upsurge enrolment levels of girls in secondary education in particular, and overall education in general.

We organize the rest of the paper as follows. Section 2 briefly explains our sampling methodology, data, and our survey. Section 3 presents the summary statistics and empirical analyses. Section 4 concludes the paper. Please note that in this paper we repeatedly refer to cash grants as scholarship amounts. The two terms simply mean the same thing. Therefore, the scholarship does not imply merit-based financial award but is a financial aid offered to support education and disbursed in the form of cash transfer to a household.

2. Methodology and Data

NCAER researchers designed and conducted household surveys in Dhaulpur, a district of Rajasthan to answer the research concerns outlined above. NCAER's research team selected household sample using a multi-stage sampling methodology. This sample came from three Tehsils (random sampling) of Dhaulpur district of Rajasthan[5]. Our final sample comprised 300 girls where a sample of 100 girls came from each of the three selected Tehsils. Furthermore, out of our sample of 300 girls, 195 girls had dropped out of school, 74 girls were attending school at the time of our survey and the remaining 31 girls had never attended school.

NCAER's field team, headed by Rajesh Jaiswal, surveyed the households of the 300 girls selected through sampling. Most knowledgeable adult of the household was the primary respondent of our survey. A copy of the survey used to collect data is available as an Appendix to this paper. The original survey was written and administered in Hindi, as it is dominantly used as a language of communication in the state of Rajasthan. The household survey data were collected over a period of 60 days in the months of March and April 2018.

The household survey was designed to collect rich information on a variety of aspects. The survey collected information on cash grants received at the time of the survey, to support a girl's education in secondary school. The surveys collected abundant information on parents' perception towards the education of their girl child such as primary benefits of enrolling the girl child in secondary school, direct and indirect costs of enrolling the girl child in school, key motivations for sending the girl to school, primary barriers faced towards enrolment and so on. In addition, through a set of iterative questions, our survey gathered information on desired levels of cash grant at which parents' would be willing to send their daughters to school. This is an important part of the survey design and we discuss its format in detail below. Our surveys gathered detailed background information on the households such as the level of household income, education background of parents in a household, caste of the household, types of expenses incurred for education of a girl child, direct cost of enrolling a girl child in school, and number of school going boys in a household. For more details, refer to the actual survey. After the collection

[5] Further details on the exact sample method and design are available upon request.

of the survey data, NCAER's team performed consistency checks of the overall data and the background information reported by the households.

In addition, NCAER's field research team conducted multiple Focused Group Discussion sessions (FGDs) to gather more elaborate qualitative evidence on parents' perception of the education of their daughters. Eight FGD sessions were hosted with parents whose daughters were 13 to 15 years old. Some of them were attending school at the time of these sessions. These sessions were about ninety minutes long. We refer to the evidence from these FGD sessions in the rest of the paper whenever relevant.

All of the 300 households in our sample responded to a series of iterative questions on scholarship amounts (or cash grants). They uncover the exact scholarship amounts demanded by the households (or parents) for the enrolment of their girls in secondary education. We start by asking the survey respondent whether he or she is willing to enrol/continue the education of his/her girl child in secondary education at the ongoing (or currently available) scholarship amount offered by the government in an academic year. If the answer is no, the household is presented with a follow-up question where it decides whether it is willing to enrol the girl child in school at a scholarship amount of Rs. 3,000 in an academic year. If the answer is again no, then the household is presented with another follow-up question where it is asked to consider enrolling the girl child in school at a scholarship amount of Rs. 3,300. This iterative process of responding to a series of questions (related to specific amounts of scholarship) continues up until one of the following two things happen. Either a household agrees to enrol the girl child in school at a proposed scholarship amount or after a series of 'no' responses, the iterative process naturally terminates at the highest proposed scholarship amount of Rs. 6,000. In this iterative process, the scholarship amounts proposed to the households were increased progressively in increments of Rs. 300 starting from the lower limit of Rs. 3,000 to a maximum limit set at Rs. 6,000. The scholarship amounts proposed were organized in a series of 12 questions. One can see the exact format of the series of scholarship questions in Table 1. An important feature of these iterative questions was the increment in scholarship amount by Rs. 300 at a time. We believe this type of questioning format is capable of eliciting truthful amount of scholarship at which a given household is willing to enrol their girl child in secondary school. On the contrary, a free response

question on the desired level of scholarship amount would have generated unreliable and perhaps over-inflated demand for scholarship amounts. Therefore, we regard the design of iterative questions an important component of our survey.

Table 1: Exact design of the iterative questions on scholarship amounts in the survey

Ques 25.1	b) Would you continue to send the girl to attend school at the ongoing scholarship amount?								Yes-1, No-2		
Ques 25.2	If answer of question of 25.1 is "No" then ask next question (26)										
Ques 26[6]	In which amount, you would like to send/continue to send your daughter to school?										
Scholarship (Rs./ Year)	**3000**	**3300**	**3600**	**3900**	**4200**	**4500**	**4800**	**5100**	**5400**	**5700**	**6000**
Would you send?	Yes-1, No-2 (if no then ask next question)	Yes-1, No-2 (if no then ask next question	Yes-1, No-2 (if no then ask next question	Yes-1, No-2 (if no then ask next question	Yes-1, No-2 (if no then ask next question	Yes-1, No-2 (if no then ask next question	Yes-1, No-2 (if no then ask next question	Yes-1, No-2 (if no then ask next question	Yes-1, No-2 (if no then ask next question	Yes-1, No-2 (if no then ask next question	Yes-1, No-2

3. Survey Findings and Empirical Results

This section discusses the primary findings of the household surveys. We organize this section into three sub-sections namely A, B, and C where A summarizes the results of the surveys. Survey results highlight the primary costs, benefits, and barriers towards enrolment of a girl child in secondary education as perceived by their parents. Section B first identifies the scholarship amounts demanded by the households (or parents) for the enrolment of their girls in secondary school. This information is essentially parents' revealed demand for the cash grants or 'willingness to accept price' at which they are willing to enrol their girl child in school. Second, Section B statistically models a household's decision to enrol a girl child in school, at one of the possible scholarship amount, using a binary logit model. Finally, Section C reports the findings of generalized ordered logit model (GOLOGIT) to isolate the non-monetary factors that influence parents' enrolment decision at a chosen level of a cash grant.

[6] The set of iterative questions was numbered question 26 in our household survey

Section A

I. Primary costs and benefits of sending a girl child to school

The decision of the parents to send a girl child to school is expected to depend on many factors including parent's perception of the value of education, social beliefs, provision of safe and conducive learning environment for a girl child, in addition to the direct costs of education. We touch upon these primary factors in this section, one by one. We first elaborate upon the direct and indirect costs and perceived benefits of education of a girl child using the information collected from the surveys and FGDs.

From the survey data, the average direct cost of a girl attending secondary education is estimated to be roughly equal to Rs.3,900 per academic year. Table 2 breaks down education expenses into sub-categories such as school fee, privation tuition, and textbook expenses. From the table, the three largest expense items appear to be clothing other than uniform (such as clothes to wear on non-uniform days and clothing accessories used to dress-up for school in addition to the school uniform), textbooks plus stationary and private tuition fees. Evidence collected from the FGDs reveals that students often hire professional help with the course material outside of the school, in the form of private tuitions as the material is challenging and the teachers at school are not as competent. As a result, private tuitions inflate education expenses.

In order to gauge the indirect costs of educating a girl child, our survey data collected information on monthly earnings of a girl child (aged 13-15 years) when she is not attending school. Such indirect costs can identify the monetary component of opportunity costs borne by an average household from enrolment of their girl child in school. As per our data, the average monthly earning of a girl child who is not attending school is approximately Rs. 987. This number should be interpreted with caution as it based on the earnings reported by 11% of our sample. Very few households report monthly earnings, probably because as per Table 3, majority of the girls' not attending school contribute to the work activities around the house by taking care of their siblings or engaging in some other work activities in their own household.

Table 2: Average expenses incurred on education of girl (13-15 years)

Education expense item	Average expense (in Rs.)
School fee of entire academic year	475.08
Expense on private tuitions	559.48
Textbooks /Stationary	760.26
School uniform expenses	515.52
Examination fee, question paper charges etc.	166.81
Clothing (other than uniform)	1215.09
Other expense[1]	111.08
Total educational expense in a year	3834.95

Notes: [1]Other expenses include travel expenses, expense on yearly study tour, incidental expenses, expense on shoes, picnic, food etc.

Table 3 shows that more than 55 % of the girls who are not attending school, take care of their siblings at home and about 96% of these girls perform household chores. Hence, as per our data, the non-monetary component of opportunity costs (or indirect costs) is formidable for an average household and is much bigger than its monetary component. FGDs evidence supports these findings. Information gathered from these sessions reveal that girls spend a lot of their time on taking care of their siblings, run chores around the house and actively contribute towards farming activities of the households when not attending school[7].

We now turn our attention to the primary benefits of educating a girl child, as perceived by their parents. Figure 1 reports parents' responses to a multiple response questions. As per Figure 1, 85% of the parents think that educating a girl up to class 10 is important in order to secure a certain level of respect for their daughters in society. The other most popular benefits perceived by the parents are better future career and marriage prospects. FGDs further add to these observations and highlight both benefits and costs of educating a girl from the parents' perspective. About 70% of the parents, who participated in the FGD sessions, indicate that it is important for a girl to acquire a certain level of education to earn respect for herself and for her family in the society. Roughly, 14% of the FGD participants indicate that a girl should

[7] In Table 3, the category of 'other activities' specified by the households is TV watching and other forms of entertainment.

acquire some education to be able to become independent. Parents' perception of girl's education in relation to marriage is mixed. Although parents feel that a certain level of minimum education can help fetch a better match for their daughters, at the same time, they feel it can get increasingly difficult to find a marriage match when a girl acquires more than a certain basic level of education. In addition, as per parents, more education could be problematic as it could increase dowry demands. Moreover, 20% of the parents indicate that since a girl child marries another family eventually, a more educated daughter would not bring monetary gain or any other benefits to the girl's parents and family.

Figure 1: Percentage of households reporting reasons as to why girls should complete at least Class 10

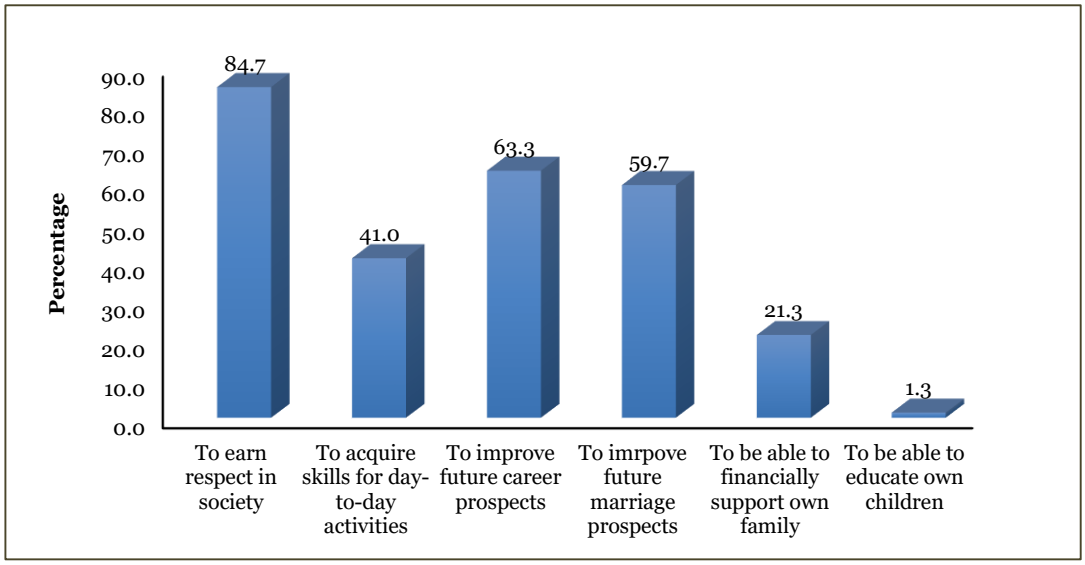


Table 3: Opportunity costs borne by parents for educating their girls

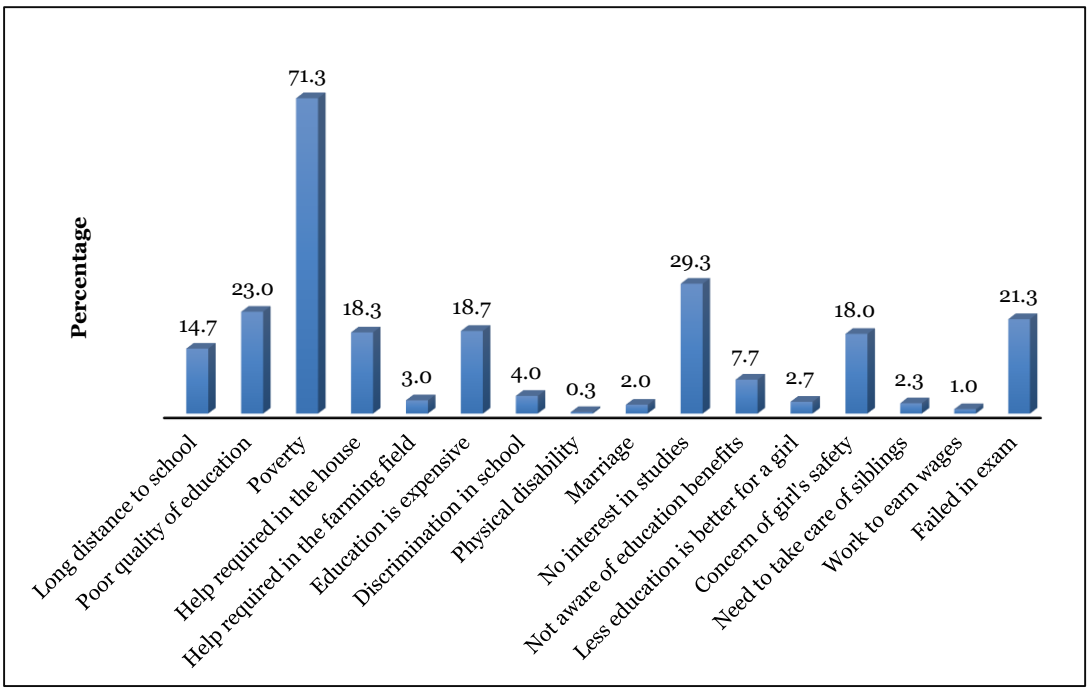
Activity[1]	Percentage[2]
1. Taking care of sibling	56.64%
2. Taking care of parents / elders in the family	25.66%
3. Household chores	95.58%
4. Work outside home to earn money and support parents	19.47%
5. Other activities	9.73%

Notes: [1]The percentages presented in this table are based on the sample of girls who dropped out of school or never attended school.
[2]Data in the table comes from a multiple response question in the survey therefore the sum of percentages across all activities exceeds 100.

II. Primary barriers towards sending a girl child to school

Figure 2 characterizes a variety of barriers faced by parents in sending their daughters to school. It reports data gathered via multiple response questions on the survey. The leading barriers that emerge from Figure 2 include poverty, poor quality of education, failure to pass the exams, girl's contribution in the household work (which is a type of non-monetary opportunity cost discussed above) and a threat to girl's safety in the respective community. There is also a lack of motivation to learn from the girl' side as seen in Figure 2 below. Moreover, 77% of the participants in the FGDs inform that parents of a girl child intend to marry their daughters as soon as they turn 14 years old. This provides evidence of early marriage (and illegal marriage) of a girl in our sample district. Overall, all the problems spelled out here, point to a mix of both financial and non-financial obstacles towards the education of a girl child.

Figure 2: Key reasons highlighted by parents for not sending their daughters to school



•

Section B

I. The demand for scholarship amounts by the households

Using the iterative questions on scholarship amounts (as explained in the methodology section above) in our survey and additional questions on ongoing scholarship, we are able to identify the demand of scholarship amounts of the households in our sample. Girls belonging to 74 households in our sample of 300 were attending school at the time of the survey. 26 out of these 74 households report that their girl child was receiving a positive scholarship amount from the government. Consequently, roughly 35% of the school-going girls in our sample reported receiving some positive scholarship amount at the time of the survey. Furthermore, the average scholarship amount reported by these 26 households is equal to Rs. 1,364.80.

Below, we tabulate and graphically illustrate the information gathered on enrolment levels corresponding to the various possible levels of scholarship amount. Column 2 of Table 4 identifies the number of reported enrollments of girls in secondary education for the ongoing scholarship amount (obtained from the survey data) and various other scholarship amounts proposed in the iterative questions of the survey. More specifically, at the estimated average of the ongoing scholarship amount of Rs. 1,365, 23 households (or parents of 23 girls) agree to enrol their girl child in secondary education. This implies a reported enrolment level of 23 at the ongoing scholarship amount and this number is recorded in the second row of column 2. Similarly, when a scholarship amount of Rs. 3,000 is proposed by the iterative question in our survey, parents of 67 additional girls agree to enrol their daughters in school. All the numbers in column 2 add up to our sample size of 300 as shown in the last row of the column.

Column 3 records the total number of enrollments (or cumulative enrollments) at any given level of scholarship amount. Columns 4 and 5 present the information of columns 2 and 3 in percentages. As we can see from column 2, the levels of enrolment progressively increase with the increase in the scholarship amount. This trend is straightforward and intuitive. We also observe that the biggest gain in enrolment occurs when the scholarship amount changes from the ongoing scholarship amount to Rs. 3,000. This marginal gain is equal to 67 enrollments. From column 5 we see that about 55 percent of the households in our sample are

willing to enrol their daughters in secondary education at a scholarship amount of Rs. 3,900. This clearly indicates that there is a presence of substantial non-monetary costs in our sample data because using our survey data we estimated the average direct costs of education to be Rs. 3,900 in section A above. If the indirect costs of education were negligible, we would observe a close to 100 percent enrolment at the scholarship amount of Rs. 3,900.

Table 4: Enrolment levels at various scholarship amounts

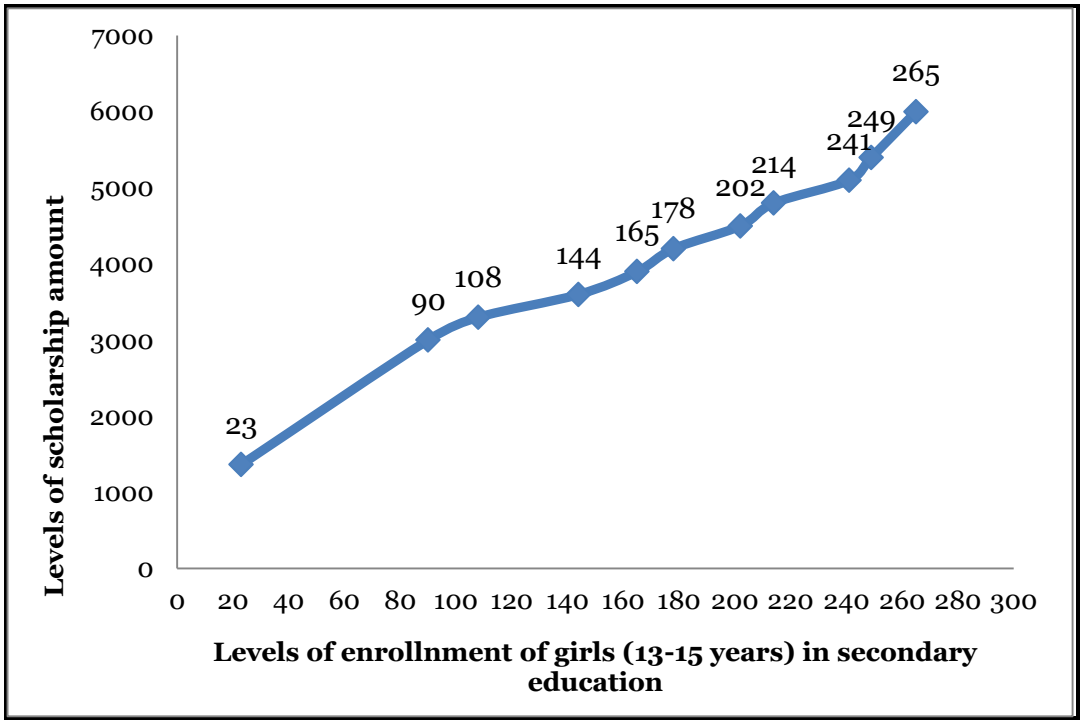
Scholarship amount (in Rs.)	Number of enrollments of a girl child	Cumulative number of enrollments of a girl child	Number of enrollments of a girl child (in %)	Cumulative number of enrollments of a girl child (in %)
Ongoing amount (Mean: 1365)	23	23	7.67	7.67
3000	67	90	22.33	30.00
3300	18	108	6.00	36.00
3600	36	144	12.00	48.00
3900	21	165	7.00	55.00
4200	13	178	4.33	59.33
4500	24	202	8.00	67.33
4800	12	214	4.00	71.33
5100	27	241	9.00	80.33
5400	8	249	2.67	83.00
6000	16	265	5.33	88.33
Never enroll	35	300	11.67	100.00
Total	300	300	100.00	100.00

Note: [1]Numbers presented in these columns are projection estimates

Finally, Figure 3 below graphs the information presented in column 3 of Table 4 to illustrate the cumulative levels of enrolment at various scholarship amounts proposed in the survey. Figure 3 is analogous to a 'Revealed Demand Curve' extracted from our sample, where the overall enrollments of a girl child in secondary education are measured on the x-axis and the corresponding scholarship amounts are on the y-axis. Since y-axis of Figure 3 plots a scholarship amount that is received instead of plotting a price paid for a good, we can think of this demand curve that illustrates 'willingness to accept a price' versus the illustration of 'willingness to pay a price'. As a result, we observe an upward sloping demand curve rather than a downward sloping curve. The last thing to note here is there are 35 girls in our sample whose parents (or households) chose to never enrol them in school, even at the maximum level of proposed scholarship amount of Rs. 6,000. Consequently, the overall enrolment level in Figure 3 (and column 2 of Table 4), reaches 265 which is

88.3 % of our sample. Therefore, our revealed demand curve suggests that an annual cash grant of Rs. 6,000 achieves the best possible enrolment of girls, that is, about 88% for our sample.

Figure 3: Scholarship amounts demanded by the households for enrolling their daughters in school



II. Binary Logit Model

We now present our first empirical analysis using a binary logit model. We statistically model a household's decision to enrol their girl child in secondary education at either the ongoing scholarship level or one of the levels proposed by our survey questionnaire. We employ this analysis to identify the most important non-monetary factors that impact enrolment decision of households, in the presence of a large enough cash grant that goes up to Rs. 6,000. We call the cash grant large enough because the maximum cash grant that is offered to the households (Rs. 6,000) is about 1.5 times greater than the average direct cost of education in an academic year (that is Rs. 3,900).

We use the model as below:

$$S_i^* = \alpha + \beta' X_i + \varepsilon_i \quad (1)$$

where S_i^* identifies household i's probability of enrolling their girl child (of age 13-15 years) in secondary education at either the ongoing scholarship amount or at one of the scholarship amounts proposed in the survey. X is a vector of covariates that determine this probability. The X vector could include variables such as income of a household, direct and indirect costs of sending a girl child to school, benefits associated with girl's education as perceived by the household and so on. Because we do not observe S*, but rather a dichotomous indicator of whether or not household i decides to enrol their girl child in secondary school (S), we estimate equation (1) as a logistic regression model. A binary logistic regression is used (instead of ordinary least squares regression) to model individual choice when the observed outcome variables are dichotomous (Peng et. al. 2002). A logit model uses a maximum likelihood estimation method and specifies the probability of discrete values of the outcome variable using the cdf of a logistic distribution function (see Cameron and Trivedi 2005). Following are the values of our outcome or dependent variable in an equation form –

$$S_i^* = 1 \; if \text{ household i continues or decides to send their daughter to secondary school}$$

$$= 0 \text{ otherwise} \quad (2)$$

In words, the outcome variable (S_i^*) in our statistical analysis is one if household I choose to enrol their girl child in school at any one of the proposed scholarship amounts and zero if it decides to not enroll, even if the scholarship amount takes the highest possible value of Rs. 6,000.

Based on the summary statistics presented in sub-section A (factors that may notably matter in the parents' decision of their girl's enrolment), we identify a set of explanatory variables to be included in the 'X' vector. First, as we determine the set of independent variables, we pay careful attention to the problem of multicollinearity[8]. We use pairwise-Pearson correlation measures to test for a strong correlation between the explanatory variables. Using the types of opportunity costs shown in Table 3, key benefits and barriers highlighted in Figures 1 and 2, we

[8]Logit model does not assume normal distribution, does not require a linear relationship between the dependent variable and the independent variables, nor does it impose homoscedasticity. However is does require little or no multicollinearity among the independent variables.

construct our set of explanatory variables. We run numerous specifications of our logit model and conduct popularly used goodness of fit tests (such as Bayesian information criterion (BIC), Akaike's Information Criterion (AIC) , McFadden R-squared) to determine the logit model that best fits our data[9]. We present our logit result in Table 6.

We first name and describe all the predictors or independent variables included in our statistical model in Panel A of Table 5. The mean values of these variables are presented in Panel B of Table 5. The means are organized by the values of our outcome variable[10].

Panel A of Table 6 reports the coefficient estimates from our logit model and the number of observations used in this estimation. The coefficients reported by a logit model are in log odds ratios. Here we present both the log odds coefficients and predicted probabilities (as these probabilities offer a more intuitive interpretation of the coefficients) estimated from our logit model. Graphical results of predicted probabilities are discussed below.

Table 5: Means and definitions of the independent variables used in binary logit model

PANEL A: Definitions of predictors	
Variable name	**Statistical definition**
Caste	This is defined as one if general caste and zero otherwise
Number of Boys	It is a variable with values zero to five. It identifies the total number of school going boys in a household.
Poor quality of education	It is equal to one if a household reports this as one of the barriers/ problem for sending their girl child to school (This variable appears as one of the key barriers towards a girl's school enrolment in Figure 2 above)
Education is expensive	It is equal to one if a household reports this as one of the barriers for sending their girl child to school (This variable appears as one of the key barriers towards a girl's school enrolment in Figure 2 above)
Girl's marriage	It is equal to one if a household reports this as one of the barriers/ problem for sending their girl child to school (This variable appears as one of the key barriers towards a girl's school enrolment in Figure 2 above)
Girl child is not motivated to learn	It is equal to one if a household reports this as one of the barriers/ problem for sending their girl child to school (This variable appears as one of the key barriers towards a girl's school enrolment in Figure 2 above)
Less / no education is appropriate	It is equal to one if a household reports this as one of the barriers/ problem for sending their girl child to school

[9] For the description of these tests, see Williams 2005

[10] Note that the outcome variable (or the dependent variable) is equal to one when a household decides to send their girl child to school and it is zero otherwise.

	(This variable appears as one of the key barriers towards a girl's school enrolment in Figure 2 above)
Girls safety is an issue	It is equal to one if a household reports that girl safety is a problem in their neighborhood (This variable appears as one of the key barriers towards a girl's school enrolment in Figure 2 above)
Social norm	It is equal to one if a household reports that social norm or social attitude towards girls education is one of the barriers for sending their girl child to school
Household chores	It is equal to one if a girl does household chores when absent from school[11] (This variable appears as one of main non-monetary opportunity costs faced by households, by sending the girl to school, in Table 3 above)

PANEL B: Means of predictors

When households decide to enroll/send their girl child to school; (Outcome variable = 1)

Variable name	**Average**
Caste	0.04
Number of Boys	1.15
Poor quality of education	0.23
Education is expensive	0.18
Girl's marriage	0.02
Girl child is not motivated to learn	0.28
Less / no education is appropriate	0.03
Girls safety is an issue	0.18
Social norm	0.20
Household chores	0.71

When households are decide to NOT enroll/send their girl child to school; (Outcome variable = 0)

Variable name	**Average**
Caste	0.03
Number of Boys	0.83
Poor quality of education	0.23
Education is expensive	0.17
Girl's marriage	0.06
Girl child is not motivated to learn	0.37
Less / no education is appropriate	0.06
Girls safety is a major issue	0.09
Social norm	0.31
Household chores	0.85

[11] This does not mean that a girl is a dropout from school or has never gone to school. This indicator is applicable to the entire sample of girls whether enrolled or not enrolled in school. It simply gauges the opportunity cost faced by a household when their girl child is not attending school.

Table 6: Result of a binary logit regression: Decision to send/enrol a girl child in school

PANEL A: Logit regression coefficients	
Independent variable[12]	**Coefficients (standard errors are reported in parentheses)**
Caste	-0.447
	(1.139)
Number of Boys	0.310
	(0.215)
Poor quality of education	0.135
	(0.459)
Education is expensive	0.0362
	(0.497)
Girl's marriage	**-1.869***
	(0.983)
Girl child is not motivated to learn	-0.367
	(0.400)
Less /no education is appropriate	-0.667
	(0.842)
Girls safety is an issue	0.831
	(0.656)
Social norm	**-0.839****
	(0.422)
Household chores	**-1.000***
	(0.537)
Observations	300

PANEL B: Average predicted probability for the independent variables that are statistically significant	
Independent Variable	**Predicted probability (standard errors are reported in parentheses)**
Girl's marriage	
When equal to 0	0.88 (0.0179)
When equal to 1	0.59 (0.206)
Social norm	
When equal to 0	0.90 (0.0187)
When equal to 1	0.81 (0.0509)
Household chores	
When equal to 0	0.94 (0.0258)
When equal to 1	0.86 (0.0231)

Notes: The binary logit models the outcome variable where it is equal to one if a household is willing to enrol their girl child in school and is zero otherwise.
Standard errors are reported in parentheses.
Notations: *** p-value <0.01, ** p-value <0.05, * p-value <0.10

[12] The results of our logit model remain the same with inclusion of household income as an explanatory variable. When we included highest level of education variable, which identifies the highest education level of the most educated parent in a household, this variable is statistically insignificant and the other results closely resemble the results presented in Table 6 above. Moreover, goodness of fit measures of the logit model presented in Table 6 above are superior to the logit models, which included income and highest level of education variables.

From Table 6, we observe that the coefficients of three covariates are statistically significant. We gather from Table 6 that the coefficient of a girl's marriage is negative. This implies that a household's decision to marry their girl child reduces the log odds of enrolling her in school and this impact of marriage on school enrolment is statistically significant. This result is not surprising given our discussion on early marriage in introduction and sub-section A of this chapter. We observe that the coefficient of social norm is negative and is statistically big as well. As a result, we can infer that the social attitude towards girls negatively affects parents' decision to send their girl child to school.

We also observe that if a girl performs household chores when not attending school then a household is less likely to send its girl child to school. As per Table 3, 95 % of the households report this variable as one of the main types of opportunity costs of sending their girls to school. This impact is also statistically meaningful and big. The inverse relationship observed here is intuitive and points to the indirect cost (or opportunity cost) to a household of sending their girl child to school. The coefficients of all the other predictors listed in Table 6 are not statistically significant[13].

For a more intuitive understanding of the size of the impact of the independent variable in the logit model, we estimate the mean predicted probabilities of the independent variables that have statistically significant coefficients. These estimates are reported in Panel B of Table 6. For the variable 'girl's marriage', we notice that the probability of an average household sending their girl child to school is 88% if the household does not report girl's marriage (when the marriage variable takes a value of 0) as a barrier to her education, holding all the other predictors constant. However, if a household reports marriage as a barrier to a girl's education, the predicted probability of sending the girl child to school drops to 59%. These probability levels show that marriage plays a substantive (and a negative) role in the decision of sending a girl child to school.

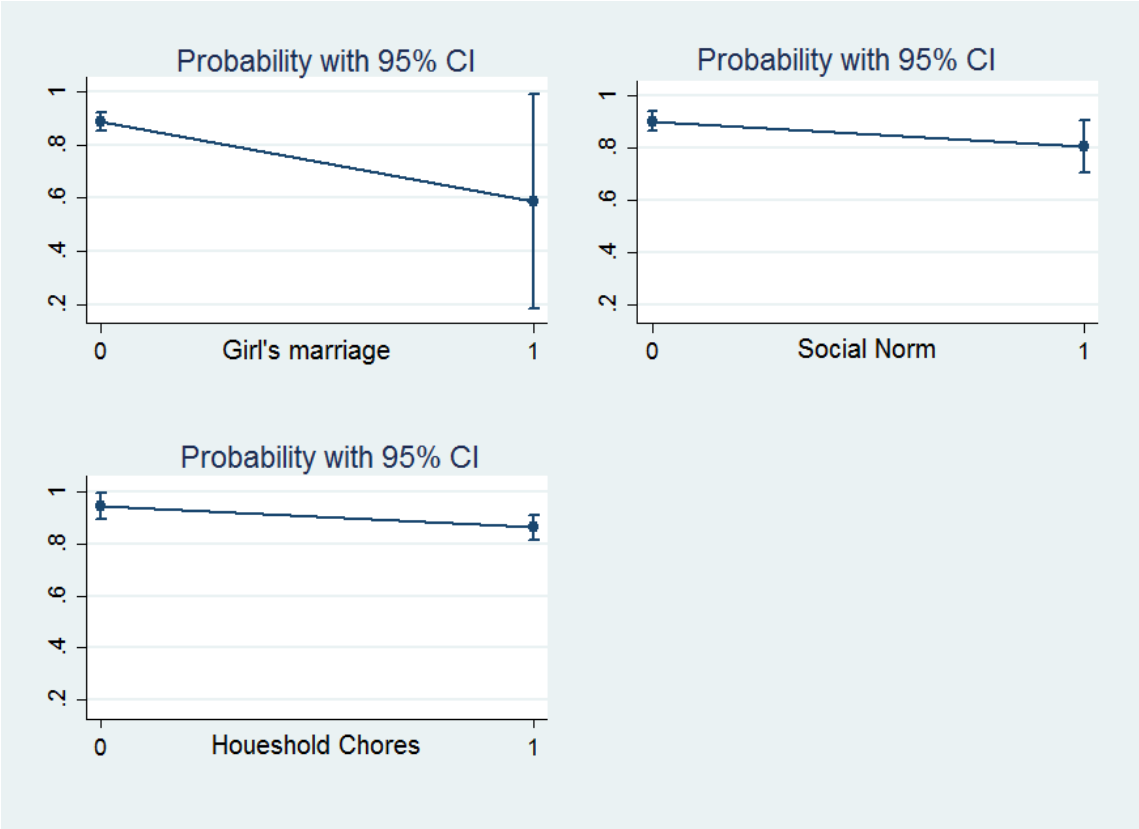
[13] We estimated logit regressions with inclusion of the household's income, highest level of education attained by one or more parents in the household, expenditure on education and finally variables identifies the primary benefits of sending girls to school (shown in Figure 3) but the coefficients of these variables were never statistically significant. In addition, the logit model with inclusion of these variables was a poorer fit, as per our goodness of fit tests, in comparison to the logit model used and reported here.

Similarly, if a household acknowledges social attitude (or social norm) towards girl's education as a barrier, the probability that this household enrols their girl child in a school shrink from 90% to 81%. Equivalently if a girl is involved with running household chores, her probability of being at school falls roughly by 8%. Figure 4 illustrates these average predicted probabilities in the graph as margin plots and present information on 95% confidence intervals. Since all the three variables that seem to matter the most statistically, are negatively influencing the probability of a girl's enrolment in school, the probability plots of these variables in Figure 4 are all downward sloping. As the value of each of the variable changes from zero to one, the probability of enrolment of a girl in secondary education decreases.

Section C

I. Modelling the choice of scholarship amount or cash grant

Figure 4: Predicted probability plots from Logit Model



In this section, we add to the empirical findings of the logit model by answering an additional research question. From the revealed demand curve discussed in Section B (see Table 4 and Figure 3), we not only know if a household chooses to enrol the girl child in school at one of the possible scholarship amounts but, we also know the level of scholarship at which it decides to make the enrolment choice. We now use this detailed information on the choice of enrolment along with the chosen level of scholarship amount to answer the following question- what factors determine a household's choice of scholarship amount provided the household elects to send the girl child to school at one of the possible scholarship amounts. As a result, we now model the choice of scholarship amount of a household using a generalized ordered logit model (GOLOGIT).

We estimate equation (3) below with GOLOGIT model:

$$Y_{is}^{*} = \alpha + \gamma_s X + \varepsilon_i \qquad (3)$$

where X is a vector of independent variables in the GOLOGIT regression

Y_{is}^{*} identifies household i's probability of enrolling a girl child (of age 13-15 years) in secondary education at a scholarship amount s, where s ranges from ongoing scholarship amount to Rs.6,000.

γ_s is a vector of predicted probabilities corresponding to each of the independent variables for a given scholarship amount equal to s, where s again ranges from ongoing scholarship amount to Rs.6,000.

Like in the logit model, we are unable to observe probability Y* in equation (3), but rather observe multiple response variables of whether a household i decides to enrol their daughter in secondary school at a scholarship amount equal to s. The exact definitions of the multiple categories of the outcome variable (Y*) in our analysis are presented in Table 7.

Table 7: Categories of the outcome variable constructed for the use of GOLOGIT Model

Values assigned to the outcome variable (Y)	Definitions
Y = 0	When a household chooses to continue their girl's enrolment at the ongoing scholarship amount which is less than Rs. 3000
Y = 1	When a household chooses to send the girl child to school at $Rs. 3000 \leq scholarship\ amount < Rs. 4000$
Y = 2	When a household chooses to send the girl child to school at $4000 \leq scholarship\ amount < 5000$
Y = 3	When a household chooses to send the girl child to school at $5000 \leq scholarship\ amount \leq 6000$
Y = 4	When a household chooses to send the girl child to school at $scholarship\ amount > 6000$

GOLOGIT is a modified version of an ordered logit model[14] (OLOGIT). Use of an OLOGIT is appropriate for modelling information obtained from the revealed demand curve of scholarship amounts because of our outcome variable stores ordinal data. In other words, a 'higher' value of the outcome variable refers to a 'greater scholarship amount' as shown in Table 7[15]. The only drawback with it is that OLOGIT is too restrictive in its assumption of proportional odds (see Williams 2006 and Harrell 2015). This assumption implies that the effect of every independent variable is constant for every value (or category level) of the outcome variable (Y*). Therefore, OLOGIT model estimates a single slope for each predictor across all values of the outcome variable (Y*). This assumption can be easily violated and need not hold for every predictor. In order to test this assumption and relax it in case it is not true for a given predictor, we use GOLOGIT model instead of OLOGIT (Williams 2016).

For the GOLOGIT model, we again employ the goodness of fit statistics mentioned in Section B to identify the model that best fits our data. The set of independent variables included in GOLOGIT are same as the ones included in logit model of Section B expect the variable on the highest level of education (see Table 8

[14] This model is also known as Proportional-odds cumulative logit model.
[15] For more details on the ordered logit model refer to Cameron and Trivedi 2005 the following link- https://onlinecourses.science.psu.edu/stat504/node/176/

for the definition of this variable). The definitions of the independent variables used in Section B can be recalled from Panel A of Table 5. Means of all the predictors included in our GOLOGIT specification of equation (3) are reported in Table 9 across the multiple categories of the outcome variable of equation (3) above[16]. Table 9 also reports the number of observations available in every category of the outcome variable.

Table 8: Definitions of the independent variable used in GOLOGIT

Variable name	Statistical definition
Highest education level	It is a discontinuous variable with values 1 to 8. This variable identifies the highest level of education of a parent in a household who has acquired the most education. More specifically – 1 = if Illiterate 2 = if literate but education level is below primary school 3 = if completed primary education 4 = if completed middle education 5 = if completed secondary education 6 = if completed higher secondary education 7 = if completed Bachelor's Degree 8 = if completed higher than Bachelor's Degree

Our findings of GOLOGIT model are illustrated in Table 10. The coefficients of GOLOGIT are also in log-odds units. If an outcome variable takes 'n' number of values, then GOLOGIT model estimates coefficients for 'n-1' points as it identifies coefficients at each cut-off point of the outcome variable. Our outcome variable takes 5 values from 0 to 4, so GOLOGIT reports coefficients at 4 cut-off points. Coefficients at each cut-off point of the outcome variable (organized in columns of Table 10) convey the same information as the coefficients of a binary logit model. More specifically, coefficients in the second column of Table 10 (at cut-off 1) can be interpreted as coefficients of binary logit model; where we compare the log odds of occurrence of zero value of our outcome variable versus all of its other values combined (that is, values 1,2,3 and 4). Next, coefficients in the third column of Table 10, cut-off 2, compare log odds of occurrence of values zero and 1 of the outcome variable versus its values of 2, 3 and 4. The coefficients in the rest of the columns in Table 10 are interpreted in a similar manner. Hence, positive coefficients imply that higher values of the predictor variable are more likely to choose higher values of the

[16] Outcome variable takes values from zero to four as delineated in Table 7

outcome variable. Moreover, if the GOLOGIT coefficients of an independent variable are same across different cut-off points (or across columns in our GOLOGIT regression tables) of the outcome variable; then this implies that the proportional odds assumption of OLOGIT model, as explained above, is not violated. Specifically for our data, this possibility suggests, that a given predictor does not have a heterogeneous effect (or a differential impact) on enrolment decisions at various scholarship amounts[17].

Table 9: Means of the predictors used in statistical model of GOLOGIT

Variable name	Average
When a household is willing to continue their girl child in school at the ongoing scholarship amount of less than Rs. 3,000 **(Outcome variable; Y = 0) (Number of observations = 23)**	
Caste	0
Number of Boys	1.78
Poor quality of education	0.26
Education is expensive	0.09
Need to marry the girl child	0.04
Girl child is not motivated to learn	0.22
Less / no education is appropriate	0
Girls safety is an issue	0.22
Social norm	0.35
Household chores	0.26
Highest education level	5.78
House quality	2.35
When a household is willing to enrol their girl child in school at the scholarship equal to or greater than Rs.3,000 but below Rs. 4,000 **(Outcome variable; Y = 1) (Number of observations = 141)**	
Caste	0.05
Number of Boys	1.17
Poor quality of education	0.23
Education is expensive	0.16
Need to marry the girl child	0.01
Girl child is not motivated to learn	0.31
Less / no education is appropriate	0.04
Girls safety is an issue	0.23
Social norm	0.18
Household chores	0.73
Highest education level	5.07
House quality	2.34
When a household is willing to enrol their girl child in school at the scholarship equal to or greater than Rs.4,000 but below Rs. 5,000 **(Outcome variable; Y = 2) (Number of observations = 50)**	
Caste	0.02
Number of Boys	0.92
Poor quality of education	0.18
Education is expensive	0.30
Need to marry the girl child	0

[17] See Williams 2006 and 2006 for more details on interpretation of GOLOGIT coefficients.

Girl child is not motivated to learn	0.18
Less / no education is appropriate	0.06
Girls safety is an issue	0.10
Social norm	0.26
Household chores	0.70
Highest education level	4.76
House quality	2.28
When household is willing to enrol their girl child in school at the scholarship equal to or greater than Rs.5,000 up until Rs. 6,000 **(Outcome variable; Y = 3) (Number of observations = 51)**	
Caste	0.06
Number of Boys	1.04
Poor quality of education	0.27
Education is expensive	0.20
Need to marry the girl child	0.02
Girl child is not motivated to learn	0.29
Less / no education is appropriate	0.00
Girls safety is an issue	0.12
Social norm	0.16
Household chores	0.84
Highest education level	4.65
House quality	2.12
When household is willing to enrol their girl child in school at some scholarship amount greater than Rs.6000 **(Outcome variable; Y = 4) (Number of observations = 35)**	
Caste	0.03
Number of Boys	0.83
Poor quality of education	0.23
Education is expensive	0.17
Need to marry the girl child	0.06
Girl child is not motivated to learn	0.37
Less / no education is appropriate	0.06
Girls safety is an issue	0.09
Social norm	0.31
Household chores	0.86
Highest education level	4.60
House quality	2.14

In Table 10, the coefficient of the caste of a household is positive and statistically significant at every cut-off point of the outcome variable. This suggests that as the caste changes from any type of 'minority caste or other categories' to a 'general category', on an average, it is more likely that a household will choose a higher level of scholarship amount in order to enrol the girl child in school. This finding may make sense if the ongoing cash grants in our sample district are targeted towards the minorities, reflecting that households in 'general caste' category, on average, are in need of greater financial assistance to support the education of their girl child. This appears to be the case in our data. Roughly, 91% of the households

belonging to general caste in our sample did not receive any cash grant for the education of their girl child at the time of the survey.

Table 10 shows that the other factors which determine a household's choice of scholarship amount (with statistical significance) include highest education level acquired by the most educated parent of a household, number of school going boys in a household, concern of safety of their girl child and whether a girl child engages in household chores when not in school. We consider the impact of each of these predictors one by one here, although we derive a more detailed intuition of our GOLOGIT results when we discuss the predicted probability plots later in the section.

The negative coefficient of highest education level signifies that, on average, with an increase in the level of education of the most educated parent in a household, the demand for higher scholarship amount for enrolment of the girl child in school is less likely. This makes sense because a household with parent/s who have stronger educational background is not expected to face sizable financial hardships and are expected to earn a reasonable level of income. Therefore, these households might not feel a financial pinch when educating their girls and are less likely to demand higher scholarship award. Similarly, a household with more school going boys is less likely to desire a higher scholarship amount. The variable of a number of school going boys is positively related to the household's income level implying the fact that a greater number of school going boys will tend to belong to richer households. A richer household is expected to demand a lower level of a cash grant, on the other hand, the coefficient of the variable 'household chores' is positive. Positive coefficient implies that if a girl child helps with household work when not attending school; then, on average, this household is more likely to demand a higher amount of scholarship for her enrolment in school. Furthermore, the size of the coefficient of this variable varies across the cut-off points. This result is strongly intuitive considering household chores appear to be a significant form of opportunity costs faced by households when their daughters attend school (see Table 4). Finally, Table 10 shows that if parents consider the safety of their daughters as an issue, then they are less likely to demand a greater scholarship amount.

The regression coefficients of GOLOGIT model are hard to interpret if we want to observe the impact of marginal changes in the independent variables on

specific categories of the outcome variable. Therefore, we turn to the estimation of the average predicted probabilities.

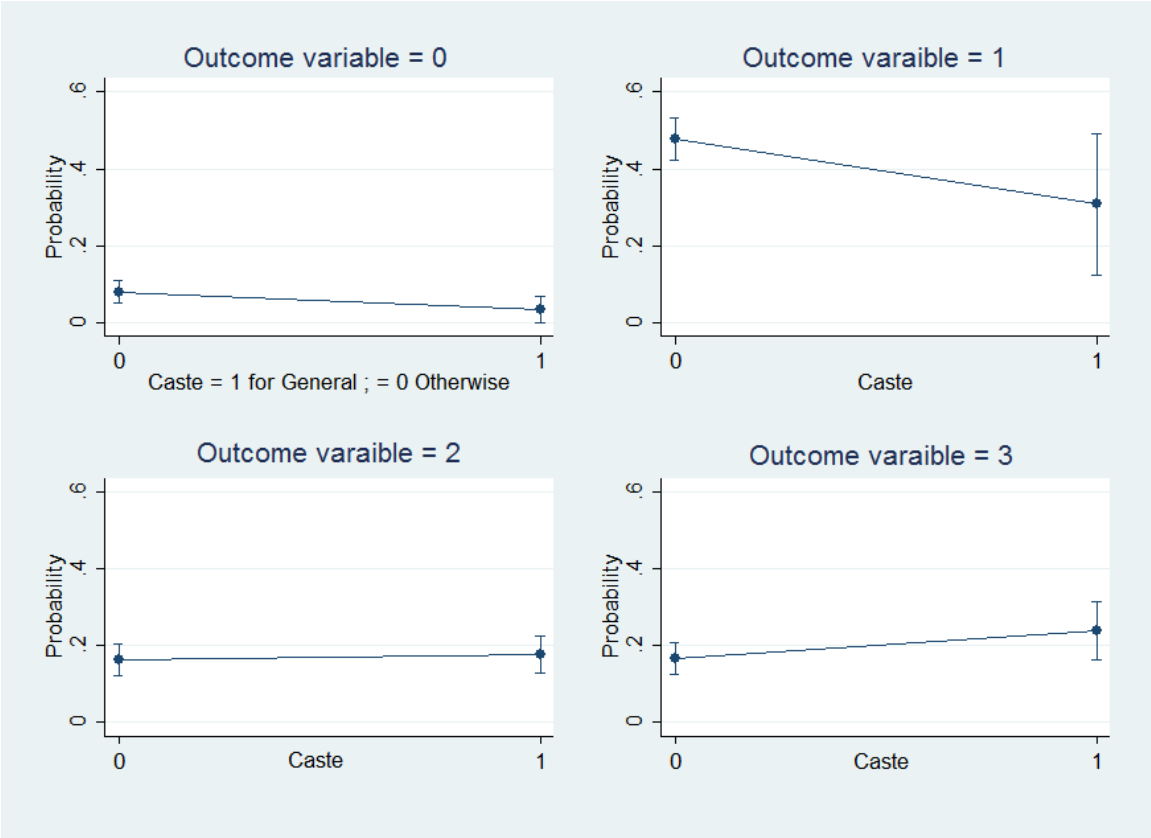
Table 10: GOLOGIT regression result

	(1)	(2)	(3)	(4)
Independent Variable	**Cut-off 1 (0 vs. 1+2+3+4)**	**Cut-off 2 (0+1 vs. 2+3+4)**	**Cut-off 3 (0+1+2 vs. 3+4)**	**Cut-off 4 (0+1+2+3 vs. 4)**
Caste	**0.970***	**0.970***	**0.970***	**0.970***
	(0.548)	(0.548)	(0.548)	(0.548)
Highest education level	**-0.170****	**-0.170****	**-0.170****	**-0.170****
	(0.0862)	(0.0862)	(0.0862)	(0.0862)
Number of Boys[18]	**-0.309*****	**-0.309*****	**-0.309*****	**-0.309*****
	(0.116)	(0.116)	(0.116)	(0.116)
Poor quality of education	0.0315	0.0315	0.0315	0.0315
	(0.259)	(0.259)	(0.259)	(0.259)
Education is expensive	0.188	0.188	0.188	0.188
	(0.273)	(0.273)	(0.273)	(0.273)
Girl's marriage	0.708	0.708	0.708	0.708
	(0.850)	(0.850)	(0.850)	(0.850)
Girl child is not motivated to learn	-0.0712	-0.0712	-0.0712	-0.0712
	(0.251)	(0.251)	(0.251)	(0.251)
Less /no education is appropriate	0.154	0.154	0.154	0.154
	(0.583)	(0.583)	(0.583)	(0.583)
Girls safety is an issue	**-0.639****	**-0.639****	**-0.639****	**-0.639****
	(0.300)	(0.300)	(0.300)	(0.300)
Social norm	0.237	0.237	0.237	0.237
	(0.268)	(0.268)	(0.268)	(0.268)
Household chores	**2.032*****	**0.517***	**0.874****	**0.778**
	(0.508)	(0.291)	(0.354)	(0.518)
Constant	2.761***	0.569	-0.492	-1.585**
	(0.583)	(0.544)	(0.576)	(0.675)
Observations	**300**	**300**	**300**	**300**

Notes:
Standard errors are in parentheses
Notation of statistical significance -- *** p<0.01, ** p<0.05, * p<0.1

[18] 'Number of boys' variable is expected to be correlated with household income. When we omit the 'number of boys' variable and include household income, the coefficient of income variable is always statistically insignificant.

Figure 5; Predicted probability plots for Caste



We graphically illustrate and discuss the predicted probabilities (margin plots) of the variables whose coefficients are statistically significant in Table 10 above in Figures 5 to 9. These plots also show 95% confidence intervals of the plotted probabilities. Figure 5 gauges the impact of caste on a household's probability to demand a given level of scholarship amount for school enrolment of their daughter. With the change in caste from a 'minority or other' (when it is equal to 0) to a 'general' category (when it is equal to 1); a household's average probability to demand the ongoing scholarship amount (of less than Rs. 3,000) for enrolment of the girl child, drops slightly from 8% to 3.5%. A downward sloping probability plot in the upper left panel of Figure 5 shows this effect of caste. For the probability plot positioned in the upper right panel of Figure 3, the level of the scholarship amount is equal to or greater than Rs 3,000, but below Rs 4,000. A household's probability of demanding this level of scholarship amount still decreases (from 48% to 31%) with the change in caste from minority to general category. This probability trend reverses for higher scholarship levels when the outcome variable takes a value of 2 and 3. These findings suggest that households belonging to general caste are likely to

demand higher amounts of a scholarship of Rs. 4,000 and greater when deciding to send their daughters to school. As discussed above, this result could make intuitive sense if the ongoing cash grant support from the government is mostly directed towards the minority and other categories of caste. As a result, we observe that cash grant of Rs. 4,000 or higher could increase enrolments of girls belonging to general caste.

Figure 6: Predicted probability plots for Education level

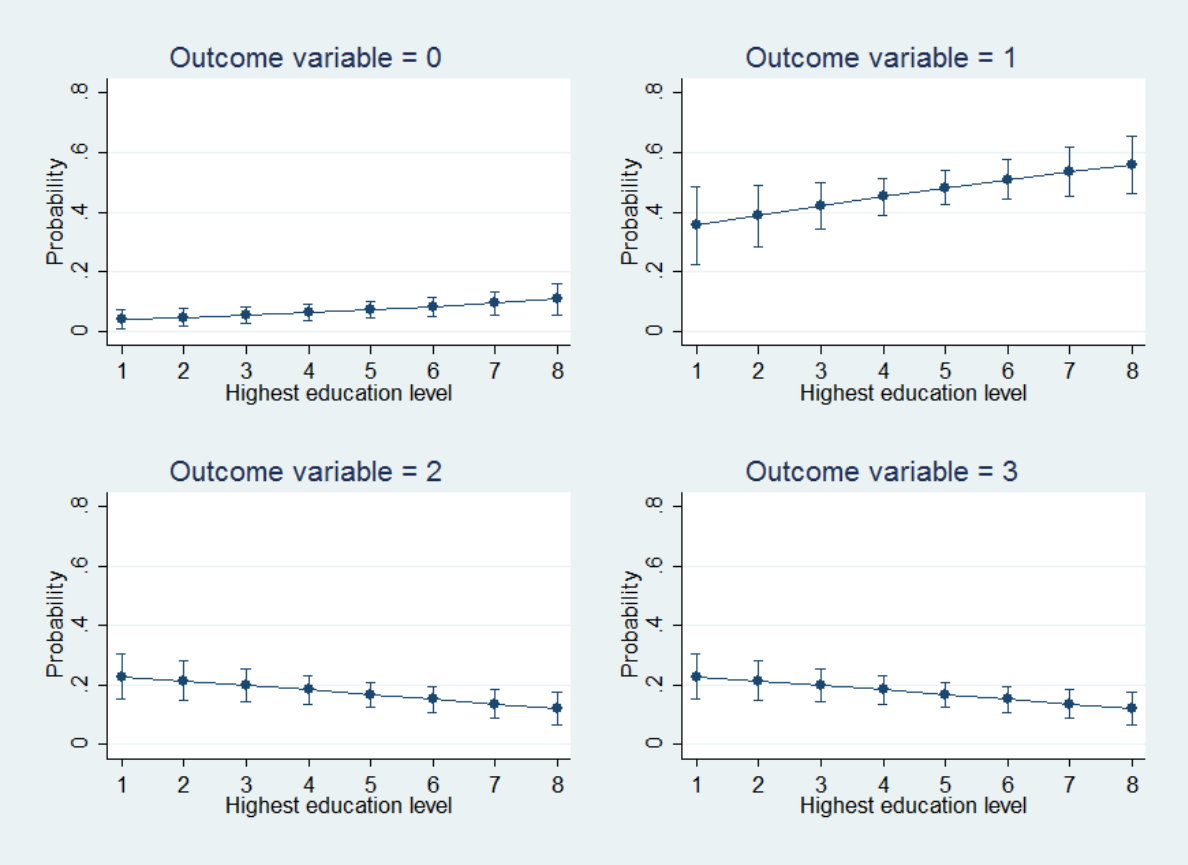


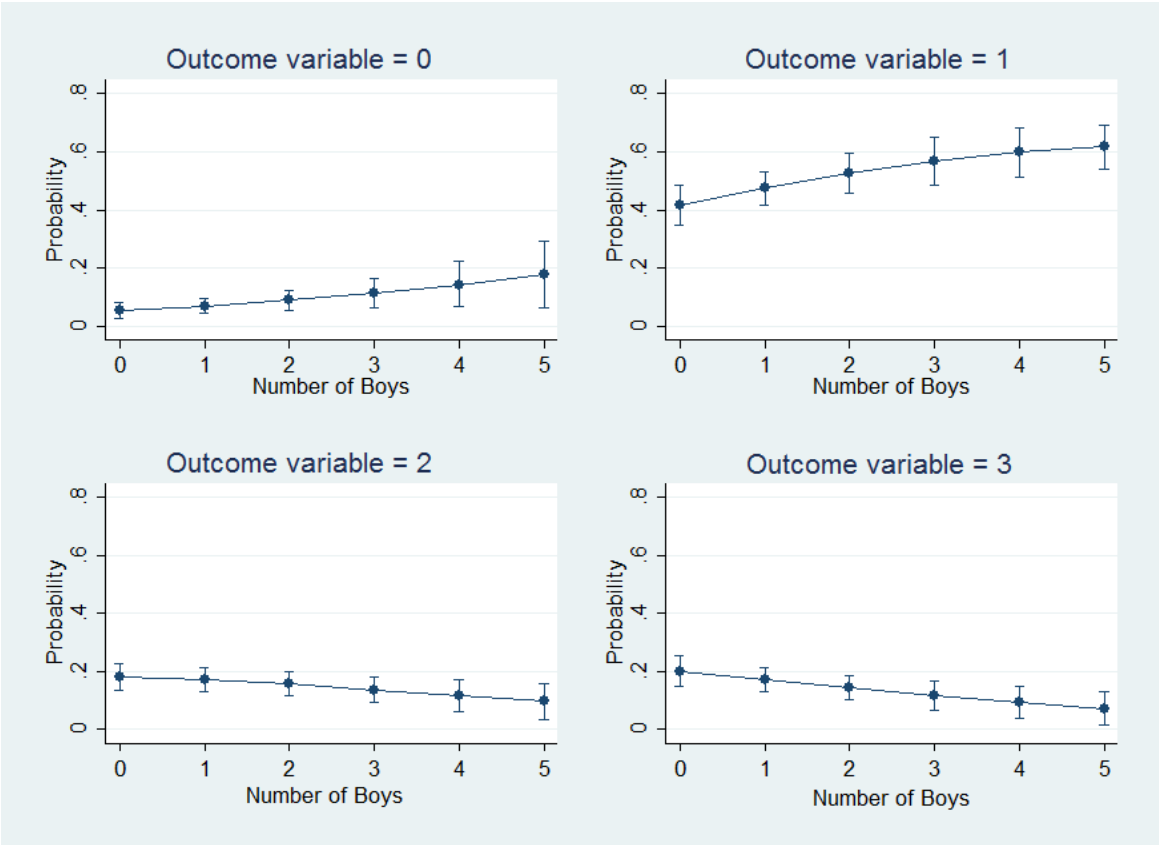
Figure 6 analyses the impact of the highest education level of the most educated parent in a household, on the household's probability of sending their daughters to school, at different levels of scholarship amounts. In Figure 6, the probability of a household to send its girl child to school at the ongoing (or current) scholarship amount, increases progressively with the increase in the education level of the parents in the household[19]. Similarly, when the scholarship amount lies between Rs. 3,000 and Rs. 4,000 (that is Y = 1); the probability of enrolling a girl in

[19] The independent variable (highest education level) considered here, takes values from 1 to 8 as described in Table 8; with 1 being the least education level and 8 being the highest education level.

school increases (from 35% at least level of education to 56% at the highest education level) with the level of education leading to an upward sloping probability plot. This is the upper right graph in Figure 6. However, this probability trend reverses itself starting with the scholarship amount of Rs. 4,000 and more (when the outcome variable is equal to 2 and 3). For the lower left and right graphs in Figure 6, enrolment probabilities drop with the increase in the level of education of the parents. Overall, this implies that more educated parents are more likely to enrol their daughters in school to the scholarship amount of Rs. 4,000. We can rationalize this observation by making a very simple assumption that the households with more educated parents tend to choose a scholarship amount between 3000 and 4000, which in fact closely approximates the true and direct education expense of sending a girl child to the school of Rs. 3,900. Households with superior education would be more aware of the actual education costs and therefore would choose scholarship amounts greater than Rs. 4,000 with lesser probability than the less educated (or less aware) households would.

Interestingly, our results also show that the enrolment probability (of a girl child in school) at a given level of scholarship; is also a function of the number of school going boys in a household. More specifically, we observe that at lower levels of scholarship (when the outcome variable is equal to 0 and 1) a girl's probability of school enrolment increases, with the increase in the number of school-going boys. However, an opposite relationship occurs at higher scholarship levels (when the outcome variable takes the values of 2 and 3). Figure 7 exhibits this relationship. The economic intuition of this result seems to be again related to the awareness of the parents who are more educated and therefore are richer. Parents, whose sons are attending school, are more likely to be familiar with the actual education expenses. Therefore, these parents seem more willing to send their girl daughters to school when the scholarship amount is closer to the true costs of education.

Figure 7: Predicted probability plots for number of school going boys in a household

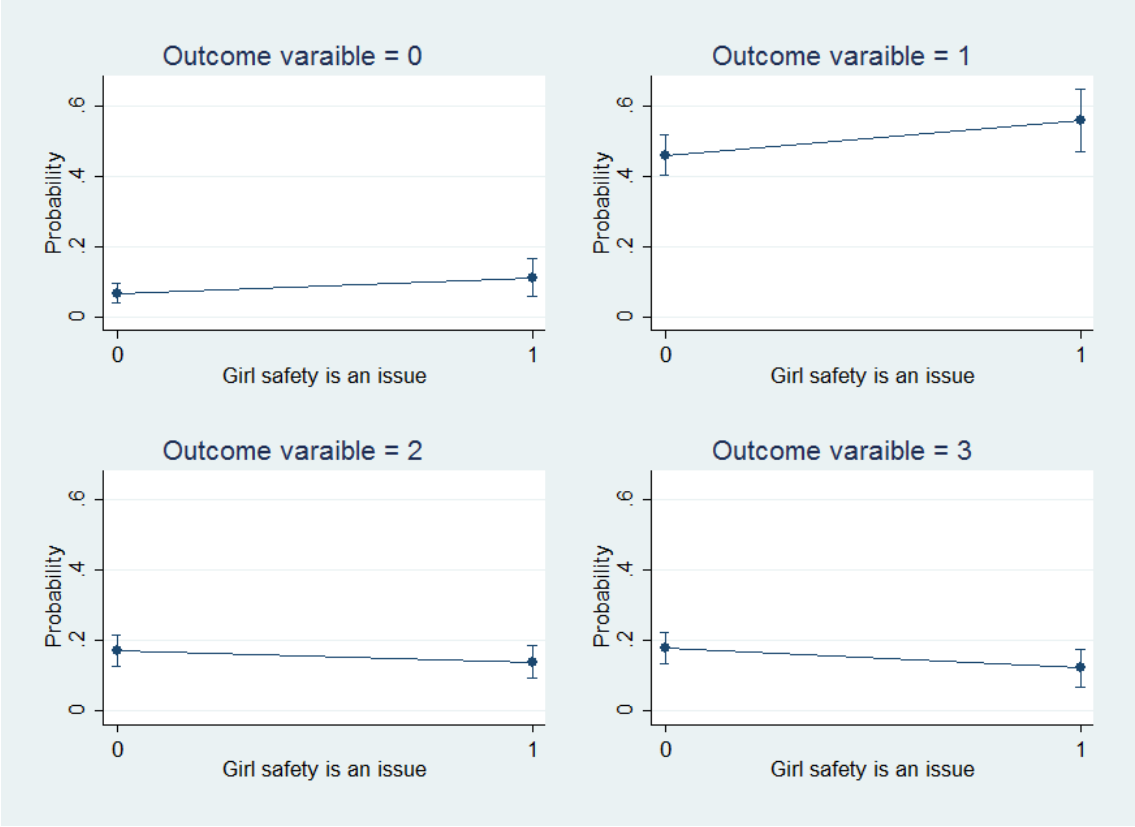


Another predictor which makes a statistically noticeable impact on a household's choice of sending a girl to school (at a given scholarship amount) is their perception of the safety of the girl child. The girl safety predictor is equal to one when a household perceives the safety of girls as a problem in their community and it is zero otherwise. As per Figure 8, concern regarding the safety of girls leads to a very small increase in the probability of girl's enrolment in school at lower scholarship levels (when the outcome variable is equal to 0 and 1). This relationship is counterintuitive[20], but at greater amounts of scholarship (when the scholarship amount is equal to and greater than Rs. 4,000), we observe a small negative relationship (as per our expectation) between a household's concern regarding a girl's safety and the willingness to send the girl child to school. Consequently, if parents worry about the safety of their daughters, then they are less likely to send

[20] It appears that we are missing some part of the story at the lower scholarship amounts, which could explain this counterintuitive relationship between the enrolment probability and girls' safety.

them to school at a given scholarship amount. There is qualitative support of this relationship also from our FGDs. More than 50% of the parents in the FGDs sessions point out the safety of the girls as a dominant challenge that prevents them from sending their daughters to school.

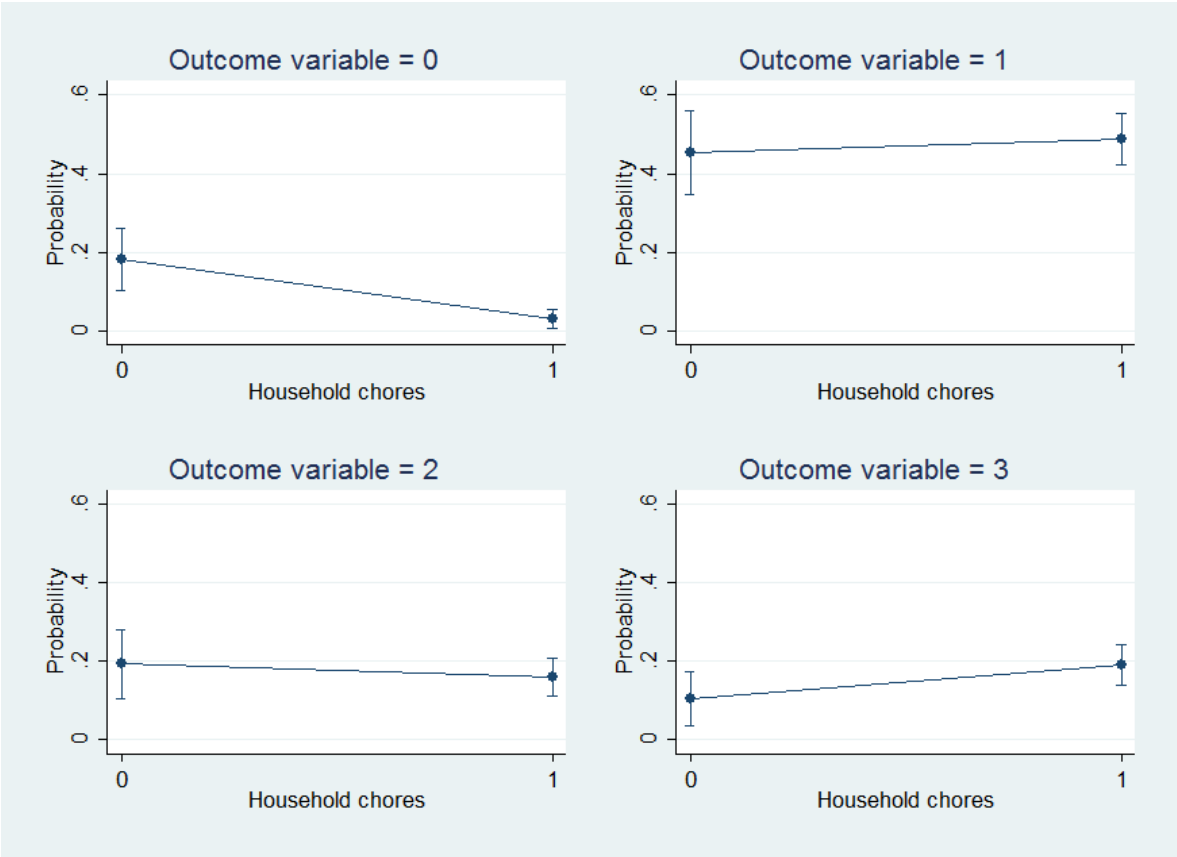
Figure 8: Predicted probability plots when girl safety as an issue



The last factor that seems to determine the decision of sending a girl to school at various levels of the scholarship is the involvement of a girl child in household activities when not in school. This is a factor, which captures one of the main forms of opportunity costs faced by a household when sending their girl child to school. Figure 9 outlines the impact of this predictor on probabilities of enrolment (of girls in school) at different scholarship levels. Figure 9 primarily shows that when the scholarship is greater than Rs. 3,000 but less than 4,000 (that is when the outcome variable is equal to 1 in upper right graph of the figure), then households whose daughters are contributing towards housework, are more likely to send them to school. A similar trend is observed when the proposed level of scholarship lies between Rs. 5,000 and 6,000. On the contrary, at the ongoing scholarship amount, a household is less willing to send their daughters to school if she actively contributes

to the work activities at home. This broadly indicates that households seem to be more willing to bear this non-monetary opportunity cost and send the girl child to school when the scholarship award either fully covers or exceeds the true education costs (Rs. 3,900).

Figure 9: Predicted probability plots when girls actively contribute towards household chores



4. Conclusion

Our survey results show that, in general, enrollments of girls in secondary education can noticeably go up with progressive increases in scholarship award as illustrated by our revealed demand curve. From the revealed demand curve presented in sub-section B of survey findings and empirical results, we also note that 55% of the households choose to enrol their daughters in school when scholarship amount rises up to the direct monetary expense of education. Additionally, one could bring-up the enrolments to about 88 percent if the proposed scholarship amount is roughly 1.5 times the direct monetary cost of education. Consequently, the evidence

presented in this paper indicates that on average, Rs. 6,000 of annual cash grant is enough to cover both the direct and indirect costs of sending a girl to secondary school for 88 % of the households in our sample. An annual cash grant of Rs. 6,000 also brings up the enrolments levels to its maximum possible value in our sample. This number may not be applicable for all (rural; semi-rural and urban) districts of Rajasthan and /or all states of India; but gives us a rough estimate of the size of a cash grant that could substantially boost enrollments of girls in secondary education in under-developed areas in general. One last thing to observe from the revealed demand curve in Table 4 is that the biggest marginal gains in enrolment level occur when proposed scholarship changes from ongoing level to Rs. 3,000 (with marginal gain of 22%), from Rs. 3,300 to Rs. 3,600 (with a marginal gain of 12%) and from Rs. 4,800 to Rs. 5,100 (with a marginal gain of 9%). This suggests that in order to benefit from all the three largest jumps in marginal enrollments, the size of annual scholarship or cash grant should be set at Rs. 5,100 at least. Therefore, we could refer to the optimal size of scholarship as Rs. 5,100 or more annually; for our sample of households.

Our logit analysis shows that early marriage of a girl child, negative social attitude towards a girl's education and her considerable involvement in household work primarily discourage enrolment of 13-15-year-old girls in schools. In the second part of our statistical analysis, we find that parents with a stronger educational background more frequently enrol their daughters at a cash grant level that closely resembles the direct education cost. We also observe that households belonging to 'general' caste are more likely to choose higher scholarship amounts for enrolment of their daughters. Furthermore, we observe that households where daughters considerably contribute towards domestic chores and housework are more willing to enrol them in school at cash grant amounts that exceed the direct education expense. Finally, parents who consider the safety of their daughters as an issue are less likely to demand higher cash grants for their school enrolment. These findings inform policy making, in general, by suggesting that level of enrolments of girls in schools can go up if education cash grants are big enough (and are set at a value over and above the directs costs of education). Households demand higher cash grants if they face substantial opportunity costs (if their daughters perform household chores) of enrolling their daughters in school. Moreover, our results reinforce the importance of non-monetary factors in a parent's decision to educating his/her girl child in

underdeveloped areas. The negative impact of early marriage and social resistance towards girls' education purges strongly in our statistical results. Perhaps new government policies could (in the state of Rajasthan and other less developed states of India) emphasize positive social attitude towards education of young girls and condemn child marriage. To achieve the former goal, the government could publicize the importance of a young girl's education and its long-term benefits in the rural areas. Such initiatives could go a long way in achieving superior educational outcomes for girls and women in rural society in general.

References

Annual Status of Education Report (ASER), Rajasthan (Rural) 2011

Annual Status of Education Report (ASER), Rajasthan (Rural) 2012

Ayse, Kudat, Huseyen Tatlidil, Bulent Ozbilgin, Cigdem Baykal, Michelle Adato, and Akhter
Ahmed. 2006. Evaluating the Conditional Cash Transfer in Turkey: A Qualitative Assessment. International Food Policy Research Institute.

Cameron, A. Colin, and Pravin K. Trivedi. Microeconometrics: methods and applications. Cambridge university press, 2005.

Centre for Education Innovations (CEI), Education Status Report – Rajasthan, November 2013.

Harrell, Frank E. "Ordinal logistic regression." In Regression modeling strategies, pp. 311-325. Springer, Cham, 2015.

Jain, Paras, Rishu Agarwal, Roshni Billaiya, and Jamuna Devi. "Women education in rural India." International Journal of Social Sciences and Humanities (IJSSH) 1, no. 1 (2017): 21-26.

Khandker, Shahidur R, Mark Pitt, and Fuwa Nobuhiko. 2003. Subsidy to Promote Girls' Secondary Education: The Female Stipend Program in Bangladesh. The World Bank.

Muralidharan, Karthik, and Nishith Prakash. 2016. "Cycling to School: Increasing Secondary School enrolment for Girls in India."

Peng, Chao-Ying Joanne, Kuk Lida Lee, and Gary M. Ingersoll. 2002. "An introduction to logistic regression analysis and reporting." The Journal of Educational Research 96, no. 1: 3-14.

Roelen, Keetie. 2014. Sticks or carrots? Conditional cash transfers and their effect on child abuse and neglect. Child Abuse and Neglect.

Sekher, T.V., and F. Ram. 2015. Conditional Cash Transfers for Girls in India:Assessment of a Girl Child Promotion Scheme from Beneficiary Perspective. Mumbai: International Institute for Population Sciences (IIPS).

So, Ying, and Warren F. Kuhfeld. "Multinomial logit models.1995. "In SUGI 20 Conference Proceedings, pp. 1227-1234.

UNESCO Institute for Statistics: Adult and Youth Literacy: Global Trends in Gender Parity

UNGEI and GPE, 2014. Discussion Paper Accelerating Secondary Education for Girls: Focusing on Access and Retention. s.l.:United Nations Girls Education Initiative and Global Partnership for Education.

WCD, 2014. Kanyashree Rapid Assessment, Kolkata: Department of Women and Child Development, Government of West Bengal.

WCD, 2015. Kanyashree Prakalpa Rapid Assessment, Kolkata: Department of Women and Child Development.

Williams, Richard., 2005 "Scalar measures of fit: Pseudo R2 and information measures (AIC & BIC)." Retrieved November 11: 2005.

Williams, Richard., 2006. "Generalized ordered logit/partial proportional odds models for ordinal dependent variables." Stata Journal 6, no. 1: 58.

Williams, Richard., 2016. "Understanding and interpreting generalized ordered logit models." The Journal of Mathematical Sociology 40, no. 1: 7-20.

World Bank, 2013. World Development Indicators: Participation in Education, s.l.: World Bank.