

An economic analysis of gender gap in
household demand for education *

March 25, 2018

Suparna Das

PhD Scholar, Central European University,
Budapest, Hungary

*I thank Andrea Weber for valuable advice.

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1 Introduction

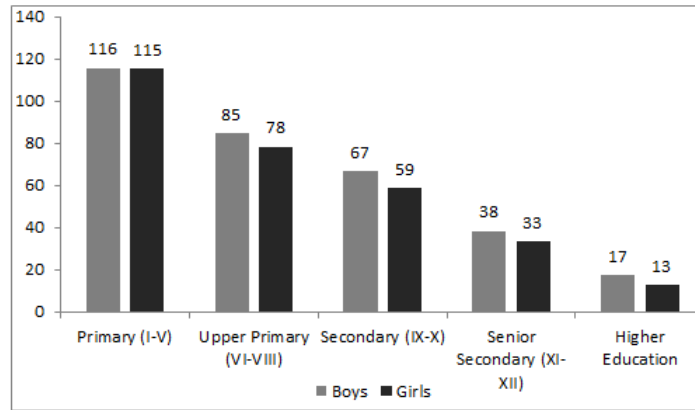
Education plays a crucial role in building tomorrow’s human capital, and thus access to education is considered as an important tool for economic growth and development. In 2000, upon recognition of this importance of education, the second UN Millenium Development Goal (MDG) was directed towards achieving universal primary education and recommended to ensure that, by 2015. As from the past it was evident that girls are not getting to schools as equally as boys, various supply initiatives were undertaken with additional emphasis to close the gender gap in education. The interventions regarding this were primarily to address the special health needs of adolescent girls, their safety concerns and ease in accessibility to schools from their neighborhood. The third MDG of promoting gender equality and empowering women includes the target of elimination of gender disparity in primary and secondary education, preferably by 2005, and in all levels of education no later than 2015. Despite of widely taken global initiatives to acheive universal access to education, the gender gap in education still exists in many developing regions.

Table 1: Out-of school rate (in per cent), 2014

Regions	Primary		Lower Secondary		Upper Secondary	
	Male	Female	Male	Female	Male	Female
Caucasus and Central Asia	5.4	6.1	3.7	4.6	16.9	15.5
Developed Regions	3.4	2.9	2.2	2.0	8.5	7.3
Eastern Asia	3.0	3.0	6.6	6.6	21.2	12.4
Latin America and the Caribbean	6.2	5.8	8.0	7.3	24.9	24.9
Northern Africa	1.0	0.7	1.0	0.7	23.8	26.6
Oceania	8.9	14.3				
South-Eastern Asia	5.3	5.1	15.2	13.1	36.8	36.5
Southern Asia	5.8	6.8	21.4	17.7	48.7	51.2
Sub-Saharan Africa	19.2	23.3	31.8	36.5	54.6	60.8
Western Asia	7.8	13.7	13.1	20.0	29.8	35.5
World	8.1	9.7	16.0	16.0	36.9	37.5

Source: UNESCO Institute for Statistics database.

Figure 1: Gross Enrolment Rate at different education levels (2011)- India



Source: Ministry of Human Resource Development, Government of India.

Followed by MDGs in 2000, extensive government initiatives with special emphasis on girls were undertaken and recognition towards importance of universal education was reflected in plans, programs and policies of India. The access to education has shown tremendous progress and become successful to bring almost all potential pupils at the age-group of primary level (6-10 years of age) to school. In India, the gross enrollment rate (GER) at primary level (I-V) is 116 for boys and 115 for girls and at below secondary level (VI-VIII), it is 85 for boys and 78 for girls (Ministry of Human Resource Development, Government of India, 2011). Starting from below secondary (VI-VIII), secondary (IX - X) to higher secondary (XI - XII) level the gender gap persists and widens with the level of education (Figure 1). The school attendance rate and learning outcomes even at the primary education level are still questionable. The girls in India still lag behind boys in terms of literacy, enrolment, attendance, retention and learning at different education level. Therefore the question arises that despite the enhanced infrastructure and policies to improve supply of education system, girls still are not going beyond primary schooling as similarly as boys?

The Nobel laureate economist Amartya Sen once mentioned that for policy making towards Indian education system "...require the analysis of the characteristics of the economic and social forces operating in India, and response of public policy to these forces" (Sen, 1970). The goals for ensuring access to education for all does not automatically means use of education

system equally by all. It is crucial to identify the constraints that inhibit full enrolment beyond primary level and to analyze the link between economic and social fabrics which creates these constraints that are responsible for the low rate of usage.

This paper attempts to identify the underlying demand side factors that keep girls out of the post-primary education system. This paper addresses the following questions:

- Does the demand for school education differ between boys and girls?
How big is the gap?

The household demand for schooling of children primarily depends on parents' preferences and decisions.

- Do parents prioritise son's education over daughter's education?
- Which factors are responsible for gender gap in parents' demand for children's education?

The paper provides the policy framework towards demand driven initiatives which may help ensuring access to education beyond primary levels equally for girls and boys.

The paper is organised as follows: Section 2 reviews relevant theoretical and empirical literature on the topic; Section 3 gives theoretical background for the empirical model that will be used for analysis; Section 4 presents methodological approach and data used; Section 5 gives the results as well as the robustness tests; and Section 6 concludes with discussion on results and relevant policy implications.

2 Literature Review

Education is the primary component of human resources and thus have important economic and labor market implications. The human capital and labor market research have identified schooling years as an important determinants of wage earning and therefore its return generate incentive for demand for education. From household perspective, perceived/actual returns

from education motivate parents to spend in education of children. The paper by Jensen (2010) examines the importance of returns to education in schooling decisions. He uses survey information on perceived knowledge about the returns from education from eighth -grade boys in the Dominican Republic and found that the perceived returns from secondary schooling is lower, despite high measured returns. However, when randomly selected school students were made aware of the higher actual measured returns, he found 0.20–0.35 more years of school on average for the aware students over the next four years than those who were not aware.

Attanasio and Kaufmann (2014) investigated the role of expected returns to schooling and related risks as determinants of schooling decisions in Mexico and found that mothers' and youth's subjective expectations play crucial role in decision to enter college and continue high school.

The returns to education and parents demand for child's education are actually linked due to parent's expectation that the child will grow up to an earning individual and then will reciprocate as parents will retire from labor market. Parish and Willis (1993) highlight that parents altruistic behavior leads to investment in child's education in Taiwan. Alderman and King (1998) discuss the possible sources of gender disparity in parental investment in children and claimed that such disparities in investment could come through differences in returns realised by parents, that is the expectation of future transfers from children to parents even when market returns to the children themselves do not differ. Without the empirical exercise, the paper provides arguments towards the gender differential treatment among parents for investment in children education.

Greenhalgh (1985) discussed that patriarchal norms and parent's preference for sons in Taiwan are responsible for different treatment towards girls education compared to boys. Greenhalgh also mentioned that parents often send their girls to work due to resource constraints within the household and also to generate resource for brother's higher studies.

Using 1985-86 Peru Living Standards Survey, Gertler and Glewwe (1992) showed that parents perceive lower net returns to education for girls which leads to lack of parental desire to invest in daughter's education compared to son's education. Similarly, Kingdon (2002) mentioned that parent's gen-

der preference and thus differential treatment of sons and daughters lead to gender gap in education in developing countries like India.

A large number of literature have highlighted that higher birth order, sibling composition and large family size are responsible for lower usage of education in developing countries (see at Gomes (1984) Africa; Knodel, Havanon and Sittitrai (1990) - Thailand; Pong (1997) Malaysia; Shreeniwas (1993) - Malaysia; Greenhalgh (1985); Lillard and Willis (1994) - Malaysia; Parish and Willis (1993); Black, Devereux and Salvanes (2005) - Norway; Knodel and Wongsith (1991) - Thailand). Black, Devereux and Salvanes (2005) examine the effects of family size and birth order on the educational attainment of children using a dataset on the entire population of Norway and find a negative correlation between family size and children's education, but instrumenting for birth order or twin births the family size effects become negligible. Additionally, they showed that higher birth order has a significant and large negative effect on children's education.

A study by Knodel and Wongsith (1991) shows that family size has a significant negative impact on the probability that a child will attend secondary school in Thailand most likely due to the dilution of familial resources available per-child associated with larger numbers of children.

Many literature has also shown marriage and related age is responsible for girl's drop-out from formal educational institutions. Hill and King (1995) details about the barriers to female education. Marriage prospects can encourage or discourage girl's education depending on the relationship they hold between them. Also, social customs like patrilocality, seeing women as primary care-giver and/or home-maker may discourage parents to invest in girl's education as equally as in boy's education. Parish and Willis (1993) also show that elder or eldest daughters are taken out from schools earlier and married away earlier in Taiwan. Cochrane (1983) and Mehra and Osheba (1986) show that parents' education has stronger influence on children's education in Egypt and educated parents attach higher value to education and more likely to educate their girls similarly as boys.

Bommier and Lambert (1999) found that in Tanzania particularly, boys and girls follow fundamentally different patterns of schooling due to different return from pre-school training in the family's economic activities or marriage

prospects of girls. Their model predicts that when school quality decreases or schooling costs increase, parents send their children to school at a later age and for a shorter duration. Specifically for girls, despite they attain lower level of education than boys, girls enroll earlier possibly due to relatively lower returns to pre-school experience for girls than for boys. It could also be the sign of interactions between education and marriage decisions that parents are eager to make their daughters ready for marriage prospects as soon as possible.

Studies also found the child schooling varies with household wealth and location type (i.e, rural or urban). Mauldin, Mimura and Lino (2001) explore the factors and amount related to parents' allocation of money for children's primary and secondary education and found after-tax income, parent's education, region, age and race are important determinants to decide the allocation of parents money on children's schooling.

Using probit models, Glick and Sahn (2000) investigates gender gap in schooling indicators such as grade attainment, enrollment, and drop-out from school in urban West Africa and found increase in household income lead to greater investments in girls' schooling but have no significant impact on boys. Education of father improves schooling of children of both gender, however, mother's education has significant impact only on daughters' schooling. Opportunity cost of schooling and increasing domestic responsibilities such as taking care of very young siblings have strong negative impact on girls' education but not on boys' schooling in India (Pal 2004).

A large volume of literature in human capital and labor has identified either a factor or factors in combination that are responsible for gender gap in education. This paper will further contribute to the existing body of literature by providing a more formal and holistic framework to the demand for education in the household level. In this process this paper identifies the fundamental factors that generate household demand for education and how they contribute to gender gap in demand. This paper also measures the inherent gender gap due to parent's preferences towards sons after separating out the impact of the identified determinants.

3 Theoretical Background

3.1 Household Demand for Education:

The household demand for schooling of children primarily depends on parents' preferences and choices. However, beyond schooling, tertiary (college) education is a combined decision by both parents and children. Without government's education subsidy, parents are sole responsible to bear the cost of education and to decide whether to enroll, how long to keep the children in school, or discontinue a child's schooling. After completion of school education, students often take up part-time jobs to finance (fully or partially) their own education and also play a crucial role in decision of whether continuing education further or not and in which specialization. Beyond school education, perhaps parents and children together bear the expenses. As this paper focuses on parent's decision making on children's education, I would consider only school level education as at such levels parents are the primary decision makers. The crucial responsibility of educating the offspring relies upon parents choices about sending whom to which school and till when. Decision on children's schooling can have both consumption and investment purposes.

When value of education is positive, parents would like to provide schooling to children as it feels good to have educated successful (from labor market and earning perspective) children. The consumption motive behind schooling of children depends on preference for other goods and services that is how much parents value education (in terms of potential earning capacity) compared to other goods and services. Parents' schooling decision for children can also be considered as an investment component as to bear the cost (both direct and indirect) of schooling currently and get return in the future as they expect reciprocity after retirement from grown-up children. The schooling decision is constrained by the household income. I can write this as utility from enrollment of child i at level S :

$$U(E_{S_i}) \text{ is constrained by } I = C + \sum_{i=1}^K T_i$$

where U stands for utility; E_{S_i} implies enrollment of child i at level S ; I represents the household disposable income; C denotes consumption on any other goods and services; K is the total number of children at school-going

age in the household and T_i denotes total expenditures on schooling of child i .

Therefore, $\sum_{i=1}^K T_i$ denotes total household expenses on K number of children's school education. Parents decision towards children's education depends on the current expenses (T) required to send children to school, that is the cost of schooling, both direct (tuition fees, transport cost to school, uniforms, books and stationary) and indirect (opportunity cost of children's schooling time) costs. As this research considers only school education, any household expenditure on college education or higher education of children can be considered as consumption (C).

Parents' decision towards a child's schooling will depend on the utility gains from choosing one option (i.e, to continue the child's enrollment) over another (i.e, to discontinue his/her schooling). Rational parents will keep sending their child to school iff the utility gain from sending him/her to school is higher than the utility gain from not sending him/her to school. And parents will not send a child to school when utility from sending school is lower than utility from not sending. That is parents will,

- Continue child's schooling if $U(E_{Si} = 1) - U(E_{Si} = 0) \geq 0$
- Stop child's schooling if $U(E_{Si} = 1) - U(E_{Si} = 0) < 0$

where, E_{Si} takes value 1 if child i is enrolled at S and 0 otherwise.

Based on parents incentives to educate a child, the utility from providing school education depends on future expected remuneration of working children and on the probability that the grown up earning children will take care of retired parents. Therefore, controlling for economic and demographic characteristics of households, the incentives to send a child to school depend on:

- parent's perception towards returns from education in future when the child will start earning; and
- parent's expectation that the child will reciprocate in terms of providing old-age (economic and social) care to parents.

Parents are more likely to keep a child in school for longer years when the return has a positive relationship with years and levels of education. However, the future returns from education can not be observed at current times

and parent's perception towards future earning from a level of education are formed from the information on current actual wages in the known circle (family members, relatives and people in the neighborhood) with that level of education. The information set includes not only the distribution of wage rates for different education level but also the associated risk in earning and access to opportunities. Therefore, the perceived returns to education is estimated from wage distribution and the variability in the distribution. So I will assume that the expectation of returns to education is formed by the entire distribution of current actual wage returns for different education level in the neighborhood. The effect of this distribution can be summarized by the moments of the distribution.

The expected average return from an education level is explained as discounted difference between average (expected value) wage at education levels S and $S - 1$. To explain this more specifically, I categorize schooling years into five levels as *below primary* level (I-IV), *primary* level (V), *below secondary* (VI-VIII), *secondary* (IX-X) and *higher secondary* level (XI-XII). The returns to education across these levels are then defined as:

$$ER_{Si} = \frac{W_{Si} - W_{(S-1)i}}{(1+r)^t} \quad (1)$$

where,

ER stands for expected returns from education;

W is the average wage of respective level of education;

S = below primary, primary, below secondary, secondary, higher secondary;

$S - 1$ = no schooling, below primary, primary, below secondary, secondary;¹

1

$$ER_{\text{below primary}} = \frac{E(\ln(W_{\text{below primary}})) - E(\ln(W_{\text{no schooling}}))}{(1+r)^t}$$

$$ER_{\text{primary}} = \frac{E(\ln(W_{\text{primary}})) - E(\ln(W_{\text{below primary}}))}{(1+r)^t}$$

$$ER_{\text{below secondary}} = \frac{E(\ln(W_{\text{below secondary}})) - E(\ln(W_{\text{primary}}))}{(1+r)^t}$$

$$ER_{\text{secondary}} = \frac{E(\ln(W_{\text{secondary}})) - E(\ln(W_{\text{below secondary}}))}{(1+r)^t}$$

$$ER_{\text{higher secondary}} = \frac{E(\ln(W_{\text{higher secondary}})) - E(\ln(W_{\text{secondary}}))}{(1+r)^t}$$

r is discount rate and
 t is time in future when i will earn.

The expected returns, ER is attached with some uncertainties related to matching and other labor market imperfections and can be measured in terms of variance (standard deviation) of the wage distribution of a particular level of education, $Var(W_{Si})$.

Parents also recognize that the higher the earning of the grown up children, the larger will be their capacity to provide old-age-care to parents. The parent's expectation of old-age-care from a child i (R_i) depends on social customs, feasibility and capacity of the child to provide economic and social security to parents at old age.

If continuing child's education is a component of parent's utility function, then parents' utility (U) from the child's schooling can be explained as,

$$U(E_{Si}) = U(ER_{Si}, Var(W_{Si}), R_i) \quad (2)$$

The relationship of the components mentioned that would generate utility for parents with the enrollment decision are expected to be as follows:

- If returns from education level S compared to level $(S - 1)$ is positive then parents will be interested to continue the child education into level S and wont stop his(her) schooling after completion of level $(S - 1)$ that is, $\frac{\delta ER_S}{\delta S} \geq 0$ leads to $\frac{\delta U(E_{Si})}{\delta S} \geq 0$.
- The variability of wages has an inverse relationship with enrollment decision. If the wage distribution of level S has higher variance the parents will be discouraged to continue child's education in level S . Higher risks towards earning opportunities may lead to lower demand for education.
- And if parents expect to stay with and to get financial help from the child then will more likely continue child's education into level S , given the positive relationship of returns with levels.

Apart from the fundamental components that contribute to parents utility from a child's schooling, there are other factors that can influence parents

decision making in children's schooling.

Parent's income and cost of schooling: The expenditure on children's schooling is constrained by parents' disposable income and thus plays an important role in the schooling decision. If the schooling costs, direct or indirect are higher for higher levels, then parents will be less likely to continue children's education at higher levels given the returns to education is same. Poor parents with lower income level may have to take out a child from school due to fund constraint even if they want to continue children's education. It is also more likely for poor families to send children to schools where education costs are low if not free. The incentives to save can influence the decision of educating children and vice versa. Educated children when grown up can earn and will be capable to provide old-age-care to parents'. If parents perceive so, then the motivation of savings for old age will be lower. To avoid this complexity in decision making I have ignored savings possibilities in this paper.

Family size and Sibling composition: Parents decision to a child's schooling also depends on the family size and composition of children the parents have. Larger family and large number of siblings lead to division of household resources between more persons and the per capita resources available will be lower compared to smaller families, holding income constant. Children with higher birth order and higher number of siblings are more likely to drop out from school.

3.2 Household Demand for Education based on the Gender of Child

In many developing countries, presence of children at school-going age in educational institutions differ vastly between boys and girls. In spite of extensive government initiatives and recognition towards importance of girls' education as equally as boys, or the promotion of universal access to education irrespective of gender; girls still lag behind boys in terms of usage of the education system. This paper intends to explore the source and dynamics of gender gap in school education.

If the parents are biased towards a gender among children, such as if parents

prefer sons over daughter, then investment in education may differ among children of different gender. However, even when parents are gender neutral between the children of different gender, their demand for children's education may differ if any of the factors that can influence the expected future returns from education and expected reciprocity differ between gender.

Labor market discrimination: Labor market opportunities differ between girls and boys. Worldwide, there is a considerable gender wage gap across occupation, male workers earn more compared to female workers with same level of education, experience and location. $W_{Sb} > W_{Sg}$.

Also I assume that the female wages are less elastic to schooling years compared to male wages, that is, $W_{Sb} - W_{Sg} \geq W_{(S-1)b} - W_{(S-1)g}$ or ,

$$\frac{\delta W_g}{\delta S} \leq \frac{\delta W_b}{\delta S} \quad \longrightarrow \quad \frac{\delta ER_b}{\delta S} \geq \frac{\delta ER_g}{\delta S}$$

Therefore, to parents sons' higher education is more beneficial compared to daughters' higher education and it is more likely that parents will discontinue daughter's schooling earlier than son's schooling. The prevalence of gender wage gap in almost any occupation leads to different investment (demand) functions for a girl's education than a boy's education. Therefore, it implies that,

$$\frac{\delta U_b}{\delta S} \geq \frac{\delta U_g}{\delta S} \quad \longrightarrow \quad \frac{\delta Pr(E_{Sb})}{\delta S} \geq \frac{\delta Pr(E_{Sg})}{\delta S}$$

Further if the riskiness in earning opportunities is higher for girls compared to boys with same level of education, parents will prefer to continue boys education longer compared to girls. It may be the case that women with lowest education level is less likely to or can never reach the higher income level due to less opportunity compared to the men with lowest education level. Similarly, the women with highest education level also may not be as successful as the men with highest education level due to labor market discrimination in hiring, remuneration differences and societal gender stereotype role of men and women. However, it is not always true that $Var(W_{Sb}) \leq Var(W_{Sg})$.

Traditionally, due to gender-stereotyped views of society, women are seen as home-makers and caregivers whereas men are seen as bread-earners. This perception is much more evident in patriarchal society. The value of women

in a household is measured by their efficiency in managing home and taking care of children/elderly; and to perform this role of women, parents may consider education as irrelevant. Even if when today larger number of women are joining the labor force, the labor market structure still contributes to and reinforces gender stereotype in the society. The hiring, remuneration and promotion strategies often favor the male workers over the females and during recession time companies lay off women workers first. The situation is worse in the informal sectors where workers are primarily school educated or without any education. Due to the society assigned gender roles, women often take breaks from labor market participation due to marital, reproductive and nurturing responsibilities. Thus employers consider women as less loyal and reliable, this leads to preference towards male candidates over females in responsible positions and offering of remunerations.

Patri-locality and providing old-age-care to parents: One of the primary incentives to provide schooling to a child can come from parents' expectation that the child will reciprocate by providing old-age care to parents in future. However, there are uncertainties attached to this reciprocal behavior. The probability of providing old-age-support to parents is low among girls than boys, specially in patriarchal and patrilocal society. In such society daughters are married away to live with in-laws family, whereas married sons stay with parents. Therefore it is less likely that married daughters will take care of parents compared to married sons. Today many men migrate to urban areas within the country or abroad for better job opportunities with higher earning. It is not rare to find retired parents are staying away from sons and receive only remittances for their monetary needs. However physical presence of grown up children whether sons and/or daughters with parents has become less likely than earlier. It remains difficult for grown up married daughter to provide even monetary support if husband and in-laws don't allow her. Therefore, on average parents bear less expectation from daughters in regard to physical and monetary support at their retired age compared to sons. This perception provides less incentives for parents to continue daughters education longer similarly as sons.

$$R_{Sg} \leq R_{Sb} \quad \text{then} \quad Pr(E_{Sg}) < Pr(E_{Sb})$$

Household income (I) and cost of schooling (T): Household or parents income influences the decision of schooling such as, poor families either send their

children to free school or schools with lower cost, or choose between children for schooling. Due to fund constraint, if parents have to choose between children's schooling and in cases where parents can't afford everyone's schooling, it is more likely that parents stop girls schooling and continue boys schooling. Parents decision for a child's schooling may also differ if the cost of schooling is different for boys and girls. Controlling for economic and demographic factors the direct cost of education for girls and boys in a household is likely to be same, but the indirect cost of education may differ between boys and girls. After a certain age, some household responsibilities may also come on the shoulder of adolescent girls, such as helping mothers at household chores, taking care of younger siblings etc. Such household responsibilities are not borne by adolescent boys in general. If,

$$T_{Sg} \geq T_{Sb} \quad \text{then} \quad Pr(E_{Sg}) < Pr(E_{Sb})$$

Parents preference towards one particular gender: If parents have a preference towards boy child over girl child then parents will perceive $U(E_{Sb}) > U(E_{Sg})$, and this may lead to lower probability to continue girls schooling compared to boys that is parents' preference for boys will emphasize the inequality, $Pr(E_{Sg}) < Pr(E_{Sb})$.

4 Estimation Method and Data:

4.1 Estimation Strategy

To estimate the model of parents' schooling decision for children, I use the probability model. Parents decision to keep a child enrolled in school depends on their perceived difference in utilities from two alternative choices that is utility from keeping the child in school minus the utility from taking-out the child from school. This differences in utilities can't be observed, instead we only observe the current enrollment status of a child. So I assume that rational parents have made the decision comparing the two alternative choices. Let Y_i^* represents the unobserved latent variable and can be defined as,

$$Y_i^* = U(E_{Si} = 1) - U(E_{Si} = 0) \quad (3)$$

where,

(E_{Si}) is a binary variable whether the child i continues schooling (enrolled

= 1) currently in S or is taken out from school (enrolled = 0).

Based on this differences in utility, parents keep their child i enrolled in school if $Y_i^* \geq 0$ or decide to take out child i from school if $Y_i^* < 0$. Therefore I can write this as,

$$\begin{aligned} E_{Si} &= 1 \text{ (enrolled)} && \text{if } Y_i^* \geq 0 \\ &= 0 \text{ (not enrolled)} && \text{if } Y_i^* < 0 \end{aligned} \quad (4)$$

The equation for estimation can be formulated as:

$$\begin{aligned} Pr(E_{Si} = 1|Z_i) &= Pr(Y_i^* \geq 0|Z_i) \\ &= Pr(\beta_0 + \sum_{n=1}^N \beta_n \cdot Z_{ni} + \epsilon_i \geq 0) \quad \text{where } n \in [1, N] \end{aligned} \quad (5)$$

where, Z_{ni} is the vectors of all regressors.
 ϵ is the error term. And,

$$\sum_{n=1}^N \beta_n \cdot Z_{ni} \equiv \beta_1 \cdot G_i + \beta_2 \cdot Sb_i + \beta_3 \cdot ER_{li} + \beta_4 \cdot Var(W_{li}) + \beta_5 \cdot R_i + \beta_6 \cdot X_i \quad (6)$$

where,

G_i : If child i is a girl then takes value 1 and if a boy then takes value 0.

Sb_i : The composition of siblings includes two variables, the number of siblings child i has and the male siblings i has.

ER_{Si} : The expected returns from education level S that child i has completed and dropped out or the level child i currently studying.

$Var(W_{Si})$: The variances or standard deviation of distribution of (neighborhood) wages of the corresponding education level S that child i has completed and dropped out or the level child i currently studying.

R_i : Parent's expectation from child i that he/she will take care of parents when they retire.

X_i : Control variables such as age, urban or rural location, parents education and income of the household.

As I want to capture the gender gap in education demand within household, the main explanatory variable (G_i) is gender of the child, that is whether the child i is a girl (= 1) or a boy (= 0).

4.2 Data

In this analysis I have primarily used the second round dataset of the India Human Development Survey (IHDS), published in 2012. The first round of IHDS data was published in 2005. IHDS is a nationally representative, multi-topic survey of 42,152 households and 204,565 individuals in 1503 villages and 971 cities across India. The survey has both household and individual level information on income and employment; consumption and standard of living; household and family structure; education; marriage and gender relations; fertility and health; social and cultural capital.

The data has information on the current enrollment status as in terms of whether the individual go to school currently, which is used as the dependent variable that is current enrollment status of children. Also the information on the completed years of education is used as a control variable in the estimation. The dataset has information on age, gender, location and parents' income and education which are used in the analysis.

Children's education decision by parents depends on their perceived monetary returns (ER_i) from spending on child i 's education for another year/level. A vast number of research paper has used survey information on percieved future returns from education and proposed modeling of current education decisions conditional on such subjective information (Attanasio and Kaufmann, 2014; Reuben, Wiswall and Zafar, 2017; Keane and Wolpin, 1997; Attanasio et.al., 2011).

The IHDS survey data do not have information on expected returns from education. However, we can assume that parent's perception about the returns to education is formed by the information they have about wage returns from different levels of education. The information set is a function of actual wage returns across education levels among the known circle of people in the family, relatives and neighborhood. The returns are calculated by using the actual wage distribution across education levels in the same primary sampling unit (PSU). Each PSUs were formed with randomly selected 150-200 households in villages and urban blocks. Exploiting the distribution of actual wages, not only the returns but also the riskiness attached with the wage opportunities are also captured.

This survey has asked questions on preference towards gender and expectation of old-age-care. The mothers were asked questions as: *Who do you expect to live with when you get old? Would you consider living with your daughter when you get old? Who do you expect will support you financially when you get older?* and *Would you consider being financially supported by your daughter?* I have used these information and constructed the expectation variable as if mothers has expectation of reciprocity from children then reciprocity variable (R) takes value 1, otherwise 0.

As the dataset have information regarding the birth history of children in the household, it helps preparing data on sibling composition (both in number and gender). The location variable are constructed if the household is situated in urban locality then gets value 1, otherwise 0. Household income is constructed from (log) total household earning, including wages, business or any other earnings. Parents schooling years are used as control variables in the estimation.

5 Results

5.1 Descriptive Statistics

In the total sample of 2,04,568 individuals 51,399 (25 per cent) are of school going age that is between age 6 to 18 years. Among these school-going age children 52 per cent are boy child and 48 per cent are girls. Chart 2 shows the age distribution of the children at school-going age in the sample.

Chart 2: Age distribution of children at school-going age

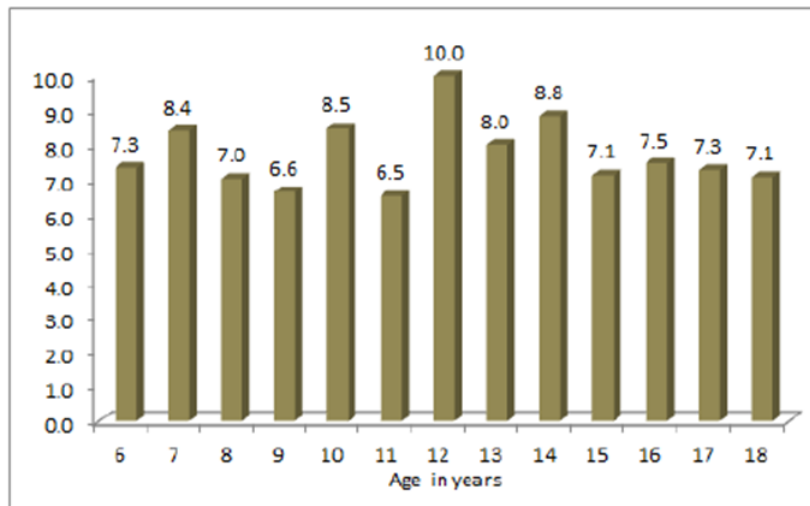


Chart 3: Gender-wise enrollment by age among children at school-going age

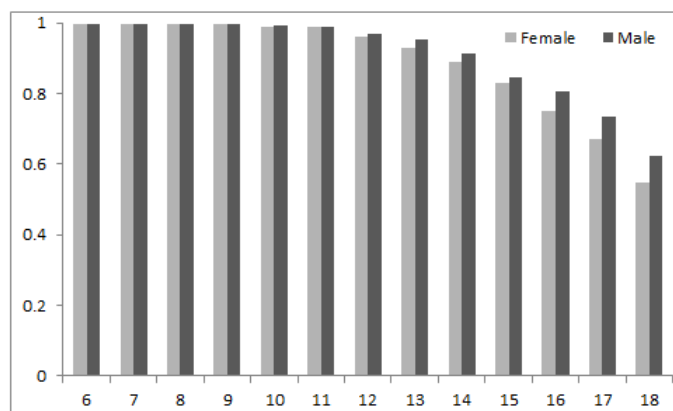


Chart 3 shows the age-wise school enrollment rates among boys and girls. The enrollment of the children at the age-group of 6 to 11 is almost full (100 per cent), with marginally lower rates for girls at age 10. Starting from age 12 and onward the enrollment rates start to diverge from the full enrollment, with higher divergence for girls.

Chart 4: Completed schooling years by age

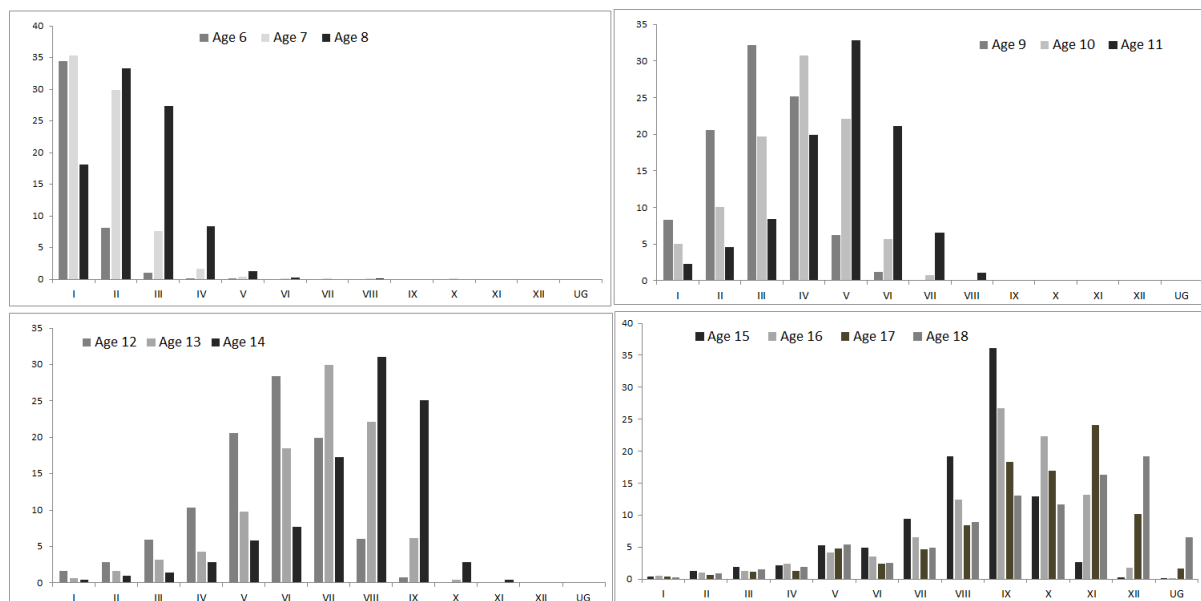


Chart 4 shows the distribution of completion rate of a schooling grade by age. Ideally at the age of 6 a child should start schooling at grade I, and complete grade I by age 7. Accordingly the ideal grade completion age is as follows: 8 for II, 9 for III and so on. Therefore the children of age 11 should finish primary, 14 should finish below secondary (VIII), age 16 should finish secondary (X) and 18 should finish higher secondary (XII). The chart shows some children has finished early and some has delayed schooling completion.

In the total sample among the 51,399 school-going age children, the first born children are around 20775 (40 per cent) and with siblings are 15,486 (30 per cent). The children who are the first born and have younger male siblings are 11,300. Chart 5 shows the distribution of boy and girl children who have younger siblings and who have younger male siblings as per number of siblings.

Chart 5: Distribution of siblings and male siblings among children at school-going age

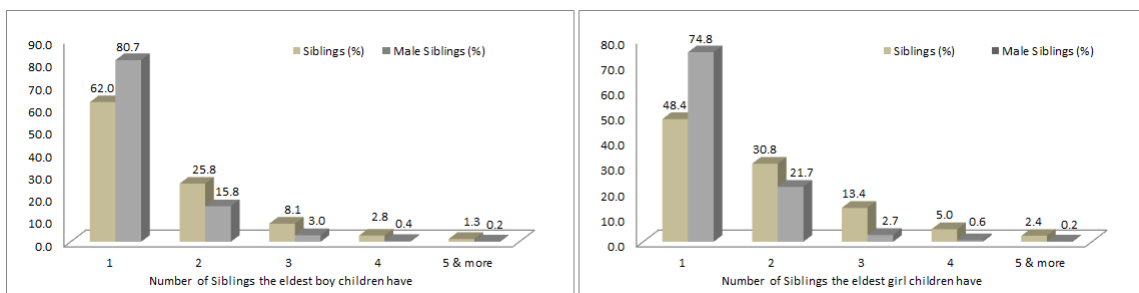


Chart 5 indicates that parents on average want at least two sons and therefore the percentage of eldest boy with one male siblings are more than the percentage of eldest girls with male siblings. Eldest child with two siblings data indicates that eldest sisters have more male siblings than eldest brothers and so on.

The descriptive statistics of the children at school going age are as follows: In

Table 2: Descriptive Statistics of School going age individuals

Variables	Obs	Mean	Std. Dev.	Min	Max
Descriptive:					
Age	51399	11.98	3.67	6	18
Siblings	51399	2.02	1.45	0	9
Male Siblings	51399	1.05	0.98	0	8
Female Siblings	51399	0.97	1.05	0	7
Mother's Education (years)	48202	4.04	4.63	0	16
Father's Education (years)	43913	4.89	4.93	0	16
Household Demographic:					
HH Members	51399	6.29	2.71	1	33
Male HH Members	51399	3.08	1.61	0	17
Female HH Members	51399	3.21	1.71	0	17
Urban Household	51399	0.312	0.46	0	1
Household Income (INR)	51399	78700.23	111989.1	0	2439999
School Demographic:					
Cost of education (INR)	41685	4536.3	9093.7	-13200	470900
School Distance (Km)	43825	2.72	5.09	1	99

the following section I will discuss the estimation in details. First I present the measurement of gender gap in enrollment and later I show results elated to factors that generate parents demand for children's education.

5.2 Measuring gender gap in education demand: Probit estimation results

This section shows the probit estimation results with different samples of children. Table 3 shows estimation results on sample of all children at school-going age and the sample of eldest (or first born) children in the household at school going age.

The dependent variable is child's current enrollment status that is whether the child is (still) enrolled in school ($E_i = 1$) or not ($E_i = 0$). As the primary purpose of the paper is to measure the gender gap in school enrollment, the main explanatory variable is the gender of the child, represented as a binary variable if the child is a girl takes value 1 and if a boy, then 0. Keeping the dependent and main explanatory variables same, different models include different set of control variables. Model I includes sibling composition of children (both number of siblings and male siblings) and completed years of schooling as control variables. The number of siblings and gender com-

Table 3: Probit Regression Results: Enrollment of all children at school-going age

Explanatory Variables:		All Children Sample			Eldest Children Sample		
		Model I	Model II	Model III	Model I	Model II	Model III
Girl Child:	Coefficient	-0.113*** (0.0159)	-0.138** (0.0340)	-0.566*** (0.0614)	-0.170*** (0.0245)	-0.184*** (0.0514)	-0.618*** (0.0988)
	dy/dx	-0.0189*** (0.0027)	-0.0284** (0.0070)	-0.0601*** (0.0033)	-0.0304*** (0.0044)	-0.0396*** (0.0110)	-0.0635*** (0.0060)
No. of Siblings		-0.0014 (0.00791)	-0.0061 (0.0131)	0.0177 (0.0219)	-0.0922*** (0.0139)	-0.0948*** (0.0228)	-0.00761 (0.0366)
No. of Male Siblings		-0.136*** (0.0108)	-0.171*** (0.0173)	-0.0155 (0.0284)	-0.0168 (0.0204)	-0.0749** (0.0329)	-0.00152 (0.0525)
Schooling years		-0.0592*** (0.00210)	-0.0419*** (0.00419)	0.376*** (0.0133)	0.0540*** (0.00315)	-0.0306*** (0.00640)	0.413*** (0.0216)
Return from Education			0.0417** (0.0186)	0.0696** (0.0313)		0.0256 (0.0279)	0.0202 (0.0509)
Std. Dev. of Wage			0.0585*** (0.0127)	0.0525** (0.0224)		0.0644*** (0.0196)	0.0634* (0.0375)
Reciprocity				0.146 (0.146)			0.156 (0.199)
Age				-0.565*** (0.0150)			-0.597*** (0.0259)
Urban				-0.0482 (0.0538)			0.0636 (0.0918)
HH income				-0.0164 (0.0256)			0.00853 (0.0464)
Employment rate				-1.292*** (0.133)			-1.531*** (0.209)
Mother's Education				0.0512*** (0.00689)			0.0579*** (0.0109)
Father's Education				0.0387*** (0.00536)			0.0405*** (0.00865)
Constant		1.855*** (0.0208)	1.053*** (0.122)	6.490*** (0.401)	1.808*** (0.0293)	0.0927*** (0.185)	6.381*** (0.717)
N		51369	15587	11743	20775	6214	4499

Robust standard errors in parentheses.

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

positions of the siblings (number of male siblings) may affect the schooling decision for the child. The higher number of siblings and especially male siblings can lower the probability for girls' enrollment. Controlling for completed schooling years will show the probability of staying enrolled as child completes more and more schooling years. The results are presented in column 1 of table 3. The first and third rows show the coefficients and the marginal effect of girl child on the enrollment status, respectively. It is found that the girl child are significantly 1.9 percentage points less likely to remain enrolled compared to boys, and first born girls have 3 percentage points lower probability compared to similar first born boys, given the number of siblings, male siblings and completed schooling years remain same.

The second model adds the labor market variables, i.e. return to education and variability (standard deviation) of wages as additional explanatory variables and the results are presented in column two. I found that the girl child has still significantly lower probability, on average 2.8 percentage points lower chance to schooling compared to boy child and 4 per cent lower probability for eldest girls compared to eldest boys, when other variables remain same. Both the labor market variables have positive and significant impacts on enrollment of child. Model III includes further the reciprocity variable and other demographic controls, such as age of the child, location dummy, household income, employment rate across education and (both) parents education. After controlling for the full set of variables the gender gap in enrollment probability is around 6 per cent for both all girls and eldest girls compared to boys and eldest boys, respectively.

Comparing the all children sample with the eldest children sample results, I found that the girl children who are eldest among the siblings have higher probability of being withdrawn from schools than boys as the eldest child. The marginal impact of gender of the child on enrollment status shows that being eldest sister is worse than being a sister in general in terms of decision that parents take for children's schooling. Eldest sisters have higher chances to be denied education compared to being sister in general.

The earlier estimation has considered all eligible children including children who have never been to school. In this section, I have repeated the regressions with the sample of all school-going age and eldest children who have attended school before. In this sample I drop the observations who never

went to school before. Therefore, the dependent variable here implies that if the children continue schooling that is remain enrolled gets value 1 and if discontinue schooling then gets value 0.

Table 4 shows regression results in columns 1, 2 and 3 using all children sample and columns 4, 5 and 6 using the eldest children sample who have attended school earlier. The three model specifications are same as the earlier estimation shown in table 3. The results remain robust as in line with the full sample results in table 3, with marginally higher impact. On average, the girl child and the eldest sister with already some schooling, has 6 percentage and 6.3 percentage points lower probability to continue schooling compared to a similar boy child and eldest brother, respectively.

Table 4: Probit Regression Results: Enrollment of children who attended school before

Explanatory Variables:		All Children Sample			Eldest Children Sample		
		Model I	Model II	Model III	Model I	Model II	Model III
Girl Child:	Coefficient	-0.114*** (0.0162)	-0.138*** (0.0340)	-0.566*** (0.0614)	-0.173*** (0.0249)	-0.184*** (0.0514)	-0.618*** (0.0988)
	dy/dx	-0.0200*** (0.0028)	-0.0284*** (0.0070)	-0.0601*** (0.0064)	-0.0323*** (0.0046)	-0.0396*** (0.0110)	-0.0635*** (0.0100)
N		45963	12985	11743	18840	4964	4499
Controls		Set 1	Set 2	Set 3	Set 1	Set 2	Set 3

Note: Controls used in these estimations are as follows:

Set 1: Number of siblings, male siblings and completed schooling years.

Set 2: Set 1 controls and return to education, standard deviation of return and reciprocity (financial) expectation.

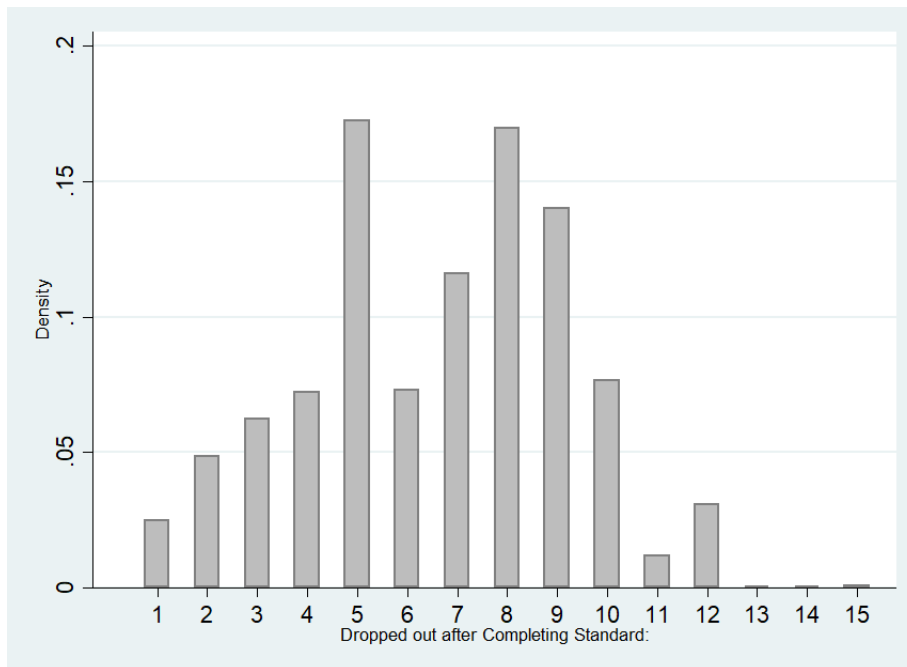
Set 3: Set 1 and 2 variables and child's age, location type of the households (urban or rural), household income, employment rate as per education level, mother's education and father's education.

Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

While examining the school enrollment across different standards, I have noticed that the drop out rate is higher at the transition from one level to another. This is evident in chart 6, it shows that the drop out rate jumps up at standard V that is the completion of primary level; increases again at VIII

standard that is completion of the below secondary level and secondary level. The drop out at primary level seems much larger than the below secondary and secondary drop outs. This can be explained as almost all the children go to primary school, and starts dropping out after primary it is much larger in proportion to below secondary and secondary level. As the level increases the children discontinue, therefore less and less remain enrolled and thus the drop out in proportion to primary seems lower. In that logic, actually drop out rate is very high upon completion of secondary level compared to primary level. The gender-wise drop-out rates are also examined, both have the similar pattern as chart 6, with higher drop-out among girls.

Chart 6: Drop out rate at different school levels



Based on these higher drop-out rates after completion of levels, I propose to examine how gender of the child and other explanatory factors can influence enrollment decision in the transition period from one level to another. For this estimation, I have used three broad samples; children who have completed primary level or standard V, children who have completed below secondary level or standard VIII and children who have completed secondary level or standard X; for all children and eldest children in each of these samples. Table 6 shows the estimation results. The three models have same

specifications as table 4 and 5, except the completed schooling years is not added as the sampling choice already takes into account of that.

The estimation using the sample of children after completion primary level education, model I results shows that the girls' enrollment has significantly lower probability compared to boys; for girls in general it is 3.8 per cent less likely to remain enrolled compared to boys and for eldest sisters it is 4 per cent significantly less likely to keep going school than eldest brothers after finishing standard V, keeping sibling composition same. The results in model II and III specifications indicate that the girl child (eldest sister) are less likely to continue schooling after finishing primary level, compared to the boy child (eldest brother). However, this results are not significant. Using the sample of children who have completed the below secondary level (until VIII), the estimation indicates that after controlling for labor market variables (model II) a girl child and an eldest sister are 2.5 and 3.7 per cent less likely to continue schooling after finishing standard VIII, compared to a similar boy child and an eldest brother, respectively. After including the full set of control variables, parent's gender gap towards schooling of a child is 7.4 per cent and 8.7 per cent for girls and eldest sisters compared to boys and eldest brothers, respectively.

The sample of children who have completed secondary level that is standard X, the estimation indicates that girl child has highly significant and on average 10 per cent less chance to remain enrolled compared to similar boys after secondary level (models II and III). In the sample of eldest children who completed standard X, girls have highly significantly on average 11 per cent less chance to continue schooling after finishing the aforementioned level (models II and III). Therefore, the implication from the level-wise results are that as the level increases parents are more likely to discontinue girls schooling compared to boys.

Table 5: Regression Results - Enrollment of children after completion of school levels, Primary, Below Secondary and Secondary

Explanatory Variables:		All Children Sample			Eldest Children Sample		
		Model I	Model II	Model III	Model I	Model II	Model III
Enrollment after completion of Primary (V) Level							
Girl child:	Coefficient	-0.156*** (0.0437)	-0.106 (0.110)	-0.185 (0.223)	-0.156** (0.070)	-0.0831 (0.170)	-0.215 (0.426)
	dy/dx	-0.0387*** (0.0108)	-0.0315 (0.0327)	-0.0180 (0.0216)	-0.0398** (0.0179)	-0.0255 (0.0520)	-0.0191 (0.0379)
	N	4785	1106	841	1852	403	292
Enrollment after completion of below Secondary (VIII) Level							
Girl child:	Coefficient	-0.102*** (0.0240)	-0.108** (0.0499)	-0.516*** (0.0854)	-0.187*** (0.0362)	-0.154** (0.0742)	-0.623*** (0.137)
	dy/dx	-0.0219*** (0.0052)	-0.0248** (0.0114)	-0.0737*** (0.0120)	-0.0427*** (0.0083)	-0.0367** (0.0176)	-0.0868*** (0.0189)
	N	17707	7364	5584	7539	3017	2213
Enrollment after completion of Secondary (X) Level							
Girl child:	Coefficient	-0.351*** (0.0543)	-0.592*** (0.130)	-0.841*** (0.179)	-0.395*** (0.0771)	-0.672*** (0.176)	-1.026*** (0.269)
	dy/dx	-0.0555*** (0.0086)	-0.0941*** (0.0207)	-0.1030*** (0.0216)	-0.0682*** (0.0133)	-0.1116*** (0.0291)	-0.1188*** (0.0307)
	N	4642	1599	1139	2204	757	535
Controls		Set 1	Set 2	Set 3	Set 1	Set 2	Set 3

Note: Controls used in these estimations are as follows:

Set 1: Number of siblings and number of male siblings.

Set 2: Number of siblings, number of male siblings, average returns to educations and standard deviations of wages across education levels.

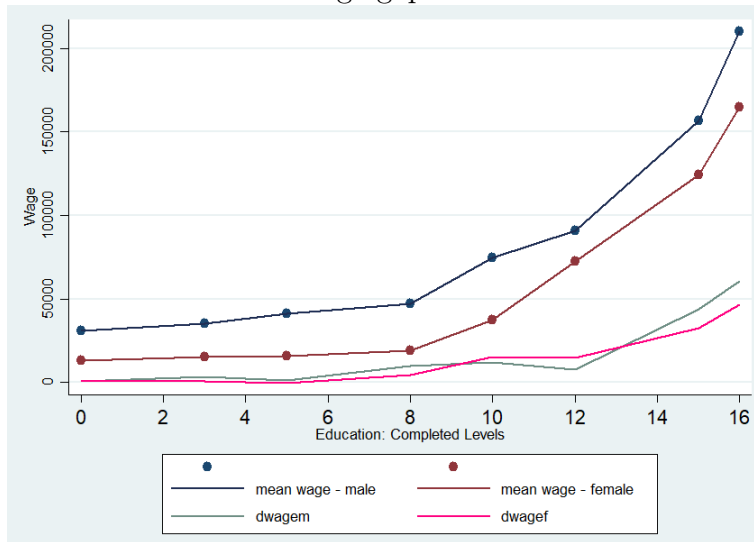
Set 3: Number of siblings, number of male siblings, average returns to educations, standard deviations of wages across education levels, child's age, location type of the households (urban or rural), household income, employment rate across education levels, mother's education, father's education and at least one parent with government job.

Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5.3 Labor market implications on enrollment

Using the IHDS 2012 data the gender gap in wages across education levels is shown in Chart 6. The gender wage gap persists at all levels of education. Therefore, $W_{Sb} > W_{Sg}$ is true in the data. However, it can not be said that the return to education is always lower for females than males though in most part it is so. At the secondary and higher secondary level the growth in female wages expedites compared to males, then in tertiary education female wage growth again falls below the male wage growth.

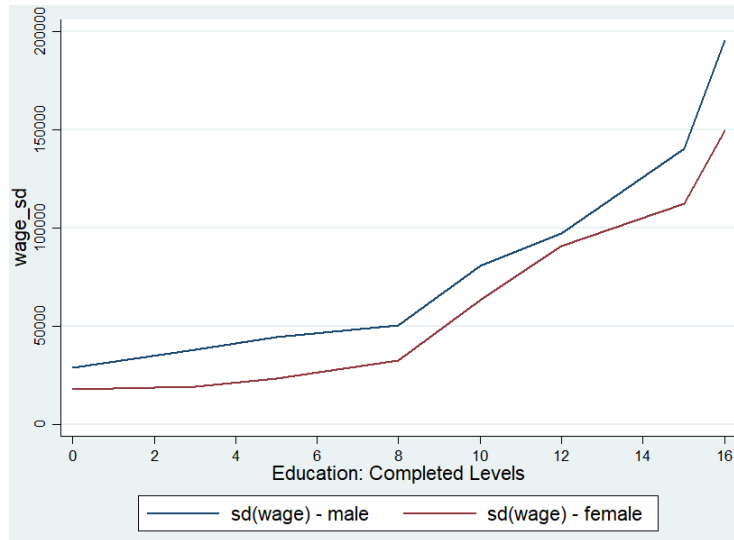
Chart 6: Gender wage gap across education levels



Source: Author's Calculation from IHDS 2012

Chart 7 shows that the standard deviation of wages across education levels and that it is lower for females than males. It can be explained as the females are less likely to even apply for the highly paid jobs when they have lower or average education levels whereas their male counterpart with similar qualification more likely to try their luck even in the highest paid jobs. Therefore, the variability in the male wages are higher not only because the inherent riskiness in opportunities in the labor market but also because males actually try and get highly paid jobs with comparatively lower education levels than females.

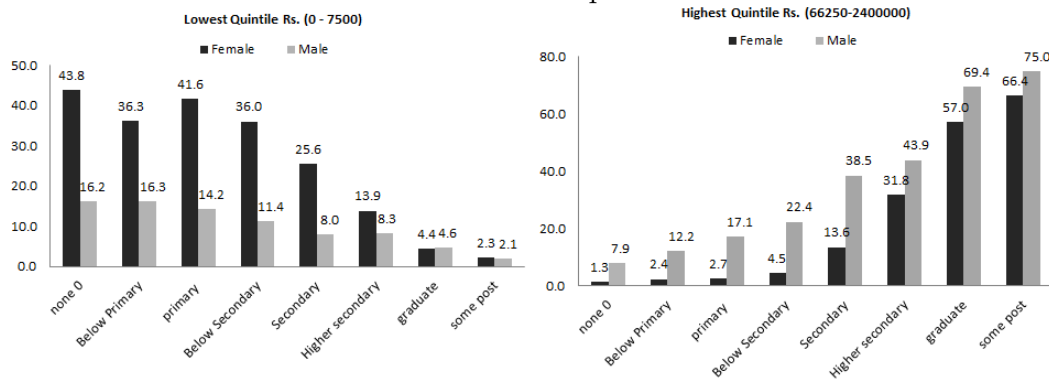
Chart 7: Gender-wise standard deviation of wages across education levels



Source: Author's Calculation from IHDS 2012

Chart 8 also reinforces my argument as it shows that only 2.4 per cent females with below primary education reach the highest quintile of income distribution compared to 12.2 per cent of males with below primary education and only 2.7 per cent female with primary education reach the highest quintile of income compared to 17.1 per cent males with similar qualification. Similarly among the lowest educated females around 36 per cent with below primary and 41.6 per cent primary educated female work with income in the lowest quintile whereas only 16.3 per cent below primary and 14.2 per cent primary educated males work with similar payments.

Chart 8: Gender-wise success in income quintiles across education levels



Source: Author's Calculation from IHDS 2012

Table 6 shows how labor market variables, estimated return to education and standard deviation of wages can influence the enrollment probability of a child. Using both return to education and standard deviation of wages as the primary explanatory variables, and enrollment as the dependent variable I perform probit regression. The results in table 6 imply that the return to education has a significant positive relation with enrollment in all cases. Panel A considers the all children sample and Panel B shows results of children who have completed primary, below secondary or secondary level of education.

Table 6: Labor market impact on enrollment: $Pr(E_{Si}|ER_{Si}, Var(W_{Si}))$

Dependent Variable: Enrollment		Model I	Model II	Model III
Panel A: All Children Sample				
Return to Education:	Coefficient	0.330** (0.174)	0.383** (0.176)	1.388*** (0.439)
	dy/dx	0.0693*** (0.0366)	0.0801** (0.0368)	0.0334*** (0.0108)
Std Deviation of Returns:	Coefficient	0.0602*** (0.0109)	0.0330*** (0.0123)	-0.0139 (0.0392)
	dy/dx	0.0126*** (0.0023)	0.0069*** (0.0026)	-0.0003 (0.0009)
N		15587	15587	11410
Controls		Set 1	Set 2	Set 3
Panel B: Completed level				
Return to Education:	Coefficient	3.275*** (1.207)	1.581*** (0.575)	3.160*** (1.211)
	dy/dx	0.0811*** (0.0667)	0.0495*** (0.0185)	0.0791*** (0.0358)
Std Deviation of Returns:	Coefficient	-0.120 (0.115)	-0.0306 (0.0489)	-0.219*** (0.0711)
	dy/dx	-0.0030 (0.0037)	-0.0040 (0.0021)	-0.0055*** (0.0022)
N		203	5303	1178
Controls		Set 3	Set 3	Set 3

Note: Controls used in these estimations are as follows:

Set 1: Only explanatory variables: Return to education and Std deviation of return.

Set 2: Set 1 and added control variables such as gender of the child and number of siblings.

Set 3: Set 1 and 2 variables and child's age, location type of the households (urban or rural), household income, mother's education and father's education.

Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

A higher return to education will increase the likelihood of enrollment for a child. In table 6 the three models show results with different control variables. The first model has only the two explanatory variables that is return to education and std. dev. of wages, second model includes the control variables such as gender of the child and number of siblings the child has and the third model further includes child's age, location type of the household, parent's education and household income. The return is positively and significantly related to child's enrollment in all the model specifications, both for all children sample and children after different level completion. Therefore, I can say that returns play a significant and positive role in parent's decision of schooling.

The standard deviation of wages has positive and significant coefficients in model I and II. However, with the full set of control in model III the result becomes negative and insignificant. The standard deviation of wages represent the riskiness in earning and labor marker opportunities and my expectation is that it should be negatively related to enrollment that is higher riskiness in job opportunities will lower the probability of enrollment. In the level completion samples, the coefficient remains negative in all cases i.e., primary, below secondary and secondary education levels and is highly significant in case of secondary completion. These results are in line with my expectation. Secondary is a crucial level of school education and this level finishes with a nationwide board exam for Indian students and therefore bear more importance than primary and below secondary level in career track. The higher variability in wages or the riskiness in job opportunities may cause significant drop out from education after completion of secondary.

Reciprocity and Enrollment

Parent's reciprocity expectation from children can influence schooling decision. Parents spend in a child's schooling in the expectation that the child will grow-up to an educated successful individual and will provide old-age support to parents in future. To check the impact of reciprocity on enrollment, probit regression is used where enrollment status of a child is the dependent variable and the main explanatory variable whether parents have reciprocity expectation from children or not. Thus, the reciprocity expectation is a binary explanatory variable, the reciprocity takes value 1 if parents has expectation from a child to provide old-age care, otherwise it takes value

0. Table 7 presents the estimation results regarding the impact of reciprocity expectation by parents on child's enrollment. I have used different samples for estimation, such as all children sample, eldest children sample and sample of children who have no siblings (or single child to parents). The estimation results show positive relationship of reciprocity with the enrollment of child, however, these results are insignificant for all children and eldest children. For the cases of all children and eldest children sample it can be the case that parents have reciprocity expectation but may or may not be from the child in question. However, for the children without siblings reciprocity has a positive and highly significant relation with the enrollment probability. This can be explained as if parents have reciprocity expectation, for children without siblings it will automatically mean reciprocity from that child him(her)-self and thus it significantly increase the probability of enrollment by around 8 percentage points for the child, keeping the other control variables same. I have also performed probit regression considering the interaction of reci-

Table 7: Reciprocity impact on enrollment: $Pr(E_{S_i}|R_{S_i})$

Dependent Variable:		All	Eldest	Children w/o
Enrollment		Children	Children	Siblings
Reciprocity:	Coeff	0.116 (0.141)	0.133 (0.177)	0.633** (0.309)
	dy/dx	0.0158 (0.0191)	0.0184 (0.0244)	0.0811** (0.0387)
N		11743	4499	849
Controls		Yes	Yes	Yes
Reciprocity*(girl child):		-0.0169 (0.0987)	-0.122 (0.127)	0.499** (0.212)
Control		Yes	Yes	Yes
Atleast a parent				
with govt job:	Coeff	-0.195*** (0.0640)	-0.197*** (0.641)	0.0466 (0.188)
	dy/dx	-.0031*** (0.0010)	-0.0033*** (0.0017)	0.0063 (0.0251)
N		36851	14208	1016
Controls		Yes	Yes	Yes

Note: Controls used in these estimations are gender and child's age, location type of the households (urban or rural), household income, mother's education and father's education.

Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

procuity variable with girl child. In case of all children and eldest children the impact is negative and insignificant on the enrollment decision. When

parents have expectation of reciprocity from child it is usually from son(s) in patri-local society of India. Then in case of all children and eldest children sample the reciprocity interacted with girl child is expected to be negative as the reciprocity is not from the girl child but can be from her male siblings and thus may negatively impact on her enrollment. But in case of girl child without siblings if her parents have reciprocity expectation it will be from her surely and therefore positively and significantly influence her probability of enrollment.

To further check on the reciprocity aspect I have also used parents with government job as a counter reciprocity variable. In India, all government employees are entitled to monthly pension payment after retirement. So people with government job can be assumed as financially less dependent on grown up children at the retired age, and therefore are expected to have lower reciprocity expectation from children. I have constructed the government job variable as if at least one parent has government job, the variable will take value 1 and otherwise takes value 0. The regression result shows that the parent with government job variable has negative and significant relation with enrollment probability of a child in both all children and eldest children sample. Thus it implies that if at least a parent has government job, that is will have less reciprocity expectation from child and thus will have lower probability for enrollment. Here I want to mention that this exercise is not intend to imply that strengthening pension schemes are not desirable but it implies that policy makers should keep in mind that pension or other savings related program may have a negative impact on parents incentive to provide education and thus to take precautionary actions for this. Thus, I only use this to show that reciprocity or financial dependence on children at old age has impact on parents decision on children's schooling.

6 Robustness

To examine the robustness of the results I have also used the first round data of IHDS 2005. Table 8 shows the enrollment probability after completion of school levels, such as primary, below secondary and secondary level. In the estimation I have controlled for labor market variables, sibling compositions and other demographic variable under different models. The results remain robust as the results from IHDS 2012.

Table 8: Regression Results - Enrolled School going children - IHDS 2005

Explanatory Variables:		All Children Sample			Eldest Children Sample		
		Model I	Model II	Model III	Model I	Model II	Model III
Enrollment after completion of Primary (V) Level							
Girl child:	Coefficient	-0.0989*** (0.0226)	-0.0666** (0.0259)	-0.151*** (0.0368)	-0.157*** (0.0358)	-0.0964** (0.0410)	-0.233*** (0.0636)
	dy/dx	-0.0280*** (0.0064)	-0.0201** (0.0078)	-0.0264*** (0.0064)	-0.0475*** (0.0108)	-0.0310** (0.0132)	-0.0377*** (0.0103)
N		15989	11591	9851	6050	4395	3570
Enrollment after completion of below Secondary (VIII) Level							
Girl child:	Coefficient	-0.0728** (0.0290)	-0.0863** (0.0354)	-0.173*** (0.0451)	-0.131*** (0.0440)	-0.153*** (0.0537)	-0.233*** (0.0730)
	dy/dx	-0.0220** (0.0088)	-0.0279** (0.0114)	-0.0412*** (0.0107)	-0.0406*** (0.0136)	-0.0503*** (0.0175)	-0.0522*** (0.0162)
N		9298	5970	5038	4008	2581	2090
Enrollment after completion of Secondary (X) Level							
Girl child:	Coefficient	-0.144*** (0.0444)	-0.118** (0.0594)	-0.128* (0.0704)	-0.251*** (0.0668)	-0.172* (0.0899)	-0.211* (0.110)
	dy/dx	-0.0407*** (0.0125)	-0.0339** (0.0171)	-0.0327* (0.0178)	-0.0679*** (0.0180)	-0.0485** (0.0253)	-0.0512* (0.0264)
N		4163	2281	1965	1907	1026	861
Controls		Set 1	Set 2	Set 3	Set 1	Set 2	Set 3

Note: Controls used in these estimations are as follows:

Set 1: Number of siblings and number of male siblings.

Set 2: Number of siblings, number of male siblings, average returns to educations and standard deviations of wages across education levels.

Set 3: Number of siblings, number of male siblings, average returns to educations, standard deviations of wages across education levels, child's age, location type of the households (urban or rural), household income, employment rate across education levels, mother's education, father's education and at least one parent with government job.

Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Different Estimation Methods: Logit and OLS regression

Further, I also examine the same estimation specification with different regression techniques, such as Ordinary Least Squares (OLS) and logistic regression. The logistic and OLS results are presented in table 9 and 10, respectively. In both the cases the robustness of the results are maintained.

Table 9: Logit Regression Results - IHDS Survey 2012

Children at School-going age		Full Sample	Eldest	Attended school and Eldest
Girl child:	Coefficient	-1.103*** (0.115)	-1.147*** (0.187)	-1.147*** (0.187)
	dy/dx	-0.0612*** (0.0062)	-0.0621*** (0.0099)	-0.0621*** (0.0099)
Controls		Yes	Yes	Yes
Children after completion of levels:		Primary	Below Secondary	Secondary
Girl child:	Coefficient	-0.363 (0.445)	-0.971*** (0.158)	-1.567*** (0.336)
	dy/dx	-0.0186 (0.0227)	-0.0757*** (0.0121)	-0.0993*** (0.0212)
Controls		Yes	Yes	Yes

Note: Full set of control variables are used in these estimations, such as number of siblings and male siblings; average returns to educations and standard deviations of wages across education levels; child's age, location type of the households (urban or rural), household income, employment rate across education levels, mother's education, father's education and reciprocity.

Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 10: OLS Regression Results - IHDS Survey 2012

Children at School-going age	Full Sample	Eldest	Attended school and Eldest
Girl child:	-0.0705***	-0.0756***	-0.0756***
	(0.00680)	(0.0107)	(0.0107)
Controls	Yes	Yes	Yes
Children after completion of levels:	Primary	Below Secondary	Secondary
Girl child:	-0.0429*	-0.0774***	-0.134***
	(0.0250)	(0.0128)	(0.0329)
Controls	Yes	Yes	Yes

Note: Full set of control variables are used in these estimations, such as number of siblings and male siblings; average returns to educations and standard deviations of wages across education levels; child's age, location type of the households (urban or rural), household income, employment rate across education levels, mother's education, father's education and reciprocity.

Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

7 Discussion and Policy Implications

Though access to free and compulsory education has been almost achieved universally in India, the persistent and wide gender gap beyond primary level calls for further action towards extension of the earlier initiatives to universal access to school education, not only till elementary level but up to senior secondary level (class XII). The targeted age-group has been extended from 6-14 to 6-18 years.

Investment in school education primarily depends on parents incentive and willingness to spend. Decisions regarding whether all the children in the family will be sent to school, which school and for how many years are made by either one or both the parents. Therefore to understand the demand side constraints we need to analyse the parents incentive to provide education. In spite of multiple interventions by Indian government to improve education situation, the policies so far have not gone beyond making the schools accessible to all, failed to adequately improve the usage of education system beyond primary level, especially for girls. The lower presence of girl in secondary schools could not be sufficiently explained by lack of girl-friendly infrastructure in schools and/or by lower intelligence and incapacity among girls to cope with secondary level of education. Rather the demand for girl's

education falls short of increased supply initiatives due to parents' lower incentive to invest in girl's education similarly as boys. This paper measures the gender gap in enrollment, on average the girls have 6 per cent lower probability to continue schooling compared to similar boys. Moreover, as the level of school education increases the probability of girl's enrollment worsens, after standard VIII girls are around 7-8 per cent more likely to drop out and after finishing secondary level girls have 11 per cent lower probability to continue schooling compared to similar boys.

The economic factors that contribute to parent's lower incentive to invest in girls compared to boys are related to expected return from daughters' versus sons' education. The results from labor market variables show that return from education and the variability of wages significantly influence the schooling decision of parents and thus contributes to gender gap in school enrollment. There are legal provisions towards equal wage to both genders with similar qualification at same occupation in India. The Equal Remuneration Act (ERA) was passed in 1976, with the purpose to ensure that employers do not discriminate on the basis of gender, in wages, transfers, training and promotion. Additionally, the Sixth Pay Commission has undertaken norms to limit discrimination of employees of different gender. However, gender wage gap still persists at all education levels. An educated female worker earns much lower than a similar male for doing the same job. The responsibilities of enforcing labor related laws lie with labor inspectors and staffing of inspectors is widely inadequate. Inspectors deem legislation such as the Minimum Wages Act, Factories Act, Employees Insurance Act with higher priority, hence enforcement of the ERA is minimal. Thus, inadequate staffs and lower priority to ERA lead to weak enforcement. The ambiguous language of the ERA, such as the terms like 'same or similar work' and 'equal pay for work of equal value' give opportunities to the employers to take advantage of, and pay different wages to different gender for doing exactly the same work. Removal of such weaknesses and strict enforcement of ERA would be essential. If gender wage gap persists, parents will remain reluctant to invest in girl's education and the country will not realize the true potential of its demographic dividend. The firms should use gender-neutral job evaluation schemes, and in cases where a specific gender has comparative advantage over others, a special tool to evaluate performance of the workers of other gender. Detail analysis of the trend of gender wage gap across education level and proposal for appropriate government interventions towards

income disparities are important.

India's patriarchal society perceives women as home-makers and caregivers and men as bread-earners. Traditionally, the value of women in a household is measured by their efficiency in managing home and taking care of children/elderly; and for this role of women, education seems irrelevant to some Indian parents. Even if more women are joining the labor force, the labor market structure reinforces gender-divided allocations of responsibilities. Companies therefore sack female workers first during recession time. The hiring and promotion strategy often favor males over females. Due to reproductive and caregiver role, women often take breaks from their jobs, thus employers consider women less reliable than men for responsible positions. When job market prefers educated males over educated females, it leads to parent's reluctance to invest in daughter's education. Therefore it is essential to change mindset of society by creating awareness of importance of women's economic contribution to society. The role of social media is crucial to increase acceptance towards women's economic role. The laws that secure women's equal employment opportunity would be useful. Labor market should help to dilute the gender roles within families, providing equal advantages to both the parents at the onset of child-bearing such as parental paid-leave, flexible working hours/work from home facility for childcare to both the parents without the loss of seniority or pension. If job opportunities become equal for both male and female across education level, gender gap in parent's incentives to provide education to children of both genders will tend to equalize.

Another important incentive for parents to provide schooling to children is parents expect that children will grow up and reciprocate in terms of old age care to parents. The results of this paper has support on this argument. Parent's perception for getting old age support from grown up children differs between genders of the offspring. The married daughters in Indian society live with parent-in-laws and their financial and other contributions often go to in-laws rather than own parents. However, married sons live with parents where son's wife manages home and takes care of the old parent-in-laws. Therefore parents perceive higher benefit to make sons more able for the labor market than daughters. Parents educate daughters to get better groom when they grow up rather than make them a better labor market candidate. This leads to parent's lower incentive to spend in daughter's education com-

pared to sons. In recent times, the probabilities of getting old-age security from sons have lowered due to current economic and social changes; the likelihood that sons will live at the same place as parents has reduced largely. At the same time, women are becoming more economically independent and aware about their rights and roles. The equal inheritance rights over parent's property have strengthened daughter's economic status further. Thus, the probability that daughters will take care of old parents increases. Further, the government interventions towards pensions schemes, transfers directed to old age security addressing health, disability issues will be useful to reduce parent's dependence on offspring at old ages. These would reduce parent's biasedness towards allocating resources differently among son and daughter.

Since the constitutional commitment and Right to Education (RTE) Act incorporate free and compulsory education to all children up to the age fourteen, that is up to elementary education. 'Free education' means that no child, other than a child who has been admitted by his or her parents to a school which is not supported by the appropriate Government, shall be liable to pay any kind of fee or charges or expenses which may prevent him or her from pursuing and completing elementary education (MHRD). However, secondary education is not free yet. If the parents decide to continue the education of the children beyond primary level they have to bear the expenses. The direct costs of education may not differ between boys and girls, however when parents have low interest to spend in education of daughters than sons, even minimal cost of education may seem burden. If the present value of returns from educating girls is lower than the present value of returns from educating boys, parents are more likely to invest less in daughter's education than in son's education, keeping other things same. When parents are already reluctant to send girls to schools, if secondary education has costs, parents will be more reluctant to continue girl's education beyond primary level. This also implies that as education cost increases with levels of education, the probability of girls' withdrawn from educational institution increases. Therefore, government interventions should be extended as free education up to higher secondary level (XII), it would help to increase girls presence beyond primary level.

Often adolescent girls are used as household labor, helping mothers at household chores, taking care of younger siblings etc. Due to these girls get less time to study, and eventually may dropout from schools. Under SSA, children

care centers are built near schools to free girls from sibling care responsibilities policy drive. The flexibility in schooling hours, evening and night schools for working girls would help. Poor families discontinue daughter's education due to fund constraint. In 2013, the revised Rashtriya Madhyamik Shiksha Abhiyan included the Girls Hostel Scheme and National Incentive to Girls by transferring a sum of Rs.3,000/- to eligible girls as fixed deposit for encouraging girls in secondary education. The girls are entitled to withdraw the sum along with interest upon reaching 18 years of age and on passing secondary examination. Recently, Uttar Pradesh chief minister announced a reward of Rs 10,000 for girls who passed class X exams in UP. Similar initiatives can be extended in other states as well to encourage girls in secondary education. However, whether this fund will be used for girls' education or as dowry payment is a matter of concern and therefore demands for more critical analysis.

To increase parents awareness about girl children and their education actions are undertaken by current government. Beti Bachao Beti Padhao scheme was launched in 2015 with the objective of providing importance to the girl child, ensuring survival and protection of the girl-child and oppose dowry and early age marriage of girls, promote equality between boys and girls in education; secure admission to and retention of girl child in schools; engage men and boys to challenge gender stereotypes and roles.

References

- Alderman, H., and King, E. M. (1998). Gender differences in parental investment in education. *Structural Change and Economic Dynamics*, 9(4), 453-468.
- Black, S.E., Devereux, P.J. and Salvanes, K.G., 2005. The more the merrier? The effect of family size and birth order on children's education. *The Quarterly Journal of Economics*, 120(2), pp.669-700.
- Bommier, A. and Lambert, S., 2000. Education demand and age at school enrollment in Tanzania. *Journal of Human Resources*, pp.177-203.
- Buchmann, C., 2000. Family structure, parental perceptions, and child labor

in Kenya: What factors determine who is enrolled in school?. *Social forces*, 78(4), pp.1349-1378.

Cochrane, S.H., 1983. Effects of education and urbanization on fertility. In Bulatao R. and Lee R.(eds.) *Determinants of Fertility in Developing Countries*, vol. 2, pp. 587-626. New York: Academic Press.

Cochrane, S.H., Mehra, K. and Osheba, I.T., 1986. The educational participation of Egyptian children. Washington, DC: World Bank.

Desai, Sonalde, Reeve Vanneman, and National Council of Applied Economic Research, New Delhi. India Human Development Survey (IHDS), 2005. ICPSR22626-v8. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor], 2010-06-29.

Desai, Sonalde, Reeve Vanneman and National Council of Applied Economic Research, New Delhi. India Human Development Survey-II (IHDS-II), 2011-12. ICPSR36151-v2. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor], 2015-07-31.

Gandhi Kingdon, G., 2002. The gender gap in educational attainment in India: How much can be explained?. *Journal of Development Studies*, 39(2), pp.25-53.

Gertler, P. and Glewwe, P., 1992. The willingness to pay for education for daughters in contrast to sons: Evidence from rural Peru. *The World Bank Economic Review*, 6(1), pp.171-188.

Glick, P. and Sahn, D.E., 2000. Schooling of girls and boys in a West African country: the effects of parental education, income, and household structure. *Economics of education review*, 19(1), pp.63-87.

Greenhalgh, S., 1985. Sexual stratification: The other side of" growth with equity" in east Asia. *Population and development review*, pp.265-314.

Hill, M.A. and King, E., 1995. Women's education and economic well-being. *Feminist Economics*, 1(2), pp.21-46.

Jensen, R., 2010. The (perceived) returns to education and the demand for schooling. *The Quarterly Journal of Economics*, 125(2), pp.515-548.

Knodel, J. and Wongsith, M., 1991. Family size and children's education in Thailand: Evidence from a national sample. *Demography*, 28(1), pp.119-131.

Mauldin, T., Mimura, Y. and Lino, M., 2001. Parental expenditures on children's education. *Journal of Family and Economic Issues*, 22(3), pp.221-241.

Morduch, J., 2000. Sibling rivalry in Africa. *American Economic Review*, 90(2), pp.405-409.

Pal, S., 2004. How much of the gender difference in child school enrolment can be explained? Evidence from Rural India. *Bulletin of Economic Research*, 56(2), pp.133-158.

Parish, W.L. and Willis, R.J., 1993. Daughters, education, and family budgets Taiwan experiences. *Journal of Human Resources*, pp.863-898.