**PIDE Working Papers**
**2012: 84**

# The Gender Differences in School Enrolment and Returns to Education in Pakistan

**Madeeha Gohar Qureshi**
*Pakistan Institute of Development Economics, Islamabad*

**PAKISTAN INSTITUTE OF DEVELOPMENT ECONOMICS**
**ISLAMABAD**

Pakistan Institute of Development Economics
Islamabad, Pakistan

*E-mail:* publications@pide.org.pk
*Website:* http://www.pide.org.pk
*Fax:* +92-51-9248065

Designed, composed, and finished at the Publications Division, PIDE.

**C O N T E N T S**



**List of Tables**

**ABSTRACT**

In this study attempt has been made to link the gender differences in parental resource allocation in demand for education at primary, secondary and tertiary level of education to gender differences in returns to education in these respective categories in Pakistan. The hypothesis was that if we find that labour market rewards male more than female then this may be able to give a plausible explanation of why households invest much less in daughter's education. However our results suggest otherwise that there is under investment in females education at all levels even though returns to education are much higher for females than males. One possible explanation could be that even though private rate of return to time spent in school than in labour market is higher for a female compared to male but the part of return that goes to parents are much lower for daughters than sons in Pakistan due to dependence of parents on their son for old age support. The key factor from policy point of view that can reduce such discriminatory attitude towards female enrolment in a household are found to be education of parents especially mother's education. Both father's and mother's education are found to have significant positive impact on education of both sons and daughters. However mother's education compared to father has much more impact in terms of magnitude at all levels of education and especially the role is more pronounced for daughters.

*JEL Classification:* I21, J16
*Keywords*: Enrolment Rates, Rates of Return, Gender, Pakistan

## 1. INTRODUCTION

The gender bias seen in the shape of differential treatment that male children receive in comparison to female in South Asian societies has been a widely studied phenomenon. The distorted ratio of male and female mortality rate in the region than the expected biological ratio speaks of the strong preference the male child enjoys [Dr`eze and Sen (1989)]. In Pakistani society, women's autonomy is severely limited in the traditional set-up because of cultural taboos and the role as a keeper that society prescribes for women with very little access to economic opportunities compared to males. This is reflected in Pakistan's 66th position on the Gender Empowerment Measure out of 75 countries [Human Development Report (2006)]. This existing poor female empowerment can perpetuate gender imbalance for generations in terms of disproportionate provision of health care and access to education across sexes.

One dimension in which the female child is marginalised in Pakistani society is of education. The adult literacy rate and the gross enrolment ratio at primary and secondary levels of education for females as a percentage of males (2000-05) as reported by UNICEF is 57 percent, 73 percent and 74 percent respectively reflect large inequalities in literacy and school attendance across the gender scale. Among the initiatives that have been taken by the government of Pakistan to bring down such inequalities is the doubling of the number of boys and girls primary schools from 1988 to 1998 to ease the supply side constraints. Yet the proportion of girls to boys enrolled in primary schools remained the same from which one may conclude that there is poor demand for female education at primary level in Pakistan [Mahmood (1997)]. On the other hand, there is empirical evidence of increase in the number of private schools in Pakistan that are primarily co-educational with few exceptions even in the rural sector [Sathar, Lloyd, and Haque (2000)]. This indicates that a possible shift from public to private schooling in search of quality education for both sexes may be taking place in Pakistan. This situation entails the need for greater research to analyse empirically, from both social and policy perspectives, whether the demand for schooling varies by gender and, if so, then what are the factors that cause such imbalances in Pakistan.

This question is even more relevant in the context of Millennium Development Goals among which the elimination of gender disparity at primary and secondary education preferably by 2005 and at all levels no later than 2015 are the targets to achieve. In this paper using the Pakistan Social and Living Standards Measurement Survey (2005-06), we try to test for the presence of

***Acknowledgements:*** My sincere thanks are to Dr Anil B. Deolalikar, Professor of Economics, University of California, Riverside. This work could not have been possible without his support and guidance.

gender discrimination against females by the reduced form demand equation for schooling of children age 5–24 as the function of prices, income and other household characteristics using individual level data. The factors that may cause this differential treatment against females at the household level are also evaluated. There is evidence of the existence of gender discrimination at all levels of education: primary, secondary and tertiary; and the key factor from the point of view of policy that can mitigate this discriminatory attitude is the parents', especially the mother's education. Both the father's and mother's education are found to have significant positive impact on education of both sons and daughters. However, the mother's education compared to the father's has far more impact in magnitude at all levels but particularly in respect of daughters. The results of this study are somewhat similar to findings by Hamid and Siddiqui (2001) who examine demand for schooling by gender for three major cities of Pakistan i.e., Faisalabad, Sialkot and Karachi and find that father's education raises the schooling opportunities of both sons and daughters but mother's education exclusively benefits the daughters' schooling chances.

This study also investigates a labour side explanation for such a differential pattern of schooling across the genders. If the returns from schooling of males are higher on average then it makes economic sense for households to invest more in education of the male child. And then this behaviour may not be considered discriminatory. But if evidence to the contrary is found, that despite higher returns from female education it is still neglected which shows in poor school presence of the female child, then this would be indicative of serious misallocation of resources in a household. In the analysis of this study it is found that the returns to schooling are higher for females than for males at all levels of education—primary, secondary and tertiary and yet parents still invest less in educational development of females as compared to males. One possible explanation for this trend could be that even though the private rate of return to time spent in school than in the labour market is higher for a female compared to male but the part of return that goes to parents is much lower for daughters than sons in Pakistan.

Another important trend that results from this study is that returns to education increase with increase in educational levels both for male and females and the incremental increase is much more for females than for males. The findings that returns to education are higher for females than males and earning function is convex with respect to education is in line with previous research done in Pakistan that includes Hamdani (1977), Haque (1977), Guisinger, Henderson and Scully (1984), Khan and Irfan (1985), Shabbir (1991), Shabbir and Khan (1991), Ashraf and Ashraf (1993a, 1993b), Shabbir (1994), Nasir (1998), Nasir (2002) and Aslam (2005).

The lay out of the paper is as follows: The following section presents literature review in respect of under-investment in a daughter's education compared to a son's in parental resource allocations in developing countries. A

brief review of key determinants of school enrolment at household level is discussed in Section 3. In Sections 4 and 5 we present the model and estimation technique. Descriptive analysis of gender difference in school enrolment and earnings is given in Section 6. The estimated results and findings are presented in Section 7. The final section concludes the paper.

## 2. LITERATURE REVIEW

Differential treatment occurs across gender both within and between societies. It can be apparent in the form of lesser household expenditure on a girl child's nutrition, health and education than on her male siblings or take hidden forms such as when a girl raised in a fair household may realise how unequal she was when she steps out of the house to work or when she gets married and is not given freedom to work or take her own decisions. She may face varying degrees of discrimination depending on her circumstances in a patriarchal society. Why has parental resource allocation been observed to be empirically skewed towards a son across a range of countries is explained in theoretical literature by conceptualising children to be either "investment goods" or "consumption goods". When children are modelled as investment goods then parents as rational neoclassical utility maximisers allocate more resources to children who yield better return [Becker (1975); Becker and Tomes (1976)]. While models in which parents directly get differential utility from their children consider them as 'consumption goods' and the societal constraints may skew their utility function for a particular child, that in our context means for the particular gender of an offspring [Lakshmanasamy (1991)].

From the investment point of view, the relative return on a son's education may be greater compared to a daughter's in developing countries where a son traditionally serves as a post retirement insurance for old parents in the absence of any other safety net measure. This dependence of parents on their sons in old age becomes even more significant in those traditional families which regard dependence on daughters as shameful. In such societies a daughter after her marriage is held responsible only for her in-laws and if she choses to remain single for some reason, that too is considered to be bad. Another reason why it is better to invest in a son than a daughter is the former's higher earning potential than the latter's. This is due to the males' better performance in physically strenuous jobs like farming, presence of labour market wage discrimination against females and, finally due to cultural constraints like purdah system that prevent women from taking part in economic activities and rigid gender roles like household exclusive for females. The evidence that parental resource allocation can change in favour of children who are expected to earn more in future has been documented in Rosenzweig and Schultz (1982) using rural household level and district level data from India where it is empirically shown that female children receive a proportionately larger share of

household allocations as compared to males when women's expected employment in the labour market is high.

In traditional societies where dowry payments are customary failure to provide the in laws with the settled sums and goods also results in loss of face for the bride and her family [Caldwell and Caldwell (2005)]. There is an inherent preference sons as investment on his education will not only mean higher returns in terms of higher potential earnings but also the possibility of receiving higher dowry at lower marriage costs. And when a daughter's parents save for dowry payments it results in under-investment on her educational activities [Lahiri and Self (2004)]. Hence sons are favoured over daughters due to cultural and social norms [Das Gupta (1987)].

Finally, the direct and indirect cost of sending a daughter to school may be more than a son's as the girl child has to do housework and babysit for her younger siblings. The presence of elderly women in the household does provide some relief to the female child from such chores. Safety concerns for the female child who is considered to be more vulnerable may also affect their education adversely.

## 3. HOUSEHOLD LEVEL DETERMINANT OF SCHOOLING

In contrast in Pakistan the debate is about whether the inadequate demand for female schooling is due to inadequate supply of government schools for females or due to the demand side factors [Sabot (1992) and Burney and Irfan (1991)]. The truth seems to lie somewhere in the middle since neither supply side constraints nor the role of household decision making in determining the level of educational attainment for a female child can be ignored. In fact the supply side factors such as the availability of girls school or a school nearby may affect the demand for schooling for the daughters. Therefore decision making at household level is critical for understanding the overall picture.

Two major approaches are found in the literature on household behaviour. One strand treats households as collective models where an altruistic head (parent) maximises the joint welfare of the household subject to its resource constraints [Becker (1981)]. Thus the choice for educational investment is explained in terms of expected returns from education of a child against the opportunity cost of the child's time spent in schooling and the returns to the forgone income of the household on education in this framework. This literature introduced a quantity and quality trade-off for children: an increase in the number of children in a household meant compromise on the quality of education given to them and vice versa. In this framework, the unequal treatment of the female child was considered a rational choice on the part of the household, as economic returns to educating a male child are greater than a female child. The expected returns to education of a child depend not only on his/her innate ability and the educational attainment but also on their parental

background since well-placed and well-educated parents may not only have the means to give their children better educational opportunities but also will have the means to place their children on high wage jobs due to their background and connections. From the parents' point of view their return on investment on a child will depend on his ability to support them in old age. The expected returns of a female child will be low because of the limited opportunities in the labour market and also their marriage will limit their ability to support their parents later on.

The other approach analyses the outcomes of intra-household resources' redistribution in terms of the bargaining power of the members of the household [McEleoy and Horney (1981)]. Various factors can determine the degree of bargaining power of an individual that could include the wage earned, received inheritance and also how society defines their roles.

Therefore the channel through which a household decides on the level of schooling for each individual is not straight. It involves many inter-linkages. A full simultaneous model of household decision making over the lifecycle would include determinants of family size, which will be affected by many of the same factors as schooling of the children. The reduced form solution will result in separate demand relation for each child's schooling as dependent on prices, income and other household characteristics like parental education etc. In this framework we will use non-labour income in place of wage income for the household as the generic model treats both time allocation of children to schooling and other wage activities and parents' wages as jointly determined in the system. The expected sign of non-labour income on the child's schooling will be positive considering that the child's education is a normal good. The expected sign of indicator for the price of a child's education including child and parent wage rate will be negative. One proxy for price of education could be the availability of an educational institution close by the place of residence that can lower the total cost of education and is expected to positively affect school enrolment.

## 4. MODEL FOR SCHOOL ENROLMENT

The approach in this section has been adopted from Deolalikar (1993)**.** Applying the insight from Section 2, a separate demand equation for schooling has been estimated for individuals in the age group 4-10, 11-17, and 18-25. These age groups roughly correspond to age groups of individuals who may be enrolled in primary, secondary and tertiary levels of education. The equations are as follows:

$$\Pr(S_i) = F(\alpha_{jk} + \alpha_{jk} A_i + \alpha_{jk} H_i + \alpha_{jk} C_i + \varepsilon_{ijk}) \qquad \ldots \qquad \ldots \quad (4.1)$$

where

$i$ = indexes the individual child

$j$ = indexes the gender ( m = males, f = females)
$k$ = indexes age groups
$F(\ )$ = cumulative logistic distribution
$Pr(S_i)$ = the probability of child $i$ being enrolled in school
$A$ = vector of single age dummies
$C$ = vector of community characteristics (urban and provincial dummies)
$H$ = vector of household characteristics (non-labour income and parental schooling dummies)

In Equation (4.1) single year age dummies are included to control for any nonlinear relation between a child's retention in school and its age. Here the urban dummy is used as an indicator of cost of education and we its positive impact on the likelihood of enrolment is expected since there should be easy access to education and availability of all sorts of schools including single sex schools in urban centres relative to the rural sector. In this study urbanisation is used as a proxy for availability of school instead of distance to school because in our data set we only have information on distance to school for school going children This introduces perfect collinearity between the enrolment dummy and distance to school variable due to which it has not been possible to use this information in the regression model. We use non-labour income as a control for family background as the full simultaneous model of household decision making treats both time allocation of children and parents to schooling and the work activities for wages to be jointly determined in the system and hence wage income cannot be considered as an exogenous variable.

Equation (4.1) is estimated by the maximum likelihood logit estimation method. In this case if we estimate Equation (1) by OLS then the discreteness of dependent variable is ignored and OLS does not constrain the predicted probabilities between zero and one. In case of the logit model, the predicted probabilities are ensured to stay between 0 and 1 range. To see the impact of dependent variables on the likelihood of enrolment across males and females grouping, we estimate each equation separately for males and females rather than using the interaction term of female dummy with all dependent variables. This has been done keeping in mind that the marginal effect of the interaction term as calculated by standard software like Stata does not give the magnitude of true interaction effect in case of non-linear models; also the sign and the significance of the true impact could be different than that calculated by Stata for the interaction term [Ai and Norton (2003)].

## 5. MODEL FOR ESTIMATION OF RETURNS TO SCHOOLING

In this study the standard Mincerian model has been used to estimate the returns to schooling in which the coefficient of years of schooling is an estimate of private rate of return to time spent in school instead of labour force as below:

$$\log(W_i) = \alpha_{ij} + \beta_{ij} Sch_i + \phi_{ij} Exp_i + \delta_{ij} Exp_i^{\,2} + \varepsilon_{ij} \quad \ldots \quad \ldots \quad (5.1)$$

$$\log(W_i) = \alpha_{ij} + \sum_k \beta_{ijk} S_{ik} + \phi_{ij} Exp_i + \delta_{ij} Exp_i^{\,2} + \varepsilon_{ij} \quad \ldots \quad \ldots \quad (5.2)$$

where

$i$ = indexes the individual
$j$ = indexes the gender (m = males, f = females)
$k$ = indexes three level of schooling (prim = primary, sec = secondary, tert = tertiary)
$log(W_i)$ = Log Daily Wage Rate for Individual $i$
$Sch_i$ = Years of Schooling for Individual $i$
$Exp_I$ = Potential Experience (Age—years of schooling—school starting age)
$S_{ik}$ = Dummy for enrolment (1 if enrolled and belong k level of schooling, zero other wise)

The provincial, rural and urban variations are controlled by introducing dummies for provinces and urban. The estimate of rate of return to schooling in Equations 5.1 and 5.2 can be biased upward because it may be capturing the impact of the omitted variables like quality of education, ability and motivation of the individual etc. To remove the impact of unobserved household and community characteristics that are shared by the family members, the household fixed effect is applied by keeping the data on siblings (for males we keep families with two or more brothers; similarly for females we keep families with two or more sisters) and taking deviation from the sibling mean. Another form of bias that may arise in the context of the earning function is the issue of selectivity as we only have information on working individuals, since the behaviour of people who chose to work may be different those who stay out of labour force. This can induce bias in our estimates. To correct for the selectivity bias we apply Heckman two step procedure by using the number of children, household size and whether one is married or not as identifying variables. These identifying variables may impact male and female participation differently. For example marriage may constrain female participation in labour force considering our cultural norms but for a male it may add responsibility on his shoulders and may induce him to work. Similarly increase in household size and number of children may induce the male to work more for wages to support his family but for a female it may add to her household responsibilities and may induce her to drop out from the labour force, especially when the proportion of young children or old members dependent on her may increase. Hence we would expect these to affect the participation of male and female in paid work differently.

## 6. DESCRIPTIVE ANALYSIS OF GENDER DIFFERENCES IN EARNING AND ENROLMENT PATTERNS

The exercise of calculating the demand functions and earning functions has been done on two distinct sets of individuals, one who fall in school going ages of primary (4–10), secondary (11–17) and tertiary levels (18–25) and the second who fall in age group of labour force participation (15–65) and are not currently enrolled in school. The mean values of variables used in the schooling equation for male and female samples by enrolment and in earning function by schooling, by region and finally by age cohort are given in Appendix Tables A.1, A.2, A.6, A.7, A.8, A.9, A.10, A.11, A.12 and A.13 respectively.

The pattern that comes clearly from the data of males and females in school going age group (4–25) is that on average the male has slightly higher level of enrolment, that is 0.577 compared to 0.49 for females (Appendix Table A.1). On examination of mean statistics by gender and by enrolment, we find that among those individuals who are currently enrolled, it is the parental education that plays an important role, especially the mother's (Appendix Table A.2). On average, the parental years of schooling are higher for both males and females for a group that is enrolled as compared to a group that is not enrolled but the difference in mean years of schooling for father and mother across enrolled and not enrolled groups for females comes to 1.91 and 2.04 respectively, which is slightly higher as compared to respective figures for males of 1.78 and 1.25. Hence parental education is a testable hypothesis. A look at household size in Appendix Table A.2 shows that those who are enrolled whether male or female come from slightly lower household size on average as compared to a group that do not go to school and this effect is more pronounced in case of the female. This again points to the fact that in face of budget constraints it is more likely that a daughter rather than a son would possibly be taken out of the school. Finally, the mean statistic of urban dummy by gender and enrolment in Appendix Table A.2 reveals that there is higher proportion of children living in urban localities in the group that are enrolled than those who do not go to school for both male and females; the proportion being higher for females at 45 percent than for males 37 percent. Hence the fact that being an urban resident could indicate a higher likelihood of being enrolled (due to easy and safe access to schooling) is also a plausible hypothesis.

Looking into the mean values of the variables used in the earning function in Table A.6, one finds that on average males earn slightly more than females by a mean value of 197.92 rupees daily compared to 94.4 rupees for females**.** Also not only do men on average earn twice as much as females they have almost double years of schooling as compared to females (5.9 for men compared to 2.7 for females) though both average earnings and years of schooling are quite low for both the males and females in Pakistan. Not only this. Among the category of no schooling, primary, secondary and tertiary level

of schooling there are marked gender differences which show that females on average are clearly the disadvantaged group with 66 percent female population against 33 percent of males who have never attended school and of those who have attended schools, the males outperform females at all levels of education. In terms of labour force participation also we find that 71.6 percent of males work while only 10.3 percent of females take part in paid work which may be an indication of the fact that culturally the primary role of bread earners falls on males and the role of females is mainly concerned with household responsibilities and child rearing. When the mean difference in daily earnings is calculated and the paid labour force participation proportions by schooling levels (as presented in Appendix Tables A.7 and A.8) we find that males on average earn more than females at all levels of education and the difference increases at higher levels. As for the trend of difference in participation in paid labour force is concerned, on average we find that males tend to have much higher participation rates than females but the difference declines slightly with education. The latter finding could be an indication of the fact that females who tend to pursue higher education come from backgrounds which are more open to female working than those who are not sent to school or are taken out early from school.

Another important channel that needs to be understood and evaluated concerns how labour market experience of males and females vary by different age groups. Since the older cohorts are at a different life cycle than the younger cohorts and the two may face varying labour market constraints, hence their experience in terms of returns to education may vary. To have an idea of the varying patterns across age cohorts, the mean level of daily wages (log values), years of schooling and participation in paid work by age cohort is presented in Appendix Table A.9. We can see from the averages presented that males tend to earn more than females at each age cohort, have much higher levels of years of schooling and have substantially higher levels of participation in work force rates than females. However, within male and female grouping we find that earning averages tend to initially increase and then decrease as we move up from younger to older age cohorts for both males and females indicating towards possible concavity of earning profile with respect to age. The years of education on average are higher for the younger cohort than the older ones for both sexes indicating that education is becoming more and more important for both males and females in the younger generation. In terms of participation in work we find that though participation rates are much higher for males than females in all age categories, but within male and female grouping participation rates peak for 41–50 age cohort for males and 31–40 age cohort for females and then decline from there on, indicating life cycle effects. In terms of mean difference in daily earning and labour force participation rates by age cohort and by schooling level as presented in Appendix Tables A.10 and A.11, we can see that at almost all

age groups and schooling levels males tend to earn more than females and tend to have much higher participation rates, though the gap in participation rates declines with increase in education level and show increasing and then declining trend across age cohorts for a given level of education, indicating again the life cycle effects.

Finally we also find evidence of marked variation in average earnings and paid labour force participation rates for both males and females across provinces and across rural and urban divide as is evident in Appendix Table A.12 and A.13, indicating the need to have control for regional variations in our earning function regressions. One clear pattern that comes out from the mean statistics across rural and urban divide in each province is that males tend to earn more on average than females in each category, have much higher mean value of years of education and also have much higher participation rates in paid work than females.

## 7. EMPIRICAL RESULTS

The evidence of gender bias against the female child is found at all levels of education. The estimated results for the reduced form demand function for enrolment shows that being female significantly reduces the likelihood of enrolment by 9.2 percent, 14.6 percent and 3 percent at primary, secondary and tertiary levels of schooling. This suggests that there exists a strong son preference while deciding about the schooling of children.

Table 1

*Summary of Impact of Key Variables in Schooling Demand Equations on Probability of Enrolment by Gender*

| | Male | | | Female | | |
|---|---|---|---|---|---|---|
| | Primary | Secondary | Tertiary | Primary | Secondary | Tertiary |
| Hhold Size | –.005*** | –.001 | –.006* | –.017* | –.008* | –.01* |
| Father Sch. | .01* | .011* | .013* | .014* | .018* | .007** |
| Mother Sch. | .016* | .021* | .017* | .0195* | .032* | .02* |
| Urban | .038*** | –.031 | .05** | .07* | .12* | .10* |

Among the control variables we can see in Table 1 that increase in household size decreases the probability of going to school for both male and females at all three levels, however, the effect is slightly more pronounced for females than males. This shows that in face of scarcity and budget constraints when the household has to decide between education of a son and a daughter, they will tend to prefer sending their sons to school than daughters. Also it can be seen in the table above that the urban dummy has positive and significant impact on the enrolment of females at all levels of education and the estimates show a sizable difference in terms of its impact across gender. This result is in

line with our hypothesis of using urbanisation as a proxy for availability of educational infrastructure and this significant sizable response to urban dummy could be due to much easier access to education for females in urban areas compared to rural setting.

Another key variable that impacts enrolment positively across gender at all levels is parent's education as can be seen in Appendix Table A.3, Table A.4 and Table A.5. Both the father's and mother's education has significant positive impact on education of both males and females. However we can see in Table 5.1 that the mother's education has much more impact in terms of magnitude at all levels of education for both males and females. For males, a unit increase in years of education of a mother increases the probability of enrolment by 1.6 percent, 2.1 percent and 1.7 percent at primary, secondary and tertiary levels of education respectively while a unit increase in father's education only increases the likelihood of enrolment by 1 percent, 1.1 percent and 1.3 percent at these respective levels. The education of mothers is even more important for education prospects of females. An increase in a year of mother's schooling increases the likelihood of enrolment of a daughter by 1.95 percent, 3.2 percent and 2 percent which is higher in magnitude to the respective impact of unit increase in the father's education which has been estimated to have an impact of 1.4 percent, 1.8 percent and 0.7 percent on female enrolment at primary, secondary and tertiary levels. The above finding shows that the educational background of parents has significant influence on the schooling preferences of the children, especially of mother's education on education prospects of daughters.

Before looking into the estimated rates of return across gender let us analyse the main characteristics of the sample used to calculate these returns as presented in Table A.6 in the appendix that shows that the proportion of males working for wages is much higher than females (71.6 percent for males, 10.3 percent for females). It means a much higher proportion of females is choosing not to work as compared to males. Hence the selectivity bias could be quite a problem for this sample. Also the descriptive analysis of population that works and those that choose to stay out of the labour force by gender as presented in Appendix Table A.14 shows that among males who work 72 percent are married while among those who do not work only 39 percent are married, while we see an opposite trend among females where the proportion of females who are married is less in those who participate in labour force (64 percent) than those who choose not to work (71 percent). Marriage therefore could be used as an identifying variable for induction into labour force though in the cultural context it may provide opposite incentives to males and females. In terms of household size as the identifying variable in the selection equation we find that those who do not work generally come from slightly larger households for both sexes though the effect on average is larger for males, indicating that the presence of joint family set-up in Pakistani society may release people from pressure to work.

The summary of rate of returns using different estimation techniques with and without quality of education control is presented in Tables 2 and 3 below.[1] We can see that returns to years of schooling for males range from roughly 1.4 percent to 6.1 percent and for females roughly between 4.4 percent to 12 percent. Therefore it can be concluded that on average females get higher return to a year of education than males.

Table 2

*Summary of Impact of Schooling Coefficients on Log(Wages) by Gender*

| | Male | | | Female | | |
|---|---|---|---|---|---|---|
| | OLS | Heckman | FE | OLS | Heckman | FE |
| Years | 0.06 | 0.061 | 0.014 | .109 | 0.12 | 0.044 |
| Primary | 0.04 | 0.045 | –.06 | 0.26 | 0.21 | 0.025 |
| Secondary | 0.30 | 0.31 | 0.105 | 0.54 | 0.59 | 0.278 |
| Tertiary | 0.74 | 0.75 | 0.189 | 1.02 | 1.16 | 0.32 |

Table 3

*Summary of Impact of Schooling Coefficients on Log(Wages) by Gender (Controlling for Quality of Education)*

| | Male | | | Female | | |
|---|---|---|---|---|---|---|
| | OLS | Heckman | FE | OLS | Heckman | FE |
| Years | 0.059 | 0.06 | .014 | 0.10 | 0.115 | .044 |
| Primary | 0.03 | 0.039 | –.06 | 0.25 | 0.21 | .019 |
| Secondary | 0.30 | 0.30 | .10 | 0.54 | 0.59 | 0.28 |
| Tertiary | 0.73 | 0.74 | .19 | 1.02 | 1.15 | 0.317 |

It is further evident from these results that return to education is higher for females than for males at all levels of education: primary, secondary and tertiary and also that the returns increase with education both for males and females and the incremental increase is higher for females than males. Also looking into the pattern across the various age cohorts as presented in Table 4, we again see that returns to schooling for females are higher than male for all levels of education across all age cohorts except for a few anomalies. There is also evidence of successive increase in returns with increase in education levels for both males and females in younger age cohorts (21–30 and 31–40) which are most relevant for current and future schooling decision.

[1]To control for quality of education we include a dummy variable private equal 1 if individual has attended school in private school, zero otherwise in earning function regressions. This has been done under the assumption that private schooling in general provides better quality of education than public and madrassa system of schooling. Our estimates do not vary much by inclusion of this variable though Adj. R-square improves. In our data set this is the best possible information regarding quality of education.

Table 4

*Summary of Gender and Cohort Specific Rate of Returns*
*(Selection Corrected Estimates)*

| | 15-20 | 21-30 | 31-40 | 41-50 | 51-65 |
|---|---|---|---|---|---|
| | | | **Female** | | |
| Years | 0.037 | 0.10 | 0.13 | 0.12 | .14 |
| Primary | –0.118 | 0.31 | 0.47 | 0.61 | .78 |
| Secondary | 0.405 | 0.36 | 0.72 | 0.32 | 0.64 |
| Tertiary | 0.409 | 0.98 | 0.87 | 1.25 | 0.47 |
| | | | **Male** | | |
| Years | 0.027 | 0.04 | 0.05 | 0.059 | .06 |
| Primary | –0.06 | -0.052 | 0.105 | 0.265 | 0.28 |
| Secondary | 0.23 | 0.27 | 0.275 | 0.184 | .23 |
| Tertiary | 0.50 | 0.66 | 0.55 | 0.569 | 0.53 |

There are several policy implications of convexity of the education-earnings profile. Firstly, the argument relating to higher returns at lower education levels has often been used to justify allocating funds to expand primary education. However, the presence of convex education earning profiles may reflect un-met demand within industry sectors for high skilled labour and policy- makers may need to promote high level skills as well as adopt policies which encourage these individuals to participate in the labour market (especially women). Secondly, convexity has implications for increasing education inequality. If private returns to schooling increase with higher education, poorer families who educate their children only up to primary level will face lower returns while richer families who educate children up to higher levels will reap higher returns. Consequently, the poor are motivated to educate their children less and may also send only the more able children to school for whom returns are higher. Consequently, education and earnings differentials may widen both across families and within families.

However our findings reveal that females have significantly higher economic incentives to invest in education than males. Yet we find significant and sizable evidence of gender differential in educational outcome. The coexistence of high returns to education for women and gender bias against them in household education decisions is a puzzle that demands explanation. One potential explanation is that even if the return to girls' education is higher than that to boys' education, the part of the return to daughters' education accruing to parents may be much lower than that accruing from a son's education due to cultural norms and labour market discrimination. Since in Pakistan parents generally depend on their sons for support in old age than their daughters, it makes economic sense to invest more in them. Moreover in patriarchal societies daughters after marriage take on the duties relating to the

household of their in laws and become detached from duties of their parental home. So even if females work after marriage (which is not so common in Pakistan due to cultural taboos) the proportion that will be spent on taking care of her parents will be much less compared to the son's. Then the wages that females get for the same amount of work compared to males may be lower due to labour market discrimination. Hence the household under-investment on the daughter's education may actually be an optimal response to labour market conditions and cultural constraints.

## 8. CONCLUSION

An effort has been made in this study to relate the unequal treatment of the girl child in her access to education in the context of labour market dynamics. The hypothesis is that if we find that the labour market rewards the male more than the female then this plausibly explains why households invest much less in a daughter's education than a son's. However, our results suggest that there exists a systematic element of bias against females regarding their education as we see under investment in females even when returns to education are higher for females than males. This puzzling result that households under-invest in female education even when returns to education are higher for them compared to males need an explanation.

One possible explanation could be that the part from returns on education that goes to parents is much lower for daughters than sons. According to PSLM (2005-06) only 6 percent of girls aged over 21 reside in parental home, indicating that most adult females are married living with their husbands or in-laws and since in Pakistani society it is customary that parents expect support from their sons rather than daughters, it makes economic sense if sons' education gets priority in the family budget. Since the data on financial support that parents receive from their children (daughters and sons) is not available so we cannot empirically test this proposition. The other explanation could be that estimates on female returns to schooling are misleading as we have calculated that on the small wage employment sector ignoring a sizable population of self employed females. Another finding that comes out from our analysis is that both father's and mother's education is a key factor that determines educational prospects of both sons and daughters but mother's education plays a pivotal role in reducing the unequal treatment of a girl child in her access to education. This highlights a vicious cycle here: if the current generation of females is not given equal access to educational opportunities, it will result in their lack of empowerment and this discriminatory treatment will pass on its ill effects to the coming generations.

Our final finding indicates that returns to education increase with increase in the level of education from primary to secondary and secondary to tertiary level for both males and females and the incremental increase

being higher for females than males. This pattern reveals convexity of the education-earnings profile, which has several policy implications. Firstly, the higher-returns-to-higher-education argument has often been used to justify allocating funds to expand primary education. However, the presence of convex education earning profiles may reflect un-met demand within industry-sectors for high-skilled labour and policy-makers may need to promote high skill education as well as adopt policies which encourage these individuals to participate in the labour market (especially women). Secondly, convexity has implications for increasing education inequality. If private returns to schooling increase with higher education, poorer families who educate their children to only primary level will face lower returns while richer families who educate their children to higher levels will reap higher returns. Consequently, the poor are less motivated to educate their children and may also send only the more able children to school for whom returns are higher. Consequently, education and earnings differentials may widen both across and within families.

***Appendices***

Appendix Table A.1

*Mean of Variables used in Demand Function for Schooling by Gender*

| | Male | Female |
|---|---|---|
| Enrol | .577 | .49 |
| Father: Years of Schooling | 3.66 | 3.69 |
| Mother: Years of Schooling | 1.54 | 1.69 |
| Household size | 8.47 | 8.38 |
| Prim. Age Group (5–10) | .32 | .34 |
| Sec. Age Group (11–17) | .36 | .40 |
| Tertiary Age Group (18–25) | .27 | .21 |
| Non-labour Income | 43353.45 | 46208.33 |
| Urban | .358 | .37 |
| Punjab | .46 | .50 |
| Sindh | .046 | .043 |
| Khyber Pakhtunkhwa | .314 | .311 |
| Balochistan | .17 | .138 |
| N | 6,211 | 5,576 |

Table A.2

*Mean of Variables used in Schooling Equation by Gender and Enrolment*

| | Male | | Female | |
|---|---|---|---|---|
| | Enrol | Not Enrolled | Enrolled | Not Enrolled |
| Father: Years of Schooling | 4.42 | 2.64 | 4.66 | 2.75 |
| Mother: Years of Schooling | 2.07 | .82 | 2.73 | .69 |
| Household Size | 8.21 | 8.83 | 7.94 | 8.80 |
| Urban | .37 | .33 | .45 | .29 |

Table A.3

*Maximum Likelihood Logit Estimates of the Probability of Being Enrolled in School, Ages 4–10*

| | Coefficients | | |
|---|---|---|---|
| Variables | Male | Female | Total |
| Female | | | –.092 * |
| Household Size | –.005*** | –.017* | –.01 * |
| Father: Years of Schooling | .01* | .014* | .011 * |
| Mother: Years of Schooling | .016* | .0195* | .018* |
| Non-labour Income | 0.00* | 0.00* | 0.00* |
| Urban | .038*** | .07* | .055* |
| Punjab | .14* | .199* | .17 * |
| Khyber Pakhtunkhwa | .06 | .07 | .07 *** |
| Balochistan | –.04 | –.09 | –.06 |
| Age 6 | .17* | .28* | .22* |
| Age 7 | .31* | .33* | .32* |
| Age 8 | .36* | .37* | .36* |
| Age-9 | .33* | .34* | .34* |
| Age 10 | .36* | .38* | .37* |
| N | 1998 | 1906 | 3904 |

*Note:* The p-value significant at 5 percent and 10 percent are indicated by * and ** respectively. All coefficients are normalised to reflect marginal effects. Dependent variable Enrol equals 1 if enrolled and 0 otherwise.

Table A.4

*Maximum Likelihood Logit Estimates of the Probability of Being Enrolled in School, Ages 11–17*

| Variables | Coefficients | | |
|---|---|---|---|
| | Male | Female | Total |
| Female | | | –.146* |
| Household Size | –.001 | –.008* | –.005*** |
| Father's Years of Schooling | .011* | .018* | .014* |
| Mother's Years of Schooling | .021* | .032* | .028* |
| Non-labour Income | 0.00 | 0.00* | 0.00 |
| Urban | –.031 | .12* | .046** |
| Punjab | .040 | .15* | .098* |
| Khyber Pakhtunkhwa | .063 | .08*** | .08** |
| Balochistan | .023 | –.025 | .014 |
| Age 12 | –.012 | –.089** | –.042 |
| Age 13 | –.076** | –.10** | –.082* |
| Age 14 | –.12* | –.20* | –.162* |
| Age 15 | –.169* | –.25* | –.205* |
| Age 16 | –.249* | –.375* | –.308* |
| Age 17 | –.35* | –.354* | –.34* |
| N | 2284 | 2283 | 4567 |

*Note:* The p-value significant at 5 percent and 10 percent are indicated by * and ** respectively. All coefficients are normalised to reflect marginal effects. Dependent variable Enroll equals 1 if enrolled and 0 otherwise.

Table A.5

*Maximum Likelihood Logit Estimates of the Probability of Being Enrolled in School, Ages 18–25*

| Variables | Coefficients | | |
|---|---|---|---|
| | Male | Female | Total |
| Female | | | –.03** |
| Household Size | –.006* | –.01* | –.008* |
| Father's Years of Schooling | .013* | .007** | .01* |
| Mother's Years of Schooling | .017* | .02* | 02* |
| Non-labour Income | 0.00* | 0.00* | 0.00* |
| Urban | .05** | .10* | .07* |
| Punjab | –.007 | .057 | –.02 |
| Khyber Pakhtunkhwa | –0.004 | .10 | .04 |
| Balochistan | .30 | –.06 | .06 |
| Age 19 | –.02** | –.008* | –.007 |
| Age 20 | –.19* | –.14* | –.167* |
| Age 21 | –.26* | –.09* | –.17* |
| Age 22 | –.32* | –.16* | –.24* |
| Age 23 | –.33* | –.15* | –.25* |
| Age 24 | –.33* | –.16* | –.251* |
| Age 25 | –.38* | –.25* | –.30* |
| N | 1687 | 1174 | 2861 |

*Note:* The p-value significant at 5 percent and 10 percent are indicated by * and ** respectively. All coefficients are normalised to reflect marginal effects. Dependent variable Enroll equals 1 if enrolled and 0 otherwise.

Table A.6

*Mean of Variables Used in Earnings Function, Aged 15–65 by Gender*

| | Male | Female |
|---|---|---|
| Daily Wage | 197.92 | 94.4 |
| Log(Daily Wage) | 4.94 | 3.66 |
| Years of Schooling | 5.9 | 2.70 |
| No Schooling | .33 | .66 |
| Primary | .179 | .125 |
| Secondary | .384 | .173 |
| Tertiary | .101 | .03 |
| Work Participation | .716 | .103 |
| Age | 33.4 | 34.04 |
| Experience | 19.4 | 20.3 |
| Private | .017 | .018 |
| Urban | .47 | .405 |
| Punjab | .39 | .423 |
| Sindh | .27 | .24 |
| Khyber Pakhtunkhwa | .173 | .191 |
| Balochistan | .15 | .135 |
| N for Log Wage | 13606 | 1998 |
| N for Rest of Variables | 18996 | 19381 |

Table A.7

*Mean Daily Earnings of Males and Females by Schooling Level*

| | Male (M) | Female (F) | Difference (M-F) |
|---|---|---|---|
| No Schooling | 130.20 | 50.12 | 80.076 |
| Primary | 143.63 | 93.36 | 50.27 |
| Secondary | 199.67 | 87.15 | 112.51 |
| Tertiary | 470.65 | 351.07 | 119.57 |

Table A.8

*Paid Labour Force Participation Rates by Gender and Schooling Level*

| | Male (M) | Female (F) | Difference (M-F) |
|---|---|---|---|
| No Schooling | 0.70 | 0.08 | 0.61 |
| Primary | 0.71 | 0.09 | 0.62 |
| Secondary | 0.70 | 0.12 | 0.57 |
| Tertiary | 0.81 | 0.31 | 0.49 |

Table A.9

*Mean by Age Cohorts*

| | Male | | | Female | | |
|---|---|---|---|---|---|---|
| | Log Wage | Years Schooling | Work Participation | Log Wage | Years Schooling | Work Participation |
| 15–20 | 4.30 | 4.50 | .463 | 3.25 | 3.39 | .09 |
| 21–30 | 4.77 | 6.68 | .69 | 3.62 | 3.78 | .11 |
| 31–40 | 5.12 | 6.44 | .88 | 3.78 | 2.38 | .12 |
| 41–50 | 5.27 | 6.16 | .90 | 3.99 | 1.83 | .104 |
| 51–60 | 5.17 | 5.10 | .732 | 3.64 | 1.27 | .067 |
| 61–65 | 4.88 | 4.72 | .424 | 3.22 | 1.278 | .036 |

Table A.10

*Mean Difference (M-F) in Daily Earnings of Males and Females by Age Cohort*

| | 15–30 | 31–40 | 41–50 | 51–65 |
|---|---|---|---|---|
| No Schooling | 37.32 | 103.64 | 108.67 | 102.07 |
| Primary | 65.95 | –130.37 | 46.04 | 85.93 |
| Secondary | 80.37 | 92.39 | 144.23 | 107.69 |
| Tertiary | 164.47 | –178.77 | 88.93 | 90.79 |

Table A.11

*Mean Difference in Paid Labour Force Participation Rates of Males and Females by Age Cohort and Schooling Level*

| | 15–30 | 31–40 | 41–50 | 51–65 |
|---|---|---|---|---|
| No Schooling | 0.5 | 0.78 | 0.80 | 0.56 |
| Primary | 0.5 | 0.80 | 0.83 | 0.66 |
| Secondary | 0.48 | 0.75 | 0.76 | 0.62 |
| Tertiary | 0.38 | 0.54 | 0.61 | 0.54 |

Table A.12

*Mean of Variables Used in Earnings Function, Aged 15-65 by Gender and Regions*

| | | Male | | Female | |
|---|---|---|---|---|---|
| | | Log(Wages) | Years of Schooling | Log(Wages) | Years of Schooling |
| Punjab | Rural | 4.74 | 4.73 | 3.228 | 2.04 |
| | Urban | 5.18 | 7.4 | 3.85 | 5.34 |
| Sindh | Rural | 4.62 | 4.43 | 3.48 | .86 |
| | Urban | 5.16 | 7.59 | 4.02 | 5.36 |
| KPK | Rural | 4.81 | 5.37 | 3.87 | 1.27 |
| | Urban | 4.98 | 7.17 | 4.44 | 3.26 |
| Balochistan | Rural | 4.82 | 3.95 | 4.11 | .52 |
| | Urban | 5.14 | 6.59 | 4.34 | 2.17 |
| Pakistan | Rural | 4.74 | 4.64 | 3.38 | 1.39 |
| | Urban | 5.14 | 7.31 | 3.98 | 4.63 |

Table A.13

*Participation into Paid Work (Percentages)*

| | | Male | | Female | |
|---|---|---|---|---|---|
| | | Working | Not Working | Working | Not Working |
| Punjab | Rural | 66.73 | 33.27 | 13.04 | 86.96 |
| | Urban | 75.14 | 24.86 | 15.62 | 84.38 |
| Sindh | Rural | 71.55 | 28.45 | 12.02 | 87.98 |
| | Urban | 79.30 | 20.70 | 13.06 | 86.94 |
| Khyber Pakhtunkhwa | Rural | 63.86 | 36.14 | 3.70 | 96.30 |
| | Urban | 73.61 | 26.39 | 6.27 | 93.73 |
| Balochistan | Rural | 67.37 | 32.63 | 1.53 | 98.47 |
| | Urban | 75.43 | 24.57 | 4.19 | 95.81 |
| Pakistan | Rural | 67.56 | 32.44 | 12.03 | 87.97 |
| | Urban | 76.16 | 23.84 | 9.13 | 90.87 |

Table A.14

*Identifying Variables in Participation in Paid Work Equation (Mean)*

| | Male | | Female | |
|---|---|---|---|---|
| | Working | Not Working | Working | Not Working |
| Married | .72 | .39 | .64 | .71 |
| Household Size | 7.99 | 9.54 | 7.059 | 7.86 |
| No. of Children | 4.13 | 4.78 | 4.22 | 4.32 |

Table A.15

*OLS Mincerian Earnings Functions, (Males and Females), with Years of Education and Levels of Education*

| | Male | | | | Female | | | |
|---|---|---|---|---|---|---|---|---|
| | Years | | Level | | Years | | Level | |
| Variables | a | b | a | B | a | b | a | b |
| Constant | 3.77* | 3.76* | 3.8* | 3.84* | 2.78* | 2.78* | 2.92* | 2.93* |
| Yrs Sch | 0.059* | 0.059* | | | 0.109* | 0.108* | | |
| Primary | | | 0.038** | .03*** | | | 0.26* | 0.24* |
| Secondary | | | 0.34* | 0.34* | | | 0.80* | 0.79* |
| Tertiary | | | 1.08* | 1.07* | | | 1.82* | 1.81* |
| Exp | 0.06* | 0.064* | 0.063* | 0.063* | 0.053* | 0.053* | 0.052* | 0.052 |
| Exp square | –.0009* | –0.0009* | –0.0009* | –.0009* | –.0008* | –.0008* | –.0008* | –.0008* |
| Private | | 0.278* | | 0.274* | | 0.138 | | 0.225 |
| Urban | 0.27* | 0.26* | 0.28* | 0.27* | 0.20* | 0.197* | 0.22* | 0.217* |
| Punjab | –0.102* | –0.107* | –0.05** | –0.06** | –0.43* | –0.44 | –0.49* | –0.50* |
| Sindh | –0.99* | –0.99* | –0.06** | –0.06** | –0.131 | –0.135 | –.21*** | –0.22*** |
| KPK | –0.101* | –0,102* | –0.07** | –0.07** | –0.206 | –0.20 | –0.24 | –0.24 |
| R sq | 0.348 | 0.350 | 0.354 | 0.357 | 0.32 | 0.32 | 0.31 | 0.31 |
| N | 13606 | 13606 | 13606 | 13606 | 1998 | 1998 | 1998 | 1998 |

*Note:* The p-value significant at 1 percent, 5 percent and 10 percent are indicated by *, ** and *** respectively.

Table A.16

*Heckman Selection Corrected Earnings Functions, (Males and Females), with Years of Education and Levels of Education*

| | Male | | | | Female | | | |
|---|---|---|---|---|---|---|---|---|
| | Years | | Level | | Years | | Level | |
| Variables | a | b | a | B | a | b | a | b |
| Constant | 4.07* | 4.06* | 4.11* | 4.11* | 2.87* | 3.18* | 2.87* | 3.18* |
| Yrs Sch | 0.061* | 0.06* | | | 0.115* | | 0.115* | |
| Primary | | 0.39* | 0.045* | 0.39** | | 0.21* | | 0.21* |
| Secondary | | | 0.35* | 0.35* | | 0.81* | | 0.79* |
| Tertiary | | | 1.105* | 1.09* | | 1.96* | | 1.95* |
| Exp | 0.052* | 0.052* | 0.053* | 0.054* | 0.06* | 0.06* | 0.063* | 0.06* |
| Exp square | –.0007* | –.0007* | –0.0008* | –.0008* | –0.0009* | –.0009* | –.0009* | –.0009* |
| Private | | 0.39* | | 0.37* | | | 0.02 | 0.08 |
| Urban | 0.23* | 0.22* | 0.23* | 0.23* | 0.16* | 0.17* | 0.166* | 0.17* |
| Punjab | –0.07* | –0.08* | –0.04* | –0.05* | –0.37* | –0.44* | –0.37* | –0.45* |
| Sindh | –0.11* | –0.11* | –0.09* | –0.098* | –0.08 | –.19*** | –0.08 | –.19*** |
| KPK | –0.12* | –0.12* | –0.12* | –0.123* | –0.15 | –.21*** | –0.15 | –.21*** |
| Lamda | –0.40* | –0.39* | –0.33* | –0.33* | –.13 | –0.21 | –0.13 | –0.19 |
| Wald | 5822* | | 6106.5* | 6222* | 1123* | | 1123.4* | 1112.5* |
| N | 18996 | 18996 | 18996 | 18996 | 19381 | 19381 | 19381 | 19381 |

*Note:* The p-value significant at 1 percent, 5 percent and 10 percent are indicated by *, ** and *** respectively.

Table A.17

*Fixed Effects Estimates of Earnings Functions, Males and Females (15-65), Years and Levels of Education*

| | Male | | | | Female | | | |
|---|---|---|---|---|---|---|---|---|
| | Years | | Level | | Years | | Level | |
| Variables | a | b | a | B | a | b | a | b |
| Constant | .013** | .013** | .014* | .014** | –.27* | –.27* | –.27* | –.27* |
| Yrs Sch | 0.014* | 0.014* | | | 0.044* | 0.044* | | |
| Primary | | | –.069** | -.068* | | | .025 | .019 |
| Secondary | | | .035 | .036 | | | .30** | .30** |
| Tertiary | | | .225* | .227* | | | .63* | .61* |
| Exp | 0.029* | 0.029* | .033* | .03* | 0.06* | 0.06* | .06* | .06* |
| Exp square | –.0005* | –.0005* | –.0006* | –.0006* | –.002* | –.002* | –.001* | –.001* |
| Private | | –.044 | | -.03 | | 0.199 | | 0.18 |
| R sq | 0.04 | 0.04 | 0.04 | 0.04 | 0.05 | 0.06 | 0.05 | 0.06 |
| N | 4432 | 4432 | 4432 | 4432 | 528 | 528 | 528 | 528 |

*Note:* The p-value significant at 1 percent, 5 percent and 10 percent are indicated by *, ** and *** respectively.

Table A.18

*Heckman Selection Corrected Estimates of Earnings Functions by Cohorts for Males, Years and Levels of Education*

| | 15-20 | | 21-30 | | 31-40 | | 41-50 | | 51-65 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Year | Level | Year | Level | Year | Level | Year | Level | Year | Level |
| Const. | 4.22* | 4.14* | 4.78* | 4.60* | 4.54* | 4.52* | 6.20* | 5.88* | 7.76* | 7.97* |
| Yrs | 0.027* | | .042* | | .054* | | .059* | | .06* | |
| Prim. | | –0.06 | | –.05** | | .105* | | .26* | | .28* |
| Sec | | 0.17* | | .21* | | .38** | | .44* | | .51* |
| Tert. | | 0.68* | | .87* | | .935* | | 1.02* | | 1.05* |
| Exp | .019** | .03*** | –.02** | .006 | .012 | .015 | –.071* | –.04 | –.12* | –.13* |
| Exp square | –.0004* | –.0005 | .001* | .0004 | –.0001 | –.0001 | .0008** | 0.0004 | .001** | .001** |
| Urban | 0.06** | 0.06** | .21* | .217 | .24* | .254* | .296* | .3* | .30* | .30* |
| Punjab | –.10** | –0.10* | –.037 | –.01 | –.03 | –.02 | –.045 | –.03 | –.14* | –.14** |
| Sindh | –.13* | –0.12* | –.11* | –.09* | –.05** | –.05** | –.07** | –.08** | –.19* | –.19* |
| KPK | –.16* | –.17* | –.15* | –.14* | –.06** | –.07** | –.069 | –.05 | –.20* | –.21* |
| Lamda | –0.05 | –0.04 | –.52* | –.43* | –.27* | .27* | –.35 | –.39 | .35 | .336 |
| Wald | 79.33* | 80.90* | 907* | 1053* | 1266* | 1237* | 1400* | 1383* | 949* | 932* |
| N | 3730 | 3730 | 5937 | 5937 | 3947 | 3947 | 2859 | 2859 | 2523 | 2523 |

*Note:* The p-value significant at 1 percent, 5 percent and 10 percent are indicated by *, ** and *** respectively.

Table A.19

*Heckman Selection Corrected Estimates of Earnings Functions by Cohorts for Females, Years and Levels of Education*

| | 15-20 | | 21-30 | | 31-40 | | 41-50 | | 51-65 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Year | Level | Year | Level | Year | Level | Year | Level | Year | Level |
| Const. | 4.73* | 4.86* | 2.92* | 3.22* | 3.28* | 3.32* | 7.69* | 6.39* | 2.06 | 6.38 |
| Yrs | 0.03* | | .10* | | .132* | | .122* | | .14* | |
| Prim. | | –.11 | | .31** | | .47* | | .61* | | .78** |
| Sec | | 0.28** | | .67* | | 1.2* | | .93* | | 1.42* |
| Tert. | | .69*** | | 1.65* | | 2.07* | | 2.19* | | 1.89* |
| Exp | –.01 | .018 | .006 | .029 | .08 | .07 | –.20** | –.11 | .021 | –.16 |
| Exp square | –0.002 | –.0006 | .0006 | –.0004 | –.002 | –.001 | .003*** | .001 | –.0005 | .001 |
| Urban | 0.03 | 0.02 | .009 | 0.08 | .16** | .16** | .27* | .26* | .53* | .57* |
| Punjab | –0.68* | –.6*** | –.47* | –.6* | –.36*** | –0.32 | –.35 | –.41 | .58 | .55 |
| Sindh | –0.26 | –.29 | –.22* | –.3** | –.091 | –0.05 | –.07 | –.14 | .9*** | .83 |
| KPK | –0.59 | –.62 | –.4** | –.4** | –.108 | –0.06 | –.18 | –.21 | .87 | .84 |
| Lamda | –0.61 | –0.67 | .174 | .05 | –.34 | –.33 | –.42** | –.39** | .24 | .17 |
| Wald | 34.09* | 33.92* | 279* | 263* | 381* | 363.9* | 335.9* | 341.3* | 150* | 143* |
| N | 3941 | 3941 | 5000 | 5000 | 4507 | 4507 | 3282 | 3282 | 2651 | 2651 |

*Note:* The p-value significant at 1 percent, 5 percent and 10 percent are indicated by *, ** and *** respectively.

## REFERENCES


Ai, C. and E. C. Norton (2003) Interaction Terms in Logit and Probit Models. *Economics Letters* 80, 123–129.

Ashraf, J. and B. Ashraf (1993a) Estimating the Gender Wage Gap in Rawalpindi City. *Journal of Development Studies* 24:2.

Ashraf, J. and B. Ashraf (1993b) An Analysis of the Male-Female Earning Differential in Pakistan. *The Pakistan Development Review* 32:4.

Becker, G. S. and N. Tomes (1976) Child Endowments and the Quantity and Quality of Children. *Journal of Political Economy* 87.

Becker, G. S. (1975) *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education* (2nd ed.). New York and London: Columbia University Press.

Becker, G. S. (1981) *A Treatise on the Family*. Cambridge, MA: Harvard University Press.

Burney, N. and M. Irfan (1991) Parental Characteristics, Supply of school and Child School Enrolment in Pakistan**.** *The Pakistan Development Review* 30:1.

Caldwell, J. C. and B. K. Caldwell (2005) Family Size and Control by Infanticide in the Great Agrarian Societies of Asia. *Journal of Comparative Family Studies* March 22.

Das, G. M. (1987) Selective Discrimination Against Female Children in India. *Population and Development Review* 13.

Deolalikar, A. B. (1993) Gender Differences in the Returns to Schooling and in School Enrolment Rates in Indonesia**.** *The Journal of Human Resources* 28:4, 899–932.

Dr`eze, J. and A. K. Sen (1989) *Hunger and Public Action*. Oxford: Clarendon Press.

Guisinger, S. E., J. W. Henderson, and G. W. Scully (1984) Earnings, Rate of Returns to Education and Earning Distribution in Pakistan**.** *Economics of Education Review* 3:4.

Hamdani, K. (1977) Education and the Income Differential: An Estimation for Rawalpindi City**.** *The Pakistan Development Review* 16:2, 144–64.

Haque, N. (1977) An Economic Analysis of Personal Earnings in Rawalpindi City. *The Pakistan Development Review* 16:4.

Khan, S. R. and M. Irfan (1985) Rate of Returns to Education and Determinants of Earnings in Pakistan**.** *The Pakistan Development Review* 34:3.

Lakshmanasamy, T. (1991) Demand For Children Among Rural Families: Children as a Consumption Utility. *The Journal of Family Welfare* 37:4.

Mahmood, N. (1997) Transition in Primary and Secondary Schooling in Pakistan: Gender and Age Cohort Analysis. *The Pakistan Development Review* 43, 53–70.

McElory, M. B. and M. J. Horney (1981) Nash-Bargained Household Decisions: Towards a Generalisation of the Theory of Demand. *International Economic Review* 22:2, 333–50.

Munnaza, A. (2005) Rates of Return to Education by Gender in Pakistan. GPRG-WPS-064.

Nasir, Z. M. (1998) Determinants of Personal Earnings in Pakistan: Findings from the Labour Force Survey1993-1994. *The Pakistan Development Review* 37, 251–74.

Nasir, Z. M. (2002) Returns to Human Capital in Pakistan: A Gender Disaggregated Analysis. *The Pakistan Development Review* 41:1.

Rosenzweig, M. and T. P. Schultz (1982) Market Opportunities, Genetic Endowment and Interfamily Resource Distribution: Child Survival in Rural India. *American Economic Review* 72:4.

Sabot, Richards H. (1992) Human Capital Accumulation in Post Green Revolution Rural Pakistan: A Progress Report. *The Pakistan Development Review* 31:4.

Sathar, Z., C. Lloyd, and M. ul Haque (2000) *Investments in Children's Education and Family-Building Behaviour in Pakistan: Findings from Rural NWFP and Punjab*. Population Council.

Shabbir, T. (1991) Sheepskin Effects in the Returns to Education in a Developing Country. *The Pakistan Development Review* 30:1.

Shabbir, T. (1994) Mincerian Earning Functions for Pakistan. *The Pakistan Development Review* 33:1.

Shabbir, T. and A. H. Khan (1991) Mincerian Earning Functions for Pakistan: A Regional Analysis. *Pakistan Economic and Social Review* 19:2.