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Determining the Extent of Gender Discrimination in Educational Attainment: A Case of Pakistan

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ABSTRACT

Gender bias in developing countries may restrict educational opportunities for girls in comparison to boys. This paper attempts to measure the gender disparity in education amongst children from 5 years to 18 years of age across Pakistan. Using the Cross-sectional data from PSLM and applying Oaxaca decomposition with probit estimation we measure the gender gap through explained and unexplained variation on three aspects of education; first, the overall school enrollments across Pakistan, second the differences in the school enrollments based upon the type of school i.e. public vs. private schools for the three levels of education: primary, middle/secondary and higher secondary. Third, we determine whether gender discrimination exists in the accumulated schooling decision for the age group of 18 to 30 years. The results interestingly show that although a strong bias exists against females in overall enrollment rates, but as we explore further we see that males drop out of private schools more as compared to females and the accumulated level of schooling of the male adults is also lower than that of females. We find that much of these differences are not due to the endowment effects. Large negative deviation for males may be attributed to the unobservable pressure and society's norms regarding the role of males that affect them in an adverse manner.

Introduction

While gender discrimination remains a widely discussed issue, especially, in the developing countries, the main focus of this paper is to measure whether gender discrimination exists in schooling decisions that refrain girls from fair access to education, or is it that, lack of resources in form of proper educational systems and effective allocation of public expenditures have stagnated the enrollments in these schools specifically for the case of Pakistan. Using the data from PSLM 2010-2011 and Oaxaca decomposition technique we measure whether, females with similar characteristics of that of boys are discriminated when it comes to the decision of education. We check for discrimination in three major education decisions; overall enrollments of children, the enrollments in private schools and at the accumulated

level of schooling. Our results show that there is substantial discrimination against females in the overall enrollments at an aggregate level but strikingly positive female bias exists in private schools at all levels of education (primary, middle and higher) and also for the accumulated level of schooling for adults.

Education is an important medium for enhancing socio-economic growth and human capital development of a country. More importantly, education further instigates employment opportunities, appropriate skill learning and chances of better standards of living. The Human Development Index (HDI) takes into account education as one of its main component to gauge the development progress of countries. In the year 2011, Pakistan had a Human Development Index value of 0.504 and therefore, was ranked 145 out of 187 countries (United Nations Development Program, 2011). Compared to its neighboring countries, Pakistan has one of the lowest literacy rate (Economic Survey of Pakistan, 2011). Education sector is one of the under producing sectors in Pakistan. The education expenditure as a proportion of GDP was reported to be as low as equivalent to 2.7% for year 2009 (CIA - The world fact book). Similarly, according to the United Nations Development Program Report (2011), the male literacy is reported to be higher than that of females 69.5% and 45.2% respectively. Likewise, a few statistics also show disparity in enrollments across provinces as well as across rural and urban areas.

In case of Pakistan with an approximate population growth rate of 2.1% per year, it has been anticipated that influx of around 3.4 million children are added to the population cohort, of whom only half are fortunate enough to benefit from education while the rest contribute to the ever increasing dropout rate in Pakistan with females registering a figure of 66% out of school children. As far as specific gender gap index in terms of education attainment is concerned it was categorized as 123 out of 130 countries in 2008. Furthermore, a cross-country study on the impact of missing the millennium development goals (MDG) target on gender equality by (Abu-Ghaida, Klasen, 2004) estimated that countries like Pakistan, which have not achieved the target of equal education by 2005, are at risk of losing an average of 0.4% in annual economic growth between 2005 and 2015, if they fail to catch up. In developing countries where the resources are constrained a general perception is that females experience marginalized access to education as parents expect lower future economic returns from their education compared to education of male members present in the household. Therefore, we use data to measure if girls in Pakistan suffer from discrimination or not.

The paper is organized as follows: Section 1 is introduction. Section 2 comprises of the literature review. Section 3 discusses the data and summary statistics while section 4 provides the theoretical framework and the methodology. Specification issues are identified in Section 5. Discussion of the results is in section 6 and section 7 is the conclusion.

Literature Review

The literature on schooling looks at its relevance from different aspects. We broadly categorize literature into three main streams. Initially the literature comprised of the socio-economic determinants of education. A more recent literature more specifically provides the evidence of gender bias in enrollment rates and gender differentials across levels of education completed and the gender bias that exist in the

levels of understanding and preference for public vs. private schools. The third strand of literature focuses on the impact of education on the development indicators. This research paper adds to the second strand of literature by analyzing whether the gender bias exists amongst children in Pakistan for the schooling decisions at household level. We analyze the effect of gender differences on intra-household access to education in terms of type of institution, maximum level of education attained and level of understanding in children. Several economists have tried to trace the effects of gender bias in such household decisions.

Merlo and Echevarria (1999), determines gender differences in education through a two-sex (male and female) overlapping generations model. The study further incorporates a bargaining model where households take collective decisions regarding consumption, expenditure decisions related to education of children based on their gender and number of children as oppose to the model of unitary household decision making model proposed by Becker (1965, 1991). The results based on the model show that gender differences in education occur due to the main differences in both the genders that are further transmitted into the household and the labor market. The model signifies that as number of children increase in a given household women experience increasing time cost of producing children. This increase initiates gender gap in educational status as fertility rates of women rise.

Asadullah and Chauhdry (2008), in their paper on Bangladesh, examine how variation in enrollment rates of males and females occur for secondary level schooling. The study utilizes Household Expenditure Survey (HIES) of Bangladesh for years 1995, 2000 and 2005. The main aim of the research was to justify that gender difference does exist in schooling outcomes and within household resource allocations, partly because of the female secondary stipend program initiated in the year 1994 in Bangladesh. Since, more than one regression was run, variables like grade completion, currently in school, and child labor and education expenditure were used as dependent variables. The authors used a household fixed-effects approach to estimate the gender gaps in schooling firstly with both genders and then separately for both males and females. The results indicate that pooled gender based regressions did not show any evidence of gender differences for any of the four dependent variables. However, regressions based separately on males and females illustrated that girl in contrast to boys in urban non-metropolitan areas registered higher rate of school enrollment and completion. Therefore, the study concludes that gender-bias exists in Bangladesh, which favors girls more than boys for both rural and urban areas.

Likewise, the paper by Baluch and Shahid (2009), titled as "Measuring gender disparity at primary school level in Pakistan", examines gender inequality in enrollment rates at primary school level for Pakistan. The dataset used for the study is Pakistan Social and Living Standard Measurement Survey (PSLM) for years 2004-2005 covering 76,520 households. The results of the research shows that for primary level education in Pakistan the gender gap is around 11.3%, whereas explained variation due to difference in characteristics between male and female students was -2.84% and the unexplained variation was 98.4% resulting from discrimination and treatment of boys and girls in the households. The variations in the gender gap generated signify that males are prioritized over females in education. Following the same domain, another paper by Rahji (2006) also focuses on enrollment rates of primary schools in rural areas of Southwestern Nigeria. The author utilizes the same

combination of Probit and Oaxaca decomposition technique to calculate the gender differentials. By using the same set of dependent variable and explanatory variables, the results of the paper also show gender preference of boys against girls. The gender gap 12.58 whereas the explained gap is 20% and the unexplained gap is around 74.96% of the total gap.

Similarly, Aslam (2009) examines the impact of existing gender bias on two components of education; school choice and grade completion. The data is collected from a specific school based survey carried out by the author in Lahore, Pakistan in year 2002 till 2003. The author tests likelihood of boys to attend private schools through a linear probability model (LPM) against independent variables that include all children and household related characteristics. The results for this particular model show that huge pro-male biases exist in Punjab whereas Sindh exhibits a pro-female bias. The study further distinguishes schooling outcomes by testifying achievement levels of children across public and private schools. The results show that on average, students from private schools score higher on tests of literacy and numeracy than students enrolled in public institutions. From a gender perspective, results show that in both types of schools' male students scored higher in the math section whereas female students performed better in the reading section. As a result, in private schools there was more pro-male bias coming from high performance in mathematics scores and pro-female bias in reading remained insignificant, however, in government schools there was pro-male bias in math scores and pro-female bias in reading scores as well..

Andrabi, Das and Khwaja (2002) also advocate their findings regarding Pakistan's pattern of gender specific enrollment into schools, which signifies that private institutions accommodate admission of girls at the same rate as they do for boys. Specifically, it is reported that almost for all age groups of primary and secondary levels of education, female enrollment is higher in private schools as compared to boys' enrollment. However, the same pattern does not exist for females in age group of 20-24 years, which is appropriate for tertiary education.

Nevertheless, in most of the developing countries like Pakistan a general perception is that after primary and in very few cases after secondary level of education, girls are not enrolled for further education due to social norms attached to them as they either reach the age of puberty or are married off. A common belief is that in most of the developing countries even if girls are enrolled into schools in comparison to boys they are only able to gain only first few years of schooling, thus further strengthening existence of gender bias in education. Another plausible technique has been used in the literature in recent years to gauge existing gender gaps in school enrollment rates. This technique is known as Blinder-Oaxaca decomposition, which measures variation in school enrollment rates and returns to education. Pal (2004), takes into account the opportunity cost of schooling in India, by signifying existing gender gaps in children's school enrollment and participation in market jobs. The results illustrate that approximately 30% of disparity in school enrollment is due to differences in characteristics of male and female children whereas 70% of difference is unexplained due to discriminatory reasons. We use this technique to identify whether the data supports this argument in Pakistan or not after correcting largely for the measurement errors.

Data and Summary Statistics

The data used in this paper is taken from the Pakistan Social and Living Standards Measurement Survey (PSLM) 2010-2011. The survey is carried out at district levels and includes data on 76,546 households from all over Pakistan, with main focus on social indicators.

Our sample comprises of 53,414 households. However, the analysis carried out on an individual level is based on data availability of 193,051 individuals who fall in the required sample age group. Further division of the sample shows that out of the total sample 115,964 individuals are enrolled and 13,612 are not enrolled into schools whereas the remaining are not included due to data unavailability.

Table 1
Percentage of children between ages 5-18 years attending school

Gender	Percentage of children between ages 5-18 years attending school (%)
Male	59.8
Female	39.9

Table 1 shows that the sample data comprise of around 85.5% children that are enrolled whereas as remaining 17.05% are not enrolled into schools. Amongst the children enrolled into schools 59.8% are male children, whereas only 39.96% are females. 72% of the children are enrolled into public schools and 25.7% go to private institutions. The remaining 0.9% of the children are enrolled into other types of schools (like masjid, religious and other types) available, but they have not been added into this paper.

Table 2
Percentage of children between ages 5-8 years attending public vs. private school

Type of School	Percentage of children between ages 5-8 years attending public vs. private school (%)	Percentage of children between ages 5-8 years attending public vs. private school Male (%)	Percentage of children between ages 5-8 years attending public vs. private school Female (%)
Public	72%	61.1%	57%
Private	25.7%	38.8%	43%

Furthermore in table 2, the division of the statistics shows that 61.1% male children are enrolled into public schools whereas only 38.8% females are enrolled into public schools. As far as private schools are concerned, 57% male children are enrolled into private schools and on the contrary only 43% female children attend private schools.

Table 3
Average years of schooling for children aged 5 to 18 years

Type	Average years of schooling for children aged 5 to 18 years (years)
Entire Sample	4.7
Male	4.8

Female	4.7
Rural	4.4
Urban	5.2

Table 3 shows that the average years of schooling for children between ages five to eighteen years is around 4.7 years of schooling which mainly constitutes of the primary education. Gender classification shows that for male children average years of schooling is 4.8 years whereas, female students from the sample showed approximately 4.7 years of education. Likewise, region categorization also signifies that urban areas show an average of 5.4 years of education and rural areas in the study sample register only an average of 4.4 years of schooling.

Table 4
Gross and Net Enrollment Rates

Level of Education	Gross Enrollment Rate (%)	Net Enrollment Rate (%)
Primary	71.7	56
Secondary	44.7	34.3
Higher	41.5	29.6

As far as enrollment rates across different levels of education are concerned in Table 4, there appears to be a sharp decline in enrollment from primary education to secondary education. In the sample used, the net and gross enrollment rate in primary education is 56% and 71.7% respectively; however, the enrollment rate in secondary school falls to 44.7% as far as GER is concerned and NER is around 34.3%. Lastly, the enrollment rates in higher education for Pakistan are lower when compared with primary and secondary levels, standing at GER of only 41.5% and NER of 29.6%.

Material and Methods

We use the Probit-Oaxaca decomposition model as proposed by Rahji (2006), and Handa (1996), to measure gender differences in primary level enrollment rates in South Western Nigeria and to gauge gender gaps in primary school enrollments of rural areas respectively. The model combined with Oaxaca technique will decompose gender gap and estimate explained and unexplained coefficients for the two groups (males and females) of children. The technique estimates separate enrollment equations for a particular reference group and another group that will be compared with the reference group. The coefficient will be decomposed into explained and unexplained variation. The explained variation will signify differences in enrollments or years of education achieved between groups due to factors like education, age and social status. Whereas, the unexplained part of the decomposition will indicate for the reference group, the differences that occur as a result of being part of that group alone and not due to any other variable that was controlled in the regression.

The simplified equation of the appropriate Probit model to estimate the probability of enrollment is written as follows:

$$Pr(E = 1/X_i) = \Phi\ (X_i B_i) \qquad (1)$$

Where, E_i takes a value of one if the child is enrolled in school for each respective level of schooling i.e., primary, middle, secondary and higher secondary for each gender category. On the other hand, X_i refers to childrens' characteristics and household factors like education of parents and occupation status of household members, household size, wealth index, ages of all enrolled children and region (rural/urban). The B_i in the equation represents coefficients of every variable $_i$ and Φ is the sign for the cumulative density function with standard normal distribution.

The Probit models are run for both gender specifications separately. The estimated coefficients from the first two models and ordinary least squares model as the third model above is further decomposed to assess whether gender gaps exist between males and females enrollment levels on aggregate level, enrollments in private schools and accumulated years of schooling.

The predicted probability of enrollment rates, enrollment into public/private schools and level of accumulated level of schooling for boys in each model respectively is:

$$P(Xb, \hat{\beta}b) = \frac{1}{Nb} \sum_{i=1}^{Nb} \varphi(Xb, \hat{\beta}b) \quad (2)$$

Where m = every enrolled male child in the sample

Also, the predicted probability of enrollment rates, enrollment into public/private schools and level of accumulated level of schooling for girls in each model respectively is:

$$P(Xg, \hat{\beta}g) = \frac{1}{Ng} \sum_{i=1}^{Ng} \varphi(Xg, \hat{\beta}g) \quad (3)$$

Where g = every enrolled female child in the sample

Following the decomposition, the gender gap for every dependent variable (whether enrolled or not, private/public school enrollments and years of accumulated level of schooling) is estimated by measuring the gender wise difference in predicted probabilities calculated above. The equation for calculating gender differential is:

$$\textit{Gender Gap (GAP)} = P(Xb, \hat{\beta}b) - P(Xg, \hat{\beta}g) \quad (4)$$

$$\textit{Explained Variation} = P(Xg, \hat{\beta}b) - P(Xb, \hat{\beta}b) \quad (5)$$

$$\textit{Unexplained Variation} = P(Xb, \hat{\beta}g) - P(Xb, \hat{\beta}b) \quad (6)$$

$$\textit{Residual Gap} = \textit{Gender Gap} - \textit{Explained Variation} - \textit{Unexplained Variation} \quad (7)$$

Based on the equations above, the entire process of decomposition is carried out with male students as the reference group, with further disaggregation in form of differences due to observed factors also termed as explained variation as shown in equation (7). The unexplained variation (equation 8) is defined as the difference that occurs if probability of male enrollments and years of education achieved are a result of coefficients used for female children. Lastly, the residual gap (equation 9) is calculated by reversing the reference group (being boys in this case).

All the components of Oaxaca decomposition remains same for the OLS model as well, however instead of predicted probabilities the third model generates expected value of years of education attained by individuals and their resulting gender differentials as shown below:

$$Gender\ Gap\ (GAP) = E(Xb, \hat{\beta}b) - E(Xg, \hat{\beta}g) \quad (10)$$

$$Explained\ Variation = E(Xg, \hat{\beta}b) - E(Xb, \hat{\beta}b) \quad (11)$$

$$Unexplained\ Variation = E(Xb, \hat{\beta}g) - E(Xb, \hat{\beta}b) \quad (12)$$

All the estimations are based on the above specifications regarding measurement of gender differentials across overall enrollments, enrollments into public/private institutions for three levels of education primary, middle/secondary, higher secondary and accumulated years of schooling.

Next, we discuss the estimation of the equations discussed above The probabilities of males and females to get enrolled in school based upon their respective observable characteristics controlled in the regression is estimated as follows:

$$Z_{male} = \beta_0 + \beta_1\ Father's\ education + \beta_2\ Mother's\ education + \beta_3 Working\ Male/All\ Working\ members + \beta_4 Working\ Female/All\ Working\ members + \beta_5\ Household\ size + \beta_6 Wealth\ Index + \beta_7\ Age\ of\ child\ (5\text{-}18years) + \beta_8\ Own\ home + \beta_9\ Dummy\ of\ Distance\ to\ nearest\ water\ facility + \beta_{10} Total\ number\ of\ children + \beta_{11} Region\ Dummy + \beta_{12} First\text{-}born + + \beta_{13}\ Incomepercapita + \beta_{14} DistrictDummies + \epsilon \quad (13)$$

$$Z_{female} = \beta_0 + \beta_1\ Father's\ education + \beta_2\ Mother's\ education + \beta_3\ \ Working\ Male/All\ Working\ members + \beta_4 Working\ Female/All\ Working\ members + \beta_5\ Household\ size + \beta_6 Wealth\ Index + \beta_7\ Age\ of\ child\ (5\text{-}18years) + \beta_8\ Own\ home + \beta_9\ Dummy\ of\ Distance\ to\ nearest\ water\ facility + \beta_{10} Total\ number\ of\ children + \beta_{11} Region\ Dummy + \beta_{12} First\text{-}born + \beta_{13}\ Income\ per\ capita + \beta_{14} DistrictDummies + \epsilon \quad (14)$$

In model 1 the equations (13) and (14) are used to measure the probabilities of children of age group 5-18 years enrolled in school based upon their gender separately in model 1. Where, Z_{male} and Z_{female} are the binary dependent variables that takes a value of 1 if a child is enrolled and 0 otherwise for primary, secondary and higher level of education.

Model 2 is based on whether the child is enrolled in private or public school. Where, Z_{male} and Z_{female} are the two binary dependent variables for each gender specification based regression. Both the dependent variables will equal 1 if a child is enrolled in a private school and 0 if he/she is in a public school. This estimation is repeated separately for three levels of education: primary, middle secondary and higher secondary. We control for same variables in the regression as above.

In model 3 we estimate the gender differentials amongst children across accumulated level of schooling where, Z_{male} and Z_{female} will be continuous dependent variables for the age group 17 -30 years.

The independent variables contain both continuous and dummy variables. The variables include children's age cohort (Aslam, 2003; Iram and Hussain, 2008), parents' educational attainment, household employment status (Lloyd, Sathar and

Mete, 2005; Deolalikar, 1997; Iram and Hussain, 2008; Rahman, 2009), the gender of the child (Aslam, 2003), the region the family resides in, that is either urban or rural (Donkoh, 2011), district dummy variables (Baluch and Shahid, 2009) and wealth index (Donkoh, 2011; Huisman, Rani and Smits, 2010). We control for parent's characteristics that play vital role in schooling decision of a child. Parents' education, occupation and age are controlled. The variable for household size is included that may capture increased expenditures at household level which might affect the schooling choices. Additionally, in countries like Pakistan where concept of joint family is very common, increase in household size means more members contributing resources to share of public services like electricity and gas, thus, leaving behind greater proportion of resources to be allocated towards education (Aslam, 2003).

Specification Issues

First, since the analysis is carried out at an individual level, there would be a number of unobserved variables in the analysis. Basically factors like individual ability and motivation levels of children going to school and income shocks of all the households may not be measured as they are unobservable, resulting in omitted variable bias. Due to this, a biased and inconsistent estimate of enrollment rates and education levels will be achieved, thus making identification of a true causal impact difficult. As data being used for the research is from (PSLM), separate IQ or ability-based tests cannot be carried out for analysis domain of the study. In order to cater to this possible specification issue, variables like parents' education in form of highest level of education achieved. To measure the impact of parents' education on children's education variables indicating highest level of education achieved by parents will be generated. Therefore, these variables would act as proxies of every child's ability to enroll into schools.

Secondly, comparison of households enrolling their children into schools to households' not enrolling children obviously points towards difference in income and expenditure levels between the two groups. Due to this variation, the households enrolling their children into schools do not act as a random sample. To rectify this problem, the variable income can be added into the regression equation along with a wealth index. The index will be based on household possessions and other characteristics (Monazza, 2003; Baluch and Shahid, 2009). This way a long-term view of every household's social and economic condition can be assessed, since the wealth measure will incorporate historical along with recent information.

Thirdly, since the data being used in the research is a cross-sectional data, chances of heteroscedasticity may exist due to changes in the variance of error terms with magnitude of independent variables. To correct this particular problem, heteroskedastic robust standard errors are estimated.

Results and Discussion

The sub first section reports the Oaxaca-probit gender gap in enrollment status of children between ages five to eighteen years. In the second sub section we discuss the results for the gender gap estimation of enrollments into public vs. private schools across three levels of schooling: primary, secondary and higher. Lastly, the third sub section reports the results for the gender gap in levels of education achieved

by children from the study sample. All the regression estimations have been carried out by the Oaxaca- Blinder technique (1973) combined with Probit and OLS regressions are provided separately for both girls and boys

Measuring the Overall Gender Gap in Enrollments, Pakistan

The results for measuring gender differentials in enrollment rates is reported in table 5, where the dependent variable equals 1 if the child is enrolled and 0 if the child is not enrolled(5-18 years).

Table 5
Overall Gender Gap in enrollment rates, Pakistan

Dependent Variable	Enrollment Status
Main	
Girls	0.835***
	(0.00154)
Boys	0.865***
	(0.00118)
Gender Gap	-0.0295***
	(0.00194)
Endowments (Explained Difference)	0.0201***
	(0.00102)
Coefficients (Unexplained Difference)	-0.0706***
	(0.00198)
Interaction	0.0211***
	(0.00111)

Author's own calculations Standard errors are clustered at household level. ***p<0.01, **p<0.05, *p<0.1

The results from Oaxaca decomposition of gender differences suggests that a gender gap of -0.0295 exists. From the overall gender gap, the significant positive explained gap due to differences in enrollment rates of boys if they had girls' characteristics is 0.0201. The endowment effect shows that if the boys had similar observable characteristics (as controlled in the regression) of that of girls, the probability of them being enrolled in school would have increased by 2%. On the other hand, the negative yet significant unexplained gap due to differences in estimated coefficients is -0.0706. The unexplained components of this gap corresponds to the discrimination as suggested in literature due to unobservable factors like child abilities and motivation levels, parental preferences, social and cultural barriers and bias against active participation of women in education. Lastly, the gap due to significant interaction effect that accounts for possibility that variation in endowments and coefficients exist simultaneously is 0.0211

Measuring the Overall Gender Gap in primary level schools, Pakistan

The results for measuring gender differentials in primary level of education across two types of schools is reported in table 6, where the dependent variable equals 1 if the school is private and 0 if the child is enrolled in public school.

Table 6
Overall Gender Gap in primary level schools

Dependent Variable	**1= Enrolled In Private 0= Enrolled In Public**
Main	
Girls	0.304***
	(0.00274)
Boys	0.287***
	(0.00225)
Gender Gap	0.0172***
	(0.00355)
Endowments (Explained Difference)	0.0488***
	(0.00235)
Coefficients (Unexplained Difference)	-0.0272***
	(0.00267)
Interaction	-0.00436***
	(0.000825)

Author's own calculations Standard errors are clustered at household level. ***p<0.01, **p<0.05, *p<0.1

The results show that a gender gap of 0.0172 exists for the education at primary level. This positive gender differential indicates a pro-female gap that can be further substantiated by the higher enrollment probability of girls (group1: 0.304) as compared to a lower figure for boys (group 2: 0.287). From the overall gender gap, the significant positive endowment gap due to explainable differences in enrollment rates of boys if they had girls' characteristics is 0.0488. On the other hand, the negative significant unexplained gap due to differences in estimated coefficients is -0.0272. The unexplained components of this gap as suggested in literature include factors like child abilities and motivation levels, parental preferences, social and cultural barriers and bias against active participation of women in education. Also, the unexplained gap shows the discrimination effect that measures change in primary level enrollments occurring if probability of boys' enrollments is established by girls' coefficients. The negative unexplained variation shows that although the overall gender gap is in favor of girls' enrollments into private schools the difference in coefficients shows that boys based on their gender differential treatment should be going to private schools instead of girls as girls should be going even more which they are actually not. Lastly, the gap due to significant interaction effect of both endowment and coefficient gaps is –0.00436.

Measuring the Overall Gender Gap in secondary/middle level schools, Pakistan

Table 7 disaggregates the decision of child being enrolled in public or private school based upon the gender of the child at secondary level. This division incorporates the decision to be enrolled at secondary level of children between 11-14 years into public vs. private institutions.

Table 7
Overall Gender Gap in secondary/middle level schools

Dependent Variable	1= Enrolled In Private 0= Enrolled In Public
Main	
Girls	0.266***
	(0.00385)
Boys	0.229***
	(0.00284)
Gender Gap	0.0363***
	(0.00479)
Endowments (Explained Difference)	0.0738***
	(0.00310)
Coefficients (Unexplained Difference)	-0.0258***
	(0.00394)
Interaction	-0.0117***
	(0.00221)

Author's own calculations Standard errors are clustered at household level. ***p<0.01, **p<0.05, *p<0.1

The gender discrimination measured through the Oaxaca decomposition reported in Table 7, for the secondary level education shows a positive gender gap of 0.0363. This gender differential can be further substantiated by the higher average probability of girls' enrollment (group1: 0.266) as compared to a lower rate for boys (group 2: 0.229). From the overall gender gap, the significant positive explained gap due to differences in enrollment rates of boys if they had girls' characteristics is 0.0738. On the other hand, the negative yet significant unexplained gap due to differences in estimated coefficients is -0.0258. The unexplained gap again indicates that although overall gender gap demonstrates pro-female enrollments however, based on the difference due to estimated coefficients boys are more likely to enroll into secondary/middle level private schools so girls should be enrolling even at a higher number than their current rates, however they are not. Lastly, the gap due to significant interaction effect is -0.0117.

Measuring the Overall Gender Gap in higher secondary Level, Pakistan

Table 8 shows the results for the third division regarding type of school model incorporates the higher secondary level of education and enrollment of children between ages 15-18 years into public vs. private institutions.

Table 8
Overall Gender Gap in higher secondary education schools

Dependent Variable	Dummy =1 If Enrolled In Private School & =0 If Enrolled In Public School
Main	
Girls	0.263***
	(0.00517)
Boys	0.207***
	(0.00356)
Gender Gap	0.0559***
	(0.00628)

Endowments (Explained Difference)	0.0775***
	(0.00382)
Coefficients (Unexplained Difference)	-0.00337
	(0.00612)
Interaction	-0.0183***
	(0.00426)

Author's own calculationsStandard errors are clustered at household level. ***p<0.01, **p<0.05, *p<0.1

The Oaxaca decomposition shows that higher education indicates a pro-female positive gender gap of 0.0559. This gender differential can be further seen in average probability of higher education enrollment for girls (group1: 0.263) as compared to a lower rate for boys (group 2: 0.207). From the overall gender gap, the significant positive gap explained through differences in boys' enrollment rates if they had girls' characteristics are 0.0775. On the other hand, the unexplained gap due to differences in estimated coefficients is insignificant. This insignificance implies that most of the gender gap in this model is due to the endowment effect and discrimination against gender does not affect the decision of secondary schooling. Lastly, the gap due to significant interaction effect is only -0.0183.

Measuring the Overall Gender Gap in higher secondary Level, Pakistan

In the third model, the continuous dependent variable will capture accumulated years of education achieved by individuals between ages 18 to 30 years. Table 9 shows variation in years of education achieved by male and female falling in the age bracket eighteen to thirty years.

Table 9
Overall Gender Gap in Accumulated years of education achieved by children, Pakistan

Dependent Variable	Years Of Education
Main	
Girls	9.264***
	(0.0238)
Boys	9.172***
	(0.0180)
Gender Gap	0.0919***
	(0.0299)
Endowments (Explained Difference)	0.667***
	(0.0189)
Coefficients (Unexplained Difference)	-1.044***
	(0.0334)
Interaction	0.469***
	(0.0258)

Author's own calculations Standard errors are clustered at household level. ***p<0.01, **p<0.05, *p<0.1

The results from Oaxaca decomposition shows a positive gender gap of 0.150. The gender difference can also be seen in the average years of education achieved by girls (group1: 9.264) as compared to an interestingly lower figure for boys (group 2: 9.172). From the overall gender gap, the significant positive explained gap due to

differences in enrollment rates of boys if they had girls' characteristics is 0.667. On the other hand, the negative yet significant unexplained gap due to differences in estimated coefficients is -1.044. Lastly, the gap due to significant interaction effect is 0.469 that indicates that differences in endowments and coefficients can to some extent exist simultaneously between both gender groups. Interestingly, the individual components of the total gender gap indicate that both explained and unexplained along with interaction portion of the gap contribute significantly to the gender gap. Although, the overall gender gap shows that female individuals are more likely to attain additional years of education, however the unexplained component of the total gap indicates that if the girls' coefficient is applied to the boys' characteristics, the boys attain lesser years of education.

Conclusion

The objective of this study was to identify whether gender discrimination exists at different levels of education in Pakistan. After controlling for the observable child level characteristics, parent's characteristics and geographic characteristics to minimize the estimation errors we use the Oaxaca-probit technique to decompose the gender gap estimations into explained and unexplained portions. Where the unexplained proportion of the estimate is attributed to the component of discrimination against each type of gender. Our results interestingly report overall dynamics of gender discrimination in education sector for the case of Pakistan. Although we see discrimination against girls in early ages but later we find that the discrimination against girls fades away. Although overall the results show that on average the enrollments are higher for boys but the probability of being enrolled in private schools is higher for girls at primary, middle and secondary level. Also, the accumulated level of schooling is higher for girls as compared to the boys.

The results of the study are similar to the results proposed by Baluch and Shahid (2009) that show that gender discrimination in favor of boys exists in overall enrollments of children between ages 5 years- 18 years. Findings by Lancaster, Maitra and Ray (2008) in their paper on India further emphasizes on the households preference of enrolling boys into schools and argue that better future economic returns are associated with higher enrollments for boys whereas, girls are mostly not enrolled into schools especially if schools are far off and due social and security barriers. On the contrary the results for the school choice (private vs. public) disaggregated at the three levels of education indicate that pro-female preferences for enrollments into private school exist that remains consistent for at all the three levels of education i.e., primary, secondary and tertiary. These findings are similar to those of Asadullah and Chauhdry (2008) where they suggest that in Bangladesh gender-bias exists, which favors girls more than boys for both rural and urban areas.

Finally, the significance of the results on the accumulated level of schooling further signifies that there is a significant overall gender gap in performance levels of both male and female students implying that females outperform males and therefore end up with significantly higher accumulated level of schooling as compared to boys but at disaggregate level the results show that the boys ends up accumulating lesser years of schooling if the girl's coefficient is applied on the boys characteristics, implying that the unobservable characteristics on boys like pressure to earn at a specific age could possibly be a hindering factor for boys in later ages.

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