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

MADEEHA GOHAR QURESHI

Using estimates of schooling demand function and private rate of return to education by gender derived from Household Integrated Economic Survey 2010-11, this paper attempts to examine if there is any dynamics to define a differential behaviour across gender in enrolment in Pakistan and if there is then what can be the possible cause of such discrepancies and how can they be reduced. The first set of analysis focuses on the estimates of probability of enrolment at primary, secondary and tertiary level of education by gender. Strong evidence for higher likelihood of enrolment emerges only at the secondary level of education when the gender is male. The behaviour of the determinants for these schooling demand functions at different levels of education differs by gender. One such key variable is parental education, which is more pronounced in case of mother's education towards increasing the likelihood of enrolment of girls at the primary and secondary level and of father's education for boys at all levels and girls at the tertiary level. Hence investing in female education today will not only empower females today but as a positive externality will also lead to gender equity in educational outcomes in the future. Besides this intergenerational externality of investment in female education, the finding establishes that when conditional cash programmes are targeted at mothers as a policy tool they become an effective measure in increasing current female enrolment. Moreover the case for reducing gender disparities in educational outcomes is further supported when we see how gender imbalance in educational attainment and female labour force participation lead to discrepancies in the private rate of return to education by gender. The varied estimates of private rate of returns to education for males and females show that such deviations arise because the females labour force on average is much less educated than males and hence if the object is to raise the rates of returns, a targeted policy for reducing gender differences in enrolment at all levels of education primary, secondary and tertiary will have to be implemented.

### 1. INTRODUCTION

Differential treatment of male and female child has been a widely studied phenomenon in context of South Asia. The distorted ratio of male and female mortality rate than the expected biological ratio in this region, gives an indication of strong son preference [Drèze and Sen (1989)]. In Pakistani society, women's autonomy is severely limited in the traditional setup because of cultural taboos and socially prescribed role of a woman as a housekeeper with very little access to economic opportunities as opposed to males. This is reflected in Pakistan's low ranking in the over all Gender Gap Index at

Madeeha Gohar Qureshi <madeeha.qureshi@pide.org.pk> is Research Economist, Pakistan Institute of Development Economics, Islamabad.

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134th place among 135 countries with respective low rankings of 134, 129 and 123 in sub-categories of economic participation and opportunity, educational attainment and health and survival [The Global Gender Gap Report (2012), page 285]. Such gender imbalances are alarming and need due attention in both theoretical and policy relevant empirical research.

There is no realisation about the importance of investment in human capital formation through formal educational training which becomes an effective tool to enhance the capabilities and skills of the work force and define not only the economic outcomes for the individuals themselves but also significantly impact the society's level of economic progress and development [Becker (1975)]. Further the global development trends over the last several decades confirm that in economies where governments effectively invest in education as a policy priority have performed much better both in terms of economic growth and its sustainability. But a more interesting query from the perspective of the current study is how gender equity in human capital building process through educational achievements may have played its vital role in such a process of growth. Such a role may indeed exist as the regions that have prospered both economically and socially, such as East Asia and Southeast Asia, have indeed shown by closing their gender gaps and enhancing the contribution of females in the growth process through increased labour force participation [gender gap report, page17]. While the regions that have lagged behind in terms of economic growth have also been left behind in terms of social equity across gender by limiting their investments in female education compared to male and hence restricting the women's contributions to economic and social progress [Gender Gap Report, page 20]. Hence equitable access to education by gender is important not only from social but also from economic point of view. In this dimension a female child in Pakistani society does not fare too well. The marginalised role of females compared to male in terms of access to education can be seen through figures of 57 percent, 82 percent and 76 percent for adult literacy rate of females as a percentage of males (2007-2011), gross enrolment ratio at primary and secondary level of female population as a percentage of males (2008-2011) as reported by UNICEF respectively which reflects large inequalities in literacy and school attendance across gender in Pakistan.

The prevalence of such huge gender gaps in educational outcomes in Pakistan has led to a contrasting debate that the inadequate demand for female schooling is either because of inadequate supply of schools for females by the government or is the demand side factors that are solely responsible for the inequitable educational outcomes for the female [Sabot and Burney (2002); Irfan (1991)]. The truth usually lies in the middle. Neither the supply side constraints can totally be ruled out nor the role of household decision-making in determining the level of educational attainment for a female child can be ignored altogether. In fact the supply side factors such as availability of an all female school and a close-by school may affect the demand for schooling for the daughters by ensuring their safety, in a household. Among the initiatives that have been taken by government of Pakistan to ease the supply side constraints include doubling of the number of boys and girls primary schools from 1988 to 1998. Yet the proportion of girls to boys enrolled in primary schools remained the same from which one may conclude there may be a weak demand for

female education at primary level in Pakistan [Mahmood (1997)]. On the contrary, there is a strong likelihood of a possible shift from public to private schooling system<sup>1</sup> for both sexes in search of better quality<sup>2</sup> since there is mounting empirical evidence in support of increase in supply of private schools in Pakistan, primarily co-education schools with few exceptions of single sex schools even in rural sector [Sathar, Lloyd, and Haque (2000), Arif and Saqib (2003), Tahir, Das, and Khwaja (2010)]. Therefore the decision making at household level about the educational investments in to their children is critical for understanding the overall picture and much more research needs to be done to analyse empirically from both social and policy perspectives that whether demand for schooling vary by gender and if so then what are the factors that lead to such imbalances in Pakistan.

Further how one should invest is indeed guided by return to such an investment. Such a focus on return is true both for a policy maker given the budgetary constraints facing them and also for households, which besides facing resource constraints also have to give due weight to time constraints for their child so as to use their time wisely and effectively. Hence the second focus of the paper is to estimate private returns to education by gender so as to understand the decision of the household for under-investing in a daughter's education in face of such estimates of private rate of return of education for both males and females. Further by noting the positive externalities that may result from female education and through discrepancies that exist in male and female returns to education, a case is built for greater and specific policy focus on female education as a priority. This question is even more relevant in the context of Millennium Development Goals where among the goal of achieving gender equality and empowerment it was agreed as a target to eliminate gender disparity at primary and secondary education preferably by 2005 and in all levels of education by no later than 2015. Hence keeping the above consideration in mind, an attempt has been made in this study using estimates of schooling demand function and private rate of returns to education by gender for Pakistan derived from Household Integrated Economic Survey 2010-11 to understand if there is any dynamics that will define a differential behaviour across gender in enrolment and if so then what can be the possible cause of such discrepancies and how can they be reduced.

The lay out of the paper is as follows. The following section presents literature review as why there may exist under-investment in a daughter's education compared to a son in parental resource allocations in context of developing countries. A brief review of key determinants of school enrolment at household level is discussed in Section 3. In

<sup>1</sup>However how private and public schooling is playing their role in gender dynamics in schooling through assessment of quality difference across such type of school system and their subsequent impact on cognitive and learning skills of the students and also the accessibility and affordability of different types of schools to household by gender is beyond the scope of this study due to limited information in this regard in given data set and this question will not be assessed in the study at hand.

<sup>2</sup>Tahir, Das and Khwaja (2010) provide evidence in favour of private schools outperforming government schools even when located in the same village and accounting for differences in household socioeconomic characteristics. Similarly empirical evidence in Arif and Saqib (2003) also support the plausible shift in parental choice towards private sector education for their children in search of much higher quality whereby students of private schools were found to be performing significantly higher than public schools in learning achievement tests across considered six district of Pakistan and in Azad Kashmir, however there were discrepancies in how well private sector performed in education across these districts.

Section 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

The scope of the current study tries to understand the gender disparity that may exist in enrolment patterns and the returns to education and further tries to develop both conceptual and empirical link in these two distinct economic processes.<sup>3</sup> Hence keeping in view the above objective we divide the review of literature in the following four sub-sections:

### 2.1. Gender Disparities in Educational Outcomes

Differential treatment across gender can occur in different shapes and sizes in a society. It can be of apparent nature in form of smaller household expenditure on a girl child's nutrition, health and education in comparison to her male siblings to more hidden forms where a girl raised with equality may realise how unequal she is 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, a female may face varying degrees of discrimination depending on her circumstances in a patriarchal mind set. 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 parent's utility function towards a particular child in our context towards a particular gender of an offspring [Lakshmanasamy (1991)].

From the investment point of view, the relative return on a son's education in terms of how much the expected earning of the child could be spent on parent's welfare in future may be compared to a daughter's in developing countries. One possible reason for the above conjecture is that reliance on a son's earning in old age may serve as a credible post retirement insurance mechanism for parents especially in absence of any other institutionalised safety net measure in case of developing economies. This dependence of parents on their sons in old age becomes even more important in the traditional setup where dependence on daughters is considered to be demeaning for parents. In such societies a daughter after marriage is responsible only for her duties towards her in-laws and if she chooses to remain single for some reason it is also considered as a sign of dishonour for the family culturally. Another reason why it is better to invest in a son than a daughter is because of much higher future earning

<sup>3</sup>It is important to note that the current enrolment patterns and the returns to education for a given society are calculated at a point in time using two non-overlapping samples since the first phenomenon of current enrolment deals with groups of children who are of school going age and whether they are currently enrolled or not in school while the second phenomenon deals with groups of individual that are out of school and are of age to take part in labour market for wages and their completed level of schooling. Though these groups may not be the same yet they do give insight as to how much society and individuals value investment into human capital building through education.

potential for a male than female in such societies. This is due to much better performance of males to perform certain tasks due to their greater physical strength (especially in agricultural sector), presence of labour market discrimination in form of higher wages to males than females for identical work or through occupational segregation as a result of men's preferences to keep distance from their female colleagues whose mere presence in an all-male dominated profession is cause of discomfort to them, lack of employment opportunities for females that fit their social preferences and finally due to cultural constraints on female labour force participation by prevalence of purdah practices (female seclusion) and rigidity of gender roles confining women to their housekeeping responsibilities [Deolalikar (1993); Das and Desai (2003); Goldin (2003)]. The cultural element may indeed act as a determining factor for female labour force participation especially in traditional developing economies by defining both their status in the society and also their mobility in and out of labour market and into non-wage (such as self-employed) and unpaid work [Desai and Jain (1994); Ghosh (1996)]. 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 data and district level data in 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.

Further the socioeconomic background of the parents may very well shape the preference for more or less education of their children and towards a specific gender. Increase in wealth of parents at one level may act as liberating force for them from the binding resource constraints that may hamper child prospects for education in face of poverty and at the other may make children's education valuable as a consumption good for parents in case they have acquired the high class status for both the sake of equipping their children with marketable skills for their bright future and also by becoming more of a class norm to which parents belong, which may lead to over-investment in their child's education. More importantly, parental socioeconomic worth provides a financial base to access the credit market at much lower interest rates while poorer households have little access to formal banking system due to infeasibility of loan recovery mechanism in the absence of collateral for such resource-poor households [Becker (1967); Jacoby (1994); NaRanong (1998)]. The other element that guides parental decision to invest in their child's education, especially in face of resource constraints, is their attitude to risk. Whereby the higher is the parents' risk aversion, the lower is the probability of the children's enrolling in higher studies with possibility of actualisation of returns after a long time lag. The risk element may enter into a parent's consideration with higher and low socioeconomic status in varied ways. In this regard, the important decision for wealthier parents is to ensure the intergenerational class maintenance for their children and for which they may opt to over-invest in their children's academic career and higher education [Breen and Goldthorpe (1997)]. On the other hand, parents belonging to poor income groups, facing much stricter liquidity constraints with less financial strength to bear costs of expensive higher education, try to insure themselves by training their children with marketable skills that will materialise into paid employment with shorter time lag [Tieben (2011)]. With regard to how such behaviour will translate into preferences of parents for educating their son against their daughter will depend on how

the society values the son against the daughter at high and low ends of parental wealth distribution. The class consciousness and fear of intergenerational loss of class may apply to daughters as much to son at the higher ladder of social status, however, in a patriarchal setup investment in the daughter's education in high income class may not be done with the objective of increasing their induction into the labour market later on but more so for their class maintenance through marriage [Das and Desai (2003)].

Further for those households facing extreme poverty, the question is not just whether to send the child to school or not, the question is how to make mere survival of the child and household itself possible. Here in case of binding resource constraints with high level of poverty, the trade-off between child schooling and child work in paid employment for parents comes to full force that has consequent impact on the child's future [Basu and Von (1998); Ahmed (1999); Basu and Tzannatos (2003)]. Such budget requirements may be stricter for a poor household, given the limited or non-existent opportunities for borrowing in the face of a temporary crisis forcing children into paid employment [Baland and Robinson (2000)]. Further as such financial shocks have regular occurrence in poor households, the dependence on child earning that was initiated by altruistic parents for a short period, may turn into long-term arrangement given the survival of child itself being dependent on such earning in case of extreme poverty [Basu and Von (1998); Basu and Tzannatos (2003)]. Given that merely dropping off from school or deciding on child work for paid employment against schooling is more meaningful at the lower end of income distribution both as a risk coping strategy in face of stringent credit constraints, how will the child's gender matter will largely be an empirical question. This is so because a household may at one level opt against girl child schooling given higher future returns of a son's education for parents than a daughter in traditional economies. But at the same level patriarchal restrictions of purdah, family's honour consideration and safety concerns tied to females of the household that limit their schooling prospects may also constrain their participation in labour force confining them to household responsibilities. Further, when a girl child is forced to come out to work, she may face much more stringent market demand than a boy being mainly restricted to low-paid household jobs. Hence how gender dynamics may play out in the final math of the child's schooling and employment nexus and who among male and female child is more prone to take part in formal market work is also largely an empirical question.

Finally, the direct and indirect cost of sending a daughter to school may be more than a son's which will have its due impact on a female and male child schooling prospects. This could be due to involvement of a girl child in housework and in babysitting activities of her younger siblings. However, the presence of elder siblings and elder women may ease this constraint. Also the safety concerns for female child may be more than a boy that may affect their education adversely. Moreover in traditional societies, the marriage of a female is associated with dowry payment, especially where practice of hypergamy exists, to raise their daughter's marital position, whereas their inability to arrange proper marital linkages often imply loss of honour for the natal family and added social pressure [Caldwell and Caldwell (2005)]. In such societies the inherent preference for having a son than a daughter for investment in education will not only imply relative higher returns in terms of higher potential earnings but also the possibility of receiving higher dowry and having lower marriage costs in comparison to a daughter for whom parents need to save to pay up for the dowry at the time of her marriage which

leads to under-investment in her educational activities [Lahiri and Self (2004)]. Hence there can be a desire for sons over daughters shaped by cultural and social norms [Das Gupta (1987)].

## **2.2. Conceptual Link between Educational Achievements Pattern and Private Wage Returns to Education by Gender**

Given that there is no concrete evidence that biologically males and females are endowed with differed abilities and capabilities,<sup>4</sup> differential private returns to education should not theoretically be present across gender and marginal increase in earnings for an additional year of education should be the same for both males and females. However if higher private returns accrue to any one gender, one needs to be careful both in its interpretation and also in its implication. First of all, one needs to understand the concept of returns to education and why such returns should be calculated separately by gender. That is, are there any structural differences (not in biological or genetic differences sense) across male and female population that may produce different rate of private return for them and if so how much of such a process can be attributed to differences in labour market dynamics through discrimination by gender and how much due to the varied characteristics of two groups of wage earners. In this context the perspective of cultural and socioeconomic forces has to be taken into account that may be responsible for creating such discrepancies and may differ according to different conditions that for example prevail in developing and developed countries. Keeping the above considerations in mind, we will first analyse the conceptually circumstances under which private rate of returns can vary by gender and then how the problems in estimating the rate of returns may impact differently across male and female population leading to varied estimates for the two groups.

### **2.2.1. Conceptual Background for Differential Private Rate of Return to Schooling by Gender**

The starting point of assessing the value of investment into an additional year of education involves the analytical framework developed by Mincer (1974), according to which the private rate of return to an additional year of schooling is affected by comparing the present costs of education—as current wages forgone—with the present discount value of future income streams, if the opportunity cost of the time spent on that extra year of schooling approximates to the private family cost of going to school. Empirically such an estimate of private rate of return is estimated by regressing the log wage on years of schooling, whereby the estimated coefficient on schooling indicates the percentage change in wages received for attending an additional year of school. How to invest in education by gender will be decided ultimately through weighing the associated costs and benefits of such an investment that may differ by gender. For example in terms of costs, the time cost may be more relevant for females who have greater household responsibilities doing household chores or caring younger siblings while for the male the forgone wages may be much more especially in traditional societies. Further, wage

<sup>4</sup>The work of Canadian psychologist Doreen Kimura strongly supports the idea that there are subtle biology-related differences in the cognitive abilities of males and females, with these becoming significant at the high end of ability scales.

benefits of education may also differ for male and female as a result of statistical or structural gender discrimination in the labour market.<sup>5</sup> Hence given the heterogeneity in stakes by gender in relation to their education, there will be differential rate of private return to education for male and female population.

Further, the way the discount rates are determined in relation to size of educated group across male and female populations may also explain why the rates of return differ by gender. This is more relevant in case of developing countries where the level of education attained by females is much lower than that of the males at each level of education. In such a pool of comparatively less educated female workers relative to males, the marginal returns tend to be higher for females than males given that returns decline with more education [King and Hill (1993); Schultz (1988, 1995)]. Also females having higher time costs for continuing education compared to benefits of joining the labour market might end up achieving lower level of education and hence will have higher discount rates. This would mean whatever differences may arise in returns to education by gender will be in consequence of the size of the pool of that educated group across gender. Hence though the gap between men's and women's years of completed schooling is vague it is an informative measure that indicates not only the disparity in educational outcome by gender but also tells us why returns to education may differ by gender. Moreover higher returns for females are based on the larger "slope" coefficient for girls' schooling than of the males while constant terms in the earning function by gender may reveal that on average females get lower wages than men which may be due to varied labour market conditions faced by males and females. Or, in other words, even when private internal rates of return to schooling are higher for women than for men, there is a possibility that the overall level of wages would tend to be lower for women than men. However, the focus of the current study is not the gender wage gap and how much of it can be attributed to discrimination, whether statistical or otherwise, but the crucial point—that we need to keep in mind—that while comparing the rate of return by gender for explaining differential investment in education by gender, the correct interpretation is that that on average males earn more than females, but among females those who are educated enjoy higher returns than females who are not educated as compared to how much more educated males earn compared to less-educated males.

Hence a labour side explanation for the differential pattern of schooling across gender through estimate of private rate of return should be approached with caution because, firstly, how would households respond to such returns in choosing educational investments for their child is not necessarily based on the private return that the individual will get but rather on the expected return to household and parents in future and also on how such expected return from education will compare with the rate of return on alternative investments for the parents and household on the whole. In this regard benefits of male and female education may be weighed differently by household especially in traditional patriarchal society where a son is responsible for parent support and daughters for looking after in-laws. Moreover the labour market conditions as earlier

<sup>5</sup>Statistical discrimination is an economic theory of racial or gender inequality based on stereotypes. According to this theory, inequality may exist and persist between demographic groups even when economic agents (consumers, workers, employers, etc.) are rational and non-prejudiced. This type of preferential treatment is labelled "statistical" because stereotypes may be based on the discriminated group's average behaviour.



mentioned may differ for males and females and also the opportunity cost for time devoted to education may also vary by gender especially if females are expected to contribute in household chores. Hence trying to link differential private rate of return by gender without giving due weight to other social and economic linkages can give a misleading conclusion that higher private rate of return to schooling for males on average makes economic sense for households to invest more in education of the male child, but if females show less attendance males along with higher relative rate of private return to female education, then this would amount to serious misallocation of resources in a household.

### **2.2.2. Empirical Ambiguities in Private Rate of Return to Education Estimation by Gender**

Two different models for males and females need to be estimated separately because of structural differences in the two populations to avoid the ambiguities that may arise due to lower female labour force participation, especially in case of poor developing countries, and finding credible adjustments for labour productivity for females who stay out of the wage labour force. Besides the problem of credible adjustments to solve such sample selection bias, low participation rates in wage employment for females and dropping out of females from paid work due to household or child rearing activities means that post-schooling experience proxy for females has much more measurement error and is calculated with much less precision as compared to men resulting in a downward bias to its coefficient. Further, infrequent attachment of female population to paid employment not only leads to proportionately smaller increase in productivity of females in the wage labour force but also affect the kind of female pool that chooses to enter the labour market. This is so if culturally or due to household responsibilities females tend to stay out of labour force in much higher numbers than men then among those females who chose to work this very fact may show their higher level of motivation and capability. Hence the social and cultural constraints that restrict female paid work also acts as a filtering out mechanism, whereby among those females who choose to participate may on average be more capable compared to men who have a much higher mix of less and more able workers. Given that there are structural differences in labour force participation pattern across gender, not only does this call for separate estimation of the Mincerian earning function for the two groups but also the resulting differences in parameters estimates should not be directly inferred as evidence of labour market discrimination but should be placed in the context of difference in cultural and social norms for the two populations [Birdsall and Sabot (1993)].

Hence the foremost concern for estimating unbiased and consistent estimates of returns to education for females is to deal with the problem of having data on only labour productivity for females who work and not having such information for the large pool of women who opt out of wage employment. The pioneer work in finding correction for such sample selection was done by Heckman (1980) in which through identifying the variables that impact the women's decision to work or not, such as those incentives that are presented to her to come out to work due to prevailing market wage opportunities facing her, her husband's financial support system and finally her non-labour assets such as dowry or inheritances, one can correct for such sample selection under the assumption

of exogeneity of such variables. However, among the first two identifying channels such as her own market wage that creates incentive for her indulgence in paid work or the husband's income cannot be used as independent determinants of her likelihood of work since the decision regarding her marriage match-making, fertility and time allocation between household focus and paid work are simultaneously determined and are not strictly independent of her labour supply. The most credible identifying variables in predicting probability of work in a wage job for a female in this regard is then the woman's source of non-earned income given that such claims have no link in determining her expected wage rate and the greater her non-earned income assets, the more likely is that she will choose not to work [Schultz (1995)].

### **2.3. Social and Economic Rationale for Decreasing Gender Disparities in Educational Outcomes**

Sustainable development requires balancing the growth objectives of an economy with both its social impact and intergenerational impact. In this context, reducing gender gap in education by investing more in female education as a policy priority has positive consequences both socially and economically. Let us highlight few such channels through which these impacts can be materialised as below:

#### **2.3.1. Social Externalities in Face of Gender Equity in Education and Policy Perspective**

Education entails externality for both males and females; however, with the issue at hand, let us plead the case for gender equity from a social point of view by highlighting a few plausible social benefits that may result in the long run from enhancing female education. This is so because education not only equips an individual with human capital for cashing one's skill in the labour market but also generates enormous social externalities that though hard to quantify are of paramount significance in informing and guiding social policy. Any discussion of private rate of return to education and its link to educational achievements and outcomes for the society without giving due attention to such differential externalities from education by gender could mislead policy direction. The most important social benefit from gender equalisation in educational attainments is the intergenerational mechanism through which policy focus on female education today will yield a smaller but much higher quality pool of children tomorrow when these investments materialize in a decade or so. These insights result from building empirical evidence on the impact of mother's education as compared to the father's schooling on children's health and educational outcomes in terms of weight of the child at birth, infant mortality estimates, more balanced nutrition, entry into school system, school enrolment patterns and completed years of schooling at adulthood [Schultz (2001); Strauss and Beegle (1996); Thomas (1990, 1994); Quisumbing (1995); Haddad, *et al.* (1997); Schultz (1998); Alderman and King (1998)]. Moreover the fertility behaviour of females is closely linked to the education of mothers and increasing female education has been found to be an effective tool to curtail the population growth rate while the father's level of attained education has been found to be less associated with controlling population pressure which in fact has been documented to cause increase in fertility in low income countries keeping women's schooling constant, though this trend subsides with

development [Schultz (1973, 2001); Cochrane (1979)]. However the question that arises here is to find how these externalities manifest themselves at different levels of female education—primary, secondary and tertiary—to see which level policy should target. Such a differential impact of primary and post primary mother's education on a child's educational outcomes has been found in case of rural India [Behrman, *et al.* (1997)].

### **2.3.2. Economic Incentive for Gender Equity in Education and Policy Perspective (Public Finance And Implications For Taxation)**

Broadening the tax base is extremely important for proper functioning of governments especially in developing countries where tax to GDP ratio is low. The tax rate policy should focus on the means to bring more and more workforce in the tax loop while trying to minimise distortions and efficiency loss on account of the tax disincentive and the effect it will have on time management of individuals between their different roles defining the composition of their consumption and investment bundles. In this context, reducing gender disparities in education by increasing female education will at one level may result in increasing the pool of tax paying workers resulting from a bigger female labour force historically and globally [Schultz (1981)]. Hence the possibility of increasing the share of adult time allocated to marketable work through increased female participation in paid work with increase in female education not only results in increase in overall taxable income and hence tax base but also provides policy scope to decrease the overall tax rate when the tax base has grown sizably. Further to curtail efficiency loss, greater elasticity of female labour force supply than of males may also provide leverage for differential tax policy by gender, tax being lower for females and higher for males [Boskin and Sheshinsky (1983); Apps and Rees (1988); Schultz (1981, 2001); Killingsworth (1983)]. However this impact of increased female education on economic efficiency through tax mechanism is more applicable to developed economies where tax coverage is relatively higher and not in case of developing economies such as Pakistan where there is no strong association between female labour force participation and education and where public finance deficits are high and tax to GDP ratio low.

## **3. THE HOUSEHOLD LEVEL DETERMINANT OF SCHOOLING AND THE POLICY PERSPECTIVE**

Considerations that decide the level of schooling for each individual are not straightforward. There are many inter-linkages. The most important consideration in household decision making is the role of parents in choosing to invest in the child's future through educational or health investment or among the extremely poor deciding to pull the child out of school and send him or her for paid work.

In this perspective the most difficult question concerning household dynamics is the father's and mother's role whether they decide jointly for their children's future or the preference of any one the parent has a defining role in these decisions. Theoretically, these insights lead us to two approaches for modelling household behaviour. The first strand of literature treats the household as a unit where an altruistic head (parent) maximises the joint welfare of the household through a unified preference function subject to resource constraint [Becker (1981)]. The second approach analyses the outcomes of intra-household resource redistribution in terms of the bargaining power of

the members of the household and how varied preferences of the two parents have consequential impact on the children's outcomes [McEleoy and Horney (1981)]. Among factors that determine the degree of bargaining power of an individual include the wage earned in market, received inheritance and assets and how society defines their gender roles. Irrespective of whether the household maximisation problem uses a unified preference function in line with unitary household models or two separate preference functions for the two parents as done in bargaining framework, the internal household decision regarding schooling attainment of children is modelled in terms of the defined preference keeping in view the budget constraints and educational production functions that relate the educational outcomes of children through schooling to the child, mother and father time inputs. The time consideration for both child and parent has a defining role in structuring the family demands in such household models that directly affects the opportunity cost of many consumption commodities and investment activities for the household [Becker (1981)]. Here the parental background in terms of their education and other community indicators such as proximity of educational facility, rural or urban living, play an important part. Such an intra-household allocation mechanism results into a system of reduced form demand equations characterising the child's schooling being negatively related to indicators such as schooling cost and positively to household non-labour income and parental education.

In the above framework of intra-household decision making, the choice regarding educational investment is explained by weighing the expected returns to education of a child against the opportunity cost of child's time spent in studying and the forgone income of the household on education of the child. This literature introduced a quantity and quality trade-off for children implying that increase in the number of children in the household leads to compromise in the quality of education given to them and vice versa and hence, in this perspective, less investment in a female child's education may be considered a rational choice on part of a household as economic returns to the household for educating a male child are more than a female child. From the parents' point of view their return on investment in 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 labour market for them compared to males and also their marriage in to a new family will limit their ability to support their parents later on. Further expected returns to education of a child whether male or female depends not only on his/her innate ability and the education 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 in high wage jobs due to their background and connections. Hence, how the father's and mother's education impact the schooling outcome of their children especially by gender may be an important element in the decision-making and may give us a clearer perspective on the intergenerational impact for policy initiative to reduce gender gap in education.

However, before we go into the above nexus of parental education and probability of enrolment of a child, let us first discuss the empirical ambiguities in finding the correct magnitude of impact of the mother's and father's education on the probability of being enrolled for a child. Inclusion of any factor that is determined by parental education may dilute the impact of parents' schooling on the likelihood of the child's school enrolment.

For example independence of mother or father's wage income or family wage as a control is questionable since education of an individual itself may be a determinant of the income they will earn. Moreover family or mother and father's income are determined as joint preference of two spouses to share work and household responsibilities among themselves which decides how they choose to manage time allocation in respect of these two roles between themselves [Becker (1981)]. Put more precisely does the preference of parents lead to specialisation in their respective role as one spouse being the prime bread earner and the other being delegated the role of housekeeping or, do both spouses work, and if so, how do they allocate time between their work and child rearing responsibilities; these dynamics need to be assessed carefully. Moreover, the preference formation in this framework itself is important [Becker (1981); Schultz (1981)]. For example are the two parents working with each other towards a cooperative equilibrium or do they work in conflictual environment which further calls for deeper research with the need to capture the impact of those variables that define the bargaining power of each parent over the other. Further, the non-labour income indicators may very well be accumulated as a result of their wage earning capacities, hence care needs to be done to find such proxy of wealth that may not be linked with wage income of individuals in any way, otherwise it will falsely capture some impact of parental schooling. Finally, considering that the mother spent more time in child care than most fathers do, especially in traditional patriarchal societies, household behaviour may indeed show much more pronounced role for the mother's education on children's outcome including their schooling prospects, as has been supported in mounting empirical evidence globally [Thomas (1994); Alderman and King (1998)]. However this may be a good indication for policy initiative for spending much more on female education and decreasing the discrepancies across gender, especially in the education sector, so as to create positive intergenerational externality from that investment. However, this should not be mistaken as evidence of greater preference of mother for education of children than the fathers' or evidence in favour of a bargaining model against a unified model. For such a conclusion, deeper research needs to be done to see how marriage making takes place within the society. For example if an educated husband chooses an educated wives for the sole purpose of improving their children's future with greater educational focus both from his and the mother's side for the child, then it could be that the proactive role of mother's schooling on children's educational prospects may indeed be capturing the preference of the husband [Foster (1996); Behrman, *et al.* (1997)]. Hence in such cases a sizable estimate of mother's education on the probability of enrolment for a child compared to father's schooling rather than being indicative of mother's inclination towards children's education is also reflective of the influence of the marriage making process in which the husband's preferences show their impact especially if there is evidence of positive assortative marriage match in data where educated husbands are choosing educated wives for raising better quality of children.

#### **4. MODEL FOR SCHOOL ENROLMENT**

Applying the insight from Section 2, a full simultaneous model of household decision making over the lifecycle is needed for properly studying the phenomenon in respect of schooling attainment of children. Obviously such a framework should ideally

include determinants of fertility behaviour of females and hence determinants of family size, determinants of family composition through marriage or divorce for single parent who may behave differently than a married parent and how such a household composition relates to a support system through joint setup (generally relevant to traditional societies like South Asia) and co-residential arrangements of partners without formal marriage (as seen in developed western societies), some indicator of relative bargaining strength of parents, especially a mother's and finally, an indicator capturing the preference of husband through marriage making process and how that influences the mother's behaviour. However all these factors at one level will be affected by many of the same factor as schooling of the children and on the other will themselves impact determination of other variables in turn. This is a valid concern since, firstly, within the generic framework of household decision making both time allocation of children to schooling and other wage activities and parents' wages are jointly determined in the system. Secondly, many of these behaviours like fertility, marriage-matching and household compositional element and bargaining strength of spouses are themselves determined by how spouses allocate time between home activities and outside paid work. Finally, the question of investing in children both time and expenditure wise will ultimately be guided by the above objectives and preferences as to how many children to have within or outside the institution of marriage and what strength each parent have in such decisions.

Hence a comprehensive study of household behaviour is very complex. The scope of the current study does not allow the coverage of all the possible inter-linkages. Here the range of research will depend on the availability of factors in the data set. In this regard we do not aim to test for unitary versus bargaining models and neither do we take into account the marriage-matching process and fertility behaviour of females. But given the data limitation we try to estimate the impact of the mother's and father's education controlling for household budgetary constraints through putting controls for household size and characteristics of the individual that cannot be influenced by the parental educational background in any way—such as being in joint family system against a nuclear setup—and the head's age as a proxy of patriarchal rigidity in the older generation so as to get much clearer estimate of parental education on the probability of enrolment. Hence we avoid using variables related to wage income or even proxy of non-labour income for we cannot identify clearly how the household acquired that wealth in our data set and therefore the possibility of such proxies being related to wage incomes of family members cannot be ruled out and such proxies cannot be considered as exogenous. Keeping the above consideration in mind, the following separate demand function for schooling has been estimated for individuals in age group 6-10, 11-18, and 19-30 using likelihood of enrolment behaviour. These age groups roughly correspond to age groups of individuals who may be enrolled in primary, secondary and tertiary levels of education. Here we have confined the tertiary age limit from 19 to 30 since in our data set the enrolment status after 30 is found is included only for observation and this pool is generally not seeking education. However within the 19-30 age bracket we find much more concentration of individuals who are involved in higher studies.

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

where

$i$  = indexes the individual child

$j$  = indexes the gender (m = males, f = females)

$k$  = indexes age groups

$F(\cdot)$  = 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 (parental years of schooling, joint system and head's age).

In Equation (4.1) single year age dummies are included to control for any nonlinear relation between the child's retention in school and the child's age. Here we use the urban dummy as an indicator of cost of education and we expect its positive impact on the likelihood of enrolment since there should be easy access to education and availability of all sorts of schools including single sex school in urban centres compared to rural sector. We use level of urbanisation rather than using distance to school as proxy for price of education (availability of educational institution close-by to one's place of residence can lower the total cost of education and is expected to positively affect school enrolment) because in our data set we only have information for distance to school for children who go to school. This introduces perfect collinearity between the enrolment dummy and distance to school variable due to which we have not been able to use this information in our regression model. Here parental education serves two purposes: one, being a direct interest variable in terms of the differential impact of mother's and father's education on the likelihood of enrolment for a child by gender and further, as a proxy of parental socio-economic background. This is so since we cannot include proxies of wage income or non-wage income, given that such proxies will be highly influenced by education of the parents themselves. Finally the provincial variation in enrolment probabilities is controlled for in the above regression through applying provincial fixed effect.

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

## 5. MODEL FOR ESTIMATION OF RETURNS TO SCHOOLING

The extensive literature on returns to education that has come out has been built on Mincer's (1974) pioneer work. The basic idea behind Mincerian earning functions is that

individuals choose to invest in education as a human capital building tool by comparing future wage streams derived from education with current costs of being at school instead of the labour market under the assumption that only the cost of attending school is forgone wages, the tuition expenses notwithstanding. Further, the build up of additional human capital investment through post-school training is not accounted for in standard Mincerian specifications, Only enhancement in wage income other than the attained education of workers that is controlled for is accumulation of more human capital through increase in years of experience. Under the above assumption, the coefficient of years of schooling in an standard Mincerian earning function measures marginal increase in wages for an additional year of schooling or schooling spline and provides an estimate of private rate of return to time spent in school instead of labour force as below:

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

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

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  $i$

$Age_i$  = Age of Individual  $i$

$S_{ik}$  = 1 if completed educational level belong to  $k$  level of schooling, 0 otherwise

In the above model we use age as proxy for experience rather than using potential experience (Age—years of schooling—school starting age). This has been done keeping in view the endogeneity of potential experience as a proxy of experience, since the wages one person gets or may get may also define his or her acquired schooling level at one level and, at the other, the difficulty in extracting private rate of return using potential experience as a proxy keeping in view that here the analysis is not being done just for yearly increase in schooling level but also splines of education level as primary, secondary and tertiary. However, the use of age as proxy of experience will slightly overestimate the private rate of return than where potential experience is used instead, which needs to be acknowledged here. Provincial rural and urban variations are controlled by introducing dummies for provinces and urban.

Further it is impossible to find a totally unbiased and consistent measure of rate of return both theoretically and from empirical point of view [Kling (1999) and Card (1999)]. Theoretically, given that marginal returns and cost will vary for each individual, ideally one would like to get a separate estimate of private rate of return that should vary across individual and also for different levels of education for each individual. Both such estimates are impossible to retrieve empirically given data limitations. Moreover, a biased estimate may result due to inability to account for other variables that are of consequence and importance in wage determination beside education or that may impact both education level and wages such as unobserved ability and socioeconomic and family



background. Hence the estimate of rate of return to schooling in Equation 5.1 and Equation 5.2 can be biased upward because it may be capturing the impact of omitted variables like quality of education, ability and motivation of the individual etc. Ability and motivation across individuals results in variability in the marginal costs and returns faced since the more able the person is the higher is the possibility of pursuing education by resulting decrease in associated costs and increase in plausible future wage benefits; while individuals with less ability will be filtered out from education system much sooner to earn wages. Similarly family background such as the parent's education and socioeconomic status can define the costs and benefits faced. For example, wealthier families may be more inclined towards education of their children to secure their children's status in future and may use their wealth more freely for this purpose. To remove the impact of unobserved household and community characteristics that are shared by the family members and also account for parental income or education structure, we apply household fixed effect 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 take deviation from sibling means. However, these estimates may show that OLS estimates are biased upward but are not very credible due to resulting huge decline in sample size especially in case of females, given that labour force participation rates are extremely low for females.

Another form of bias that may arise in the context of earning function is the issue of selectivity as we only have information on individuals who have chosen to work, since the behaviour of people who opt to work may be different than of those who stay out of labour force which can induce bias in our estimates. This form of bias will be more acute for females than males as traditionally females are kept out of labour force much more due to cultural factors and household responsibilities. To correct for the selectivity bias in literature the Heckman two step procedure has been suggested where a correction is made for self selection into employment on the basis of information about predicted value of probability of being employed on certain identifying determinants. However, the credibility of such an adjustment depends on the validity of identifying variables that should strongly predict the probability of being employed for the individual but not the wage that the person will get if he or she enters the labour force. In our data set the identifying variables that we can extract include number of children, number of old age members and whether one is married or not. 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 shoulder and may induce him to work. Similarly, increase in number of children may induce the male to work more for wages so as to support his family but for a female it may add to her household responsibilities and may induce her to drop out from labour force especially when the proportion of young children or old dependents increases. Hence we would expect these identifying variables to affect participation of male and female in paid work differently. However, these identifying variables are not very credible since fertility itself is endogenous in decision making as the number of children a female may have varies for a female with higher ability and education than with lower ability and education, being less for the former. Also, the more able or educated female will have more wages and hence greater bargaining power within the household in terms of deciding how many children to have. Also if marriage-

making market is active with positive assortative matching, it may induce preference for less children for a couple who are both educated (both such husband and wife may also be more likely to be well-placed in terms of labour force with higher education) and may also translate into lesser fertility level for females in case preference of the male for an educated spouse are for higher quality of future children. Hence the number of children one has may not just affect the probability of being employed, especially for females, but may very well be in consequence of both schooling of parents and their wages. Further being married or not, number of aged dependents or number of children being the predictor of labour market participation will not be so clearly associated with a given female in our data set given the presence of much higher proportion of females belonging to a joint family setup and hence with shared responsibility as is prevalent in much of Pakistan. Therefore, given that we cannot meet the strict identifying restrictions for sample selectivity with available information in the data set being used, we do not attempt to correct for sample selection in our current paper and confine our work to OLS estimates of private rate of return conditional on employment.

## **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 falls in school going ages of primary (6–10), secondary (11–18) and tertiary levels (19–30) and the second, who fall in the age group of labour force participation (15–65) and are not currently enrolled in school. The mean values of variables used in 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.5 and A.9–A.15 respectively.

The pattern that comes clearly from the data of males and females in school going age group (6–30) is that on average females have a slightly higher level of enrolment that is .7127 compared to .6441 for males (Appendix Table A.1). However when we look deeper into the mean statistics by gender and by enrolment for the four provinces, as can be seen in appendix Table A.2, we find that the gender differential (M-F) in the mean level of enrolment pattern in favour of female population only stands for Punjab (–.0925\*) while in the other three provinces enrolment outcomes tilt towards educating sons more than daughters on average; such a trend being most strong for Balochistan (.0557\*) compared to Khyber Pakhtunkhwa (.0214\*) and Sindh (.0153\*). Hence though on average females may fare better than males in terms of enrolment, however such a pattern is coming primarily from the Punjab government's commitment to reducing gender disparities in education and perhaps less rigid cultural values of patriarchal control compared to the other three provinces as can be seen in the preference for son's education on average compared to daughters in the other three provinces. Further, the favourable gender difference in enrolment on average is emerging from urban sectors (–.0747\*) being reflected mainly in primary school going age group (–.0279\*) on average in contrast to secondary education age category (.0212\*) and tertiary level age group (.0066\*\*\*) where the mean gender difference shows that among enrolled group on average males are more enrolled than females.

In terms of determinants of schooling from descriptive figures in Table A.2, we do find that comparison of the enrolled group with those who are not enrolled reveals that they have a much higher level of parental education, much lower household size, joint family system, and finally comprise of younger head of the households; and this pattern is seen across both male and female population of enrolled and not enrolled children for age group 6–30. Further the average tendency in individuals belonging to enrolled group for both males and females compared to the not enrolled category having smaller family size, joint family setup, younger heads of households and finally with much higher levels of mother's and father's years of education can also be seen in the mean statistics by gender and enrolment for primary, secondary and tertiary age groupings as reported in Appendix Tables A.3, A.4 and A.5 respectively. Hence such differences may indeed show that increase in the size of the household may be creating binding resource constraints that are leading parents to take the child out of school. However this pattern is being mitigated to some extent in enrolled group for both males and females through much higher presence of joint family support system with shared family responsibilities compared to the non-enrolled sample which can be a likely possibility in our sample. Similarly on average more younger heads of households in the enrolled group compared to the non-enrolled for both males and females may imply that younger parental generation have much more focus on education of their children as compared to aged parents. Finally, the mean statistic of urban dummy by gender and enrolment reveal that there is higher proportion of kids living in urban localities in the group that are enrolled than those who do not go to school for females for age group 6-30 and this pattern is shown in the mean values at all three educational demarcation, while for males those living in urban areas are less on average among those enrolled compared to the non-enrolled group for the whole sample of 6-30 age group, however descriptive analysis by educational level shows the reverse pattern (Appendix Table A.2 to A.5). Therefore belonging to urban locality may indicate more likelihood of being enrolled due to easy and safe access to schooling especially for females is a plausible hypothesis.

Finally the most important plausible determinant for enrolment of a child that comes out from the mean estimates in Tables A.2 to A.5 is parental education. On average parental years of schooling are higher for both males and females for the enrolled group compared to the non-enrolled but the difference in mean years of schooling for father across the enrolled and not enrolled group for males and females comes to be 1.316\* and 1.311\* respectively which shows that on average father's education across the enrolled and not enrolled groups is slightly higher for males than females (Appendix Table A.2). However the difference in mean years of schooling for mothers across enrolled and not enrolled groups show much pronounced role for female enrolment compared to males (Appendix Table A.2: 1.396\* for females and 0.816\* for males). This pattern of much higher mean difference across enrolled and not enrolled groups for father's education for males and that for mother's education for females is shown in descriptive pattern at all levels of education though with varying degrees (Appendix Table A.3 to A.5). On examination of the mean statistics by gender and by enrolment in Appendix Tables A.2-A.5, it can be seen that among those individuals who are currently enrolled, it is the parental education that plays an important role. In case of females it is a testable hypothesis if the mother's education can be a determining factor of the daughter being sent to school while in case of males it is a likely empirical possibility based on the mean trends.

Looking into the mean values of variables used in the earning function in Table A.9, one finds that on average males earn slightly higher than females a mean value of 388.67 rupees compared to 214.79 rupees for females. Also not only do men on average earn almost twice as much as females, they have almost double years of schooling as compared to females (6.567 for men compared to 3.74 for females) though both average earnings and years of schooling are quite low for both males and females in Pakistan. This is not only so among the no schooling category for all levels—primary, secondary and tertiary—there are marked gender differences which show that females on average are clearly the disadvantaged group with 57.4 percent of population against 28.2 percent of the male population who have never attended school; and of those who have attended schools, the males outperform females at all levels of education (primary: 15.3 percent for males and 11.7 percent for females; secondary : 47 percent for males and 25.6 percent for females; tertiary: 9.3 percent for males and 5.1 percent for females). In terms of labour force participation also we find that 71.7 percent of males work while only 13.1 percent of females take part in paid work which may be an indication of the fact that culturally the primary role of bread earning falls on males and while females are mainly concerned with household responsibilities and child rearing activities. Also, if the selection in the labour force is not controlled in the estimation process it will create problems in terms of biased estimates for females than males, given such low labour force participation rate for females compared to males. When we calculate the mean difference in daily earnings and paid labour force participation proportions by schooling levels as presented in Appendix Tables A.10 and A.11, we find that that males on average earn more than females at all levels of education and the difference increases with the level. As to the trend in difference in participation in paid labour force, we find that on average 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 such background which are more open to female working than those closed ones who either do not send to school or take them out of school early in education.

Another important aspect that needs to be understood and evaluated is how the labour market experience of males and females varies by different age groups. Since the older cohorts are at a different life cycle than the younger 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 into paid work by age cohort is presented in Appendix Table A.12. We can see from the averages presented in Appendix Table A.12 that males tend to earn more than females at each age cohort, have much higher levels of years of schooling and have substantially high levels of participation in the work force rates than females. However, within the 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 possible concavity of earning profile with respect to age. The years of education on average are higher for the younger cohorts 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 groups participation rates peak at 31-40 age cohort for both males and females and then decline indicating life cycle effects. In terms of the mean difference in daily earning and labour force participation rates by age cohort and by schooling level as presented in Appendix Tables A.13 and A.14, 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 the evidence of marked variation in average earnings and paid labour force participation rates of both males and females across provinces and across rural and urban divide as is evident from Appendix Table A.15, indicating the need to control for regional variations in our earning function regressions. One clear pattern that emerges from the mean statistics across the rural and urban divide in each province and for Pakistan is that males tend to earn more on average than females in each category, have much higher mean values of years of education and also have much higher participation rates in paid work than females.

## 7. EMPIRICAL RESULTS

The impact of being male on the probability of enrolment at primary, secondary and tertiary levels of education is presented in Appendix Tables A.6 –A.8. According to these findings, the empirical evidence of gender difference in education in favour of a male child is found most significantly at the secondary level and weak evidence is found at the primary. However at the tertiary level in our given sample females fare better in terms of their likelihood of enrolment than males. The estimated results for the reduced form demand function for enrolment shows that being male increases the likelihood of enrolment by 0.14 percent and 6.6 percent at the primary and secondary levels of schooling, though the result is significant only for the latter category, while it has negative insignificant effect on the probability of enrolment by a magnitude of 1.27 percent.

Table 7.1

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

	Male			Female		
	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary
Household Size	.00035	-.01002*	-.0004	0.0000	.0031	-.0059
Joint Setup	.00332	-.0258***	.00504	-.0013	.0063	.0285
Head's Age	.00019	-.00152***	-.00055	-.00032**	-.0015	-.0016
Father Sch.	.00084*	.01273*	.0089*	.00025	.01023*	.0147*
Mother Sch.	.00043	.01207*	.0065*	.00088***	.0265*	.0120*
Urban	.00114	.00371	.021	.0024	.0995*	.0653**
Punjab	-.00945**	-.0348*	.0208	.00027	.0958*	.0814*
KPK	.0032	.0883*	.0940*	.00048	.1205*	.2461*
Sindh	-.009	.02464	.0013	-.00215	.05024	.0667
Pseudo R-square	0.1125	0.1954	0.1831	0.1515	0.2140	0.1361
Proportion Attending School	.798	.763	0.185	.697	.722	0.279
N	5456	8132	6175	4091	5757	2656

While the significant and sizable effect of the greater likelihood of male enrolment at secondary level is established, the estimated findings concerning determinants of probability of enrolment at different levels of education do differ by gender. The summary of estimated findings for probability of enrolment at primary, secondary and tertiary level of education for males and females is presented in Table 7.1 above. In view of the budgetary constraint it is expected theoretically that increase in household size will increase the financial burden on parents and hence limited resources will lead to decrease in the likelihood of children's schooling. However the joint family factor may partly mitigate this impact in the sense that the responsibility of educating children will be shared among extended family members and if the number of earners is increasing more than the number of children then this may actually increase the probability of the child's enrolment. However, this is largely an empirical question and there can also be the possibility that belonging to a joint family set up could only increase the burden of dependence on the head and not so much as a means to enhance the financial pool of the household. A look at the descriptive measure for household size in Appendix Table A.2 would show that those who are enrolled whether male or female come from slightly lower household size on an average as compared to the group that does not go to school, hence increasing family size could create stringent budget constraints for the household and might affect enrolment negatively. However, the estimated findings for our given sample provide strong support of the above possibility only at the secondary level of education for males where the impact is negative and significant ( $-.01002^*$ ) while in the rest of the categories the evidence is mixed. The negative, though insignificant, impact of increasing family size is found at the tertiary level of education for both males and females, while at the primary level for males and primary and secondly level for females, the impact is positive though insignificant and of negligible magnitude. Belonging to joint family also only significantly affects the likelihood of enrolment for males at the secondary level of education ( $-.0258^{***}$ ) while in other categories for both male and female the impact is insignificant. Hence in this data set, it is not very clear that in face of scarcity and budget constraints with increasing family size when household has to decide between education of a son and a daughter, who they will prefer to send to school as strong evidence of binding resource constraints is found only at secondary level of education for males while in the rest of the categories not only the impact is insignificant but there is marginal difference across gender.

As a proxy of patriarchal rigidity in the values system due to which parents may favour son's education over the daughter's, the head's age is controlled for in the above model. As can be seen in the above table, increasing the head's age decreases the probability of enrolment for both males and females at all levels of education except the primary level for males (though the impact is significant only at secondary level for males and primary level for females). This shows that education of children is much more of priority for parents of younger ages than older ones. Further, in terms of magnitude, the impact is always greater for females than males showing that increase in the head's age decreases female enrolment likelihood more than that of the males, showing that older age group may prefer to educate their sons more than the daughters. Also, it can be seen in the above table that the urban dummy has positive impact for both males and females at each level of education which is in line with our hypothesis of using urbanisation as a proxy for availability of educational infrastructure. However this impact

is found to be significant only for females at the secondary and tertiary levels of education. Further, the effect of belonging to an urban centre on females shows a sizable magnitude compared to males at all levels of education and this significant sizable response to urban dummy could be due to much easier access to education for females in urban areas as compared to a rural setting.

The most important finding of the current study is that the key variable that impacts enrolment positively across gender at all levels is parental education as can be seen in table 7.1 above. Parental education plays the most important role in a child's future. Not only the educational base of the parents defines their socioeconomic status but also their capacity to invest or not invest in the child's human capital building process whether it is in the form of their educational goals or in terms of their healthy physical and psychological growth. Further, from the policy perspective another important aspect that needs to be understood concerns parents, that is, the impact of a mother's versus a father's education on the child's schooling prospects and if so then what is the magnitude of such an impact. Hence if one finds evidence in favour of greater effective role of one parent as opposed to the other, say a mother, then it may provide rationale for who to target as the prime beneficiary in cash transfer programmes such as Benazir Income Support Programme with the objective that cash be utilised efficiently for the welfare of children in households. Both father's and mother's education has significant positive impact on education of both males and females at each level of education except the impact of father's schooling and that of mothers at primary level of schooling (positive but insignificant) for female and males respectively. Further one can see in Table 7.1 that at primary and secondary level of education, the mother's education has much more impact in terms of magnitude for females compared to father's education while the reverse patterns stand for the father's education which has greater impact compared to the mother's years of schooling for males at all levels of education. For males, unit increase in year of education of a mother increases the probability of enrolment by 0.043 percent, 1.207 percent and 0.0065 percent at primary, secondary and tertiary levels of education respectively while a unit increase in father's education increases the likelihood of enrolment by 0.084 percent, 1.273 percent and 0.89 percent at these respective level. For females, contrary to the results for males, the mother's education has been found to play more important part in educational prospects of a female. An increase of a year in mother's schooling increases the likelihood of enrolment of a daughter by 0.088 percent and 2.65 percent which is higher in magnitude than the respective impact of unit increase in the father's education that has been estimated to have an impact of 0.025 percent and 1.023 percent on female enrolment at primary and secondary educational levels. Hence the above finding shows that parental educational background has significant influence on the schooling preferences for children. Though the education of parents has positive impact on education of each child irrespective of the gender, however, the role of the mother's education is most vital for education of daughters and that of the father's is most important in education of their sons at all levels of education but of daughters at the tertiary level. Our results are somewhat similar to findings in Hamid and Siddiqui (2001) in which demand for schooling by gender is studied for three major cities of Pakistan i.e., Faisalabad, Sialkot and Karachi and it is found that increase in father's education raises the schooling of both sons and daughters but mother's education has significant impact only on daughters' schooling. Similarly the role of parental education in defining the

schooling outcomes of children, as is evident from findings of the study in hand, is also supported by empirical evidence presented in Saqib (2004), whereby it is found that there is much higher likelihood of a male child attending primary school compared to a female child and that this likelihood of enrolment increases for children with educated fathers in rural Pakistan.

Before looking into estimated rates of returns across male and female let us analyse the mean characteristics of the sample used to calculate such returns as presented in Table A.9 in the Appendix. We can see from the Appendix Table A.9 that the proportion of the males working for wages are much more than females (71.7 percent for males, 13.1 percent for females). Hence a much higher proportion of females is choosing not to work as compared to males, hence the selectivity bias would be a greater significant problem for females in view of the low labour force participation rate for females as compared to males. However due to non-availability of proper identifying variables to be used as basis for selectivity control, we confine our estimation to OLS regression. Further, non-availability of proper control for ability and quality of education may bias the estimates upward for males and females.<sup>6</sup> Hence before discussing the estimated results for private rate of return by gender, it is important to recognise the above mentioned caveats in these estimates which are primarily arising because of non-availability of data and restriction.

Table 7.2

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

	Years	Primary	Secondary	Tertiary
Male	.0476	0.1216	0.2124	0.5437
Female	.083	0.22	0.3	0.837

The summary of the rate of return is presented in Table 7.2 above. We can see that returns to years of schooling for males and females turn out to be 4.76 percent and 8.3 percent. Therefore we conclude that on average females get higher return to a year of education than males. Also it is evident that return to education is higher for females than for males at all levels of education: primary, secondary and tertiary levels and also returns to education increase as educational levels increase both for male and females and the incremental increase is slightly more for males than female as one moves from primary to secondary level of education, but there is sizable jump for females than males as one moves from secondary to tertiary level of education. This finding that returns to education are higher for females than males and the earning function is convex with respect to education is in line with previous research on returns to education 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

<sup>6</sup>We provide fixed effects estimates in Appendix table that show returns estimate decline considerably for both male and female when sample using deviation from sibling mean is used so as to control for community and household unobserved common impacts that may be biasing the OLS results. For males the sample is confined to families with two or more brothers and for females the sample is restricted to household with two or more sisters so as to control for any gender effects in ability. However, we will not use these estimates for analysis due to sizable reduction in sample size especially for female.



(1993a, 1993b), Shabbir (1994), Nasir (1998), Nasir (2002) and Aslam (2005). Also looking into the pattern across various age cohorts as presented in table 7.3, we again see that returns to schooling for females are higher than for males at all levels of education across all age cohorts except for a few anomalies. Also there is 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) that are most relevant for current and future schooling decision.

Table 7.3

<i>Summary of Gender and Cohort Specific Rate of Returns</i>					
	15–20	21–30	31–40	41–50	51–65
<b>Female</b>					
Years	.0108	.069	.097	.122	.142
Primary	.057	.087	.173	.20	.359
Secondary	0.045	0.302	0.408	0.666	0.691
Tertiary	–0.074	0.613	1.069	1.114	1.45
<b>Male</b>					
Years	.011	.035	.051	.057	.069
Primary	0.0574	0.036	0.134	0.156	0.188
Secondary	0.0446	0.164	0.256	0.304	0.346
Tertiary	–0.074	0.479	0.478	0.5	0.716

Before drawing any policy implications, we need to acknowledge that on average males earn more than females as shown by descriptive statistics in Appendix Table A.9 (though this is not reflected in our constant terms of Mincerian earning function by gender). However evidence of higher private rate of return to years of education and at each level of education (primary, secondary and tertiary) for females than males implies that among those females who are educated they enjoy much higher returns than those females who are less educated in comparison to how much their educated male counterpart earns compared to the less-educated. These higher returns for females are showing because of lower presence of educated females at each educational level as compared to males, as can be seen in Appendix Table A.9. Further, such returns increase with the increasing education level for both males and females. There are several policy implications of convexity of the education-earnings profile. Firstly, the higher return at lower education levels argument has often been used to justify allocating funds to expand primary education [Psacharopoulos and Woodhall (1985)]. The presented evidence at first glance may appear to be in contrast to prevailing logic of achieving universal primary education targets first as a policy focus and then moving on to investments in higher level of education. However here one should notice that these estimates are private rate of return estimates and do not take account of social costs and benefits. Hence making a policy consensus on these estimates will be misleading.

Further, 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 level 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 which educate their children up to only primary education for example, because of their inability to borrow against future income and then being risk averse, are led to invest in shorter term quick yielding investment, will face lower private returns while richer families which educate children up to higher levels because of intergenerational class maintenance motives, will reap higher private 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 or who culturally will be able to contribute more to households. Consequently, education and earnings differentials may widen both across families and within families and across the gender divide within families given the differential incentive the same future distribution of returns to schooling will generate for parents with poorer or wealthier background. This impact may be more pronounced for males than females especially among poor families who do not invest in education for class maintenance purposes but rather for the benefits that will accrue to them as a household. This is so in a traditional society like Pakistan's where parents rely more on their sons than daughters for their old age support. This is in accordance with the social norms that prevail in patriarchal societies according to which the daughter after marriage is culturally responsible for her in-laws and not the paternal relations. So even if women work after marriage (which is also quite small in Pakistan due to cultural taboos) the proportion that will be spent on the care of their parents will be much less compared to the men's. Also the wages the females receive for the same amount of work compared to males may be lower due to labour market discrimination. Hence even if returns to education may increase by education level for both males and females, part of the return from children's education that will benefit parents more in future will be more for sons than daughters.

## 8. CONCLUSION

In this paper using estimates of schooling demand function and private rate of return to education by gender, an attempt has been made to examine if there is any dynamics that will define a differential behaviour across gender in enrolment and if so then what can be the possible cause of such discrepancies and how can they be reduced. The first set of analysis focussed on the estimates of probability of enrolment at primary, secondary and tertiary levels of education by gender. Strong evidence for higher likelihood of enrolment for the male emerges only at the secondary level of education. However, the impact of determinants for these schooling demand functions at different levels of education differ by gender. One such key variable is parental education, whereby much more pronounced role of the mother's education is found in increasing the likelihood of enrolment for females at primary and secondary levels of education and that of the father's education for males at all levels of education and at tertiary level for females. Hence investing in female education today not only will empower females today but as a positive externality will also lead to gender equity in future. Besides this intergenerational externality of investment in female education, the above finding helps in identifying that in case of conditional cash programmes if mothers are targeted as policy tool then this can be one plausible measure to increase current female enrolment. The second set of analysis tried to highlight how gender imbalance in attained level of

education and much lower level of female labour force participation led to discrepancies in private rate of return to education by gender. The varied estimates show that such deviations are arising because females who are participating in labour market are on average much less educated than males and hence having higher rates of returns than males which again emphasises the need for a policy focussed on targets such as reducing gender differences in enrolment at all levels of education—primary, secondary and tertiary.

Further, the presence of convex education earning profiles may point to un-met demand within industry-sectors for high-skilled labour and policy makers may need to promote high-skill level 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 which educate their children only up to the primary level because of their inability to borrow against future income. Also being risk averse they invest in short term works that yield quick returns as a result they face lower private returns while richer families who educate children up to higher levels because of intergenerational class maintenance motives reap higher private returns. Consequently, the poor are less motivated to educate their children and may send only the more able children to school for whom returns are higher or who culturally will be able to contribute more to household such as a son who is not only expected to serve parents in old age but will most likely receive more reward for the same amount of work due to labour market discrimination. Consequently, education and earnings differentials may widen both across families and within families and across the gender divide within families given the differential incentive the same future distribution of returns to schooling will generate for parents with poorer or wealthier background.

## APPENDIX

Educational System Profile in Pakistan						
Levels	Categorisation	Grades	Age Group	Subjects Taught	Duration	
Pre-school	Pre-school	Play Group, Nursery, Kindergarten (KG)	3-5	Elementary skills	3 years	
Primary	Primary	1-5	6-10	Elementary skill development in Urdu, English, Mathematics, Arts, Science, Social Studies, Islamiyat and Geography	5 years	
Secondary	Middle	6-8	11-13	Urdu, English, Mathematics, Arts, Science, Social Studies, Islamiyat and sometimes Computer Studies. Additional courses on language such as Turkish, Arabic, Persian, French and Chinese are taught depending on institution	3 years	
	High (Matric)	9-10	14-16	Eight courses in total <u>compulsory subject:</u> (Mathematics, English, Urdu, Islamiyat and Pakistan Studies) <u>Elective subject</u> (Biology, Chemistry, Physics and Computer)	2 years	
	Intermediate/ Higher Secondary (FSc/FA)	11-12	17-18	<u>Groups choice</u> (pre-medical, pre-engineering, humanities and commerce) Each group consists of three electives and as well as three compulsory subject of English, Urdu, Islamiyat (grade 11 only) and Pakistan Studies (Grade 12 only).	2 years	
Tertiary	Professional college/University for Bachelor's degree courses	Undergraduate / Graduate /post graduate degree	19-30	Engineering (B.Engg/BS Engg), medicine (MBBS), dentistry (BDS), veterinary medicine (DVM), law (LLB), architecture (B.Arch), pharmacy (Pharm-D) and nursing (B.Nurs).	4 to 5 years	
	University	Bachelors (Pass)		Students normally read three optional subjects (such mathematics, statistics and Economics combination etc) in addition to almost equal number of compulsory subject such as English and Pakistan Studies	2 years	
		Bachelor of Arts (BA), Bachelor of Science (B.Sc), Bachelor of Commerce (B.Com).				
		Bachelor (Honors)		Students normally specialise in a chosen field of study	3 to 4 years	
	Master degree		Field will be defined according to Bachelor education	2 years		
	Masters in Philosophy (M.Phil)		Field will be defined according to master degree	Minimum 2 years		
	Doctor of Philosophy (PhD)		Field will be defined according to Master/Mphil. Degree	Minimum 2 years		

Table A.1

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

	Male (M)	Female (F)	Difference (M-F)
Enroll	.6441	.7127	-.0685*
Father Years of Schooling	5.238	5.9597	-.7215*
Mother Years of Schooling	2.0771	2.846	-.7693*
Household Size	7.341	7.197	.1438*
Joint Setup	.6369	.7117	-.0748*
Head's Age	48.58	47.20	1.377*
Primary Education (Grade 1–5: Age Group 6–10)	.2760	.3271	-.0511039*
Secondary Education (Grade 6–12: Age Group 11–17)	.4114	.4604	-.0489
Tertiary Education (University Education Under-graduate, Graduate and Post-graduate: Age Group 18–30)	.3124	.212	.1000*
Urban	.4380	.4988	-.0607*
Punjab	.4081	.4893	-.0811*
Sindh	.2268	.2169	.0098**
Khyber Pakhtunkhwa	.2097	.1924	.0172*
Balochistan	.1552	.1011	.0540*
N	<b>19,763</b>	<b>12,504</b>	

Table A.2

*Mean of Variables used in Schooling Equation by Gender and Enrolment  
(Age Group: 6–30)*

	Enrolled (E)			Not Enrolled (NE)			Difference (E-NE)	
	Male (M)	Female (F)	Diff. (M-F)	Male (M)	Female (F)	Diff. (M-F)	Male	Female
Father Years of Schooling	5.70	6.336	-.6297*	4.390	5.025	-.635*	1.316*	1.311*
Mother Years of Schooling	2.367	3.247	-.8799*	1.551	1.851	-.300*	0.816*	1.396*
Household Size	7.092	7.095	-.0028	7.79	7.44	.341*	-0.698*	-0.345*
Joint Setup	.7146	.7350	.0204*	.496	.653	-.157*	0.2183*	0.081*
Head's Age	45.36	45.11	.2541**	54.40	52.39	2.007*	-9.04*	-7.28*
Punjab	.3846	.4772	-.0925*	.4507	.5194	-.0686*	-0.066*	-0.042*
KPK	.2218	.2004	.0214*	.1878	.1728	.0149*	0.034*	0.0275*
Balochistan	.1693	.1135	.0557*	.1296	.0704	.0592*	0.0397*	0.0431*
Sindh	.2241	.2088	.0153*	.2316	.2371	-.005*	-0.0075	-0.028*
Prim. Age Group (5–10)	.4228	.4507	-.0279*	.0103	.0206	-.0102*	0.4125*	0.4301*
Sec. Age Group (11–17)	.4874	.4662	.0212*	.2738	.445	-.172*	0.2136*	0.0212*
Tertiary Age Group (18–25)	.0897	.0830	.0066***	.7157	.5334	.1823*	-0.626*	-0.450*
Urban	.429	.5039	-.0747*	.4540	.4860	-.0320*	-0.025*	0.017***
N	12,731	8,912		7,032	3,592			

Table A.3

*Mean of Variables Used in Schooling Equation by Gender and Enrolment  
(Age 6–10)*

	Enrolled (E)			Not Enrolled (NE)			Difference (E-NE)	
	Male (M)	Female (F)	Diff. (M-F)	Male (M)	Female (F)	Diff. (M-F)	Male	Female
Father Years of Schooling	5.245	5.830	-.585*	2.904	5.418	-2.514**	2.341*	0.412
Mother Years of Schooling	2.205	2.797	-.5917*	2.191	2.189	.0025	0.014	0.608
Household Size	6.780	6.893	-.112**	7.109	7.472	-.363	-0.329	-0.579**
Joint Setup	.7423	.7443	-.0019	.7671	.7027	.064	-0.0248	0.0416
Head's Age	41.63	41.73	-.0986	42.45	45.51	-3.061**	-0.82	-3.78*
Punjab	.3789	.4363	-.0574*	.5342	.3648	.169**	-0.155*	0.0715
KPK	.201	.189	.011***	.0684	.2027	-.134**	0.133*	-0.0137
Balochistan	.1833	.1476	.035*	.1506	.1621	-.0114	0.0327	-0.0145
Sindh	.236	.226	.009	.2465	.2702	-.0236	-0.0105	-0.0442
Urban	.3838	.4187	-.0349*	.3013	.2432	.0581	0.083	0.1755*
N	5,383	4,017		73	74			

Table A.4

*Mean of Variables Used in Schooling Equation by Gender and Enrolment  
(Age 11–18)*

	Enrolled (E)			Not Enrolled (NE)			Difference (E-NE)	
	Male (M)	Female (F)	Diff. (M-F)	Male (M)	Female (F)	Diff. (M-F)	Male	Female
Father Years of Schooling	5.682	6.48	.8007*	3.327	4.305	-.9781*	2.355*	2.175*
Mother Years of Schooling	2.247	3.394	-1.146*	1.089	1.199	-1.099	1.158*	2.195*
Household Size	7.297	7.315	-.0175	7.579	7.552	.0275	-0.282*	-0.237*
Joint Setup	.7136	.7335	-.0199**	.676	.696	-.0194	0.0371*	0.0375*
Head's Age	47.044	46.889	.1545	49.62	49.16	.4673***	-2.58*	-2.271*
Punjab	.379	.5030	-.1236*	.4589	.4700	-.011	-0.079**	0.033**
KPK	.2378	.2086	.0291*	.1645	.1916	-.0270**	0.0733*	0.017
Balochistan	.1693	.0931	.0762*	.1495	.0955	.0540*	0.019**	-0.0024
Sindh	.2135	.1951	.0183**	.2268	.2428	-.0159	-0.0133	-0.047*
Urban	.434	.5487	-.114*	.3733	.377	-.004	0.0607*	0.171*
N	6206	4155		1926	1602			

Table A.5

*Mean of Variables Used in Schooling Equation by Gender and Enrolment  
(Age 19–30)*

	Enrolled (E)			Not Enrolled (NE)			Difference (E-NE)	
	Male (M)	Female (F)	Diff. (M-F)	Male (M)	Female (F)	Diff. (M-F)	Male	Female
Father Years of Schooling	8.012	8.256	-.2444	4.818	5.612	-.793*	3.194*	2.644*
Mother Years of Schooling	3.781	4.864	-1.0829*	1.718	2.38	-.6646*	2.063*	2.484*
Household Size	7.44	6.96	.488*	7.881	7.363	.5187*	-0.432*	-0.403*
Joint Setup	.589	.693	-.1039*	.4234	.6169	-.1935	0.165*	0.076*
Head's Age	53.80	53.43	.369	56.40	55.36	1.036*	-2.59*	-1.93*
Punjab	.4404	.5540	-.1135*	.4464	.5668	-.1203*	-0.0059	-0.0128
KPK	.232	.2135	.0185	.1984	.1560	.0424*	0.0336**	0.0575*
Balochistan	.103	.043	.060*	.1217	.0459	.0758*	-0.018***	-0.0026
Sindh	.224	.189	.034**	.233	.231	.0020	-0.009	-0.042**
Urban	.616	.714	-.098*	.4871	.5861	-.098*	0.129*	0.128*
N	1142	740		5033	1916			

Table A.6  
*Maximum Likelihood Logit Estimates of The Probability of Being  
 Enrolled in School, Ages 6–10*

Variables	Male	Female	Total
Male			.0014
Household Size	.00035	2.16e-06	.00023
Joint System	.00332	-.0013	.00076
Head Age	.00019	-.00032**	-.0001
Father Years of Schooling	.000838*	.00025	.000617*
Mother Years of Schooling	.000434	.00088***	.00075***
Urban	.00114	.0024	.0020
Punjab	-.00945**	.00027	-.00512
Khyber Pakhtunkhwa	.0032	.00048	.0008
Sindh	-.009	-.00215	-.0060
Age7	-.0131	-.0041	-.009
Age8	-.0359	-.0449	-.0427***
Age 9	-.0557	-.0509	-.0579
Age 10	-.0820	-.0873***	-.09**
Pseudo R-sq	0.1125	0.1515	0.1085
Proportion Attending School	.798	.697	.75
N	5456	4091	9547

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 is Enrol equals 1 if enrolled and 0 otherwise.

Table A.7  
*Maximum Likelihood Logit Estimates of the Probability of Being  
 Enrolled in School, Ages 11–18*

Variables	Male	Female	Total
Male			.065600*
Household Size	-.0100166*	.0031	-.00368
Joint System	-.0258002***	.0063	-.010847
Head's Age	-.0015227***	-.0015	-.0016*
Father Years of Schooling	.0127268*	.01023*	.011399*
Mother Years of Schooling	.012074*	.0265*	.0189*
Urban	.0037107	.0995*	.0434*
Punjab	-.0348217*	.09582*	.0155
Khyber Pakhtunkhwa	.0882743*	.1205*	.1002*
Balochistan	.0246407	.05024	.0396**
Age12	-.125203**	-.2639*	-.1898*
Age13	-.2065579*	-.3019*	-.2527*
Age14	-.2980632*	-.4541*	-.3719*
Age15	-.4246711*	-.5291*	-.4742*
Age 16	-.511163*	-.6101*	-.5563*
Age 17	-.585171*	-.6634*	-.62163*
Age 18	-.6898523*	-.7279*	-.706*
Pseudo R-sq	0.1954	0.2140	0.1962
Proportion Attending School	.763	.722	.745
N	8132	5757	13889

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 is Enroll equals 1 if enrolled and 0 otherwise.

Table A.8

*Maximum Likelihood Logit Estimates of The Probability of Being  
Enrolled in School, Ages 19–30*

Variables	Male	Female	Total
Male			-.0127
Household Size	-.0004	-.0059	-.0017
Joint System	.00504	.0285	.0119
Head's Age	-.00055	-.0016	-.00087
Father Years of Schooling	.0089*	.0147*	.01066*
Mother Years of Schooling	.0065*	.0120*	.00827*
Urban	.021	.0653**	.0324**
Punjab	.0208	.08144*	.0376*
Khyber Pakhtunkhwa	.0940*	.2461*	.1383*
Balochistan	.0013	.0667	.0160
Age 20	-.0457*	-.0487**	-.0471*
Age 21	-.0519*	-.0804*	-.0611*
Age 22	-.0836*	-.1339*	-.0989*
Age 23	-.0941*	-.1293*	-.10601*
Age 24	-.0908*	-.1425*	-.1064*
Age 25	-.1120*	-.1452*	-.12521*
Age 26	-.1161*	-.2062*	-.1412*
Age 27	-.1129*	-.1948*	-.1367*
Age 28	-.1250*	-.1989*	-.1471*
Age 29	-.11504*	-.1836*	-.13767*
Age 30	-.13535*	-.1797*	-.1539*
Pseudo R-sq	0.1831	0.1361	0.1699
Proportion Attending School	0.185	0.279	0.213
N	6175	2656	8831

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 is Enrol equals 1 if enrolled and 0 otherwise.

Table A.9

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

	Male (M)	Female (F)	Difference (M-F)
Daily Wage	388.67	214.79	173.87*
Log (Daily Wage)	5.707	4.86	.844*
Yrs. of Schooling	6.567	3.74	2.821*
No Schooling	.282	.574	-.291*
Primary	.153	.117	.036*
Secondary	.47	.256	.213*
Tertiary	.093	.051	.042*
Work Participation	.717	.131	.585*
Age	31.46	32.80	-1.33*
Urban	.461	.421	.04*
Punjab	.39	.42	-.0298*
Sindh	.266	.246	.019*
NWFPKPK	.18	.201	-.018*
Balochistan	.160	.13	.028*
N for Log Wage	17403	2047	
N for Rest of Variables	27,956	29,801	



Table A.10

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

	Male (M)	Female (F)	Difference (M-F)
No Schooling	271.57	108.0	163.56*
Primary	297.31	122.4	174.85*
Secondary	404.44	210.49	193.9*
Tertiary	830.14	518.27	311.86*

Table A.11

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

	Male (M)	Female (F)	Difference (M-F)
No Schooling	.8267	.1479	.6787*
Primary	.7952	.1067	.6884*
Secondary	.6159	.0767	.5391*
Tertiary	.766	.274	.4927*

Table A.12

*Mean Statistics of Male and Females by Age Cohorts*

	Male Log Wage	Female Log Wage	Diff. (Log Wage) (M-F)	Male Yrs Sch.	Female Yrs Sch.	Diff. (Years Schooling) (M-F)	Male Work, WPm	Female Work, W Pf	Difference Work Participation (WPm-WPf)
15-20	5.137	4.452	.685*	6.505	5.169	1.335*	.4117	.0875	.324*
21-30	5.546	4.91	.6288*	7.360	5.02	2.33*	.8063	.1382	.668*
31-40	5.874	4.857	1.01*	6.789	3.023	3.76*	.948	.17	.778*
41-50	5.987	4.993	.994*	5.927	2.085	3.84*	.923	.156	.767*
51-60	5.962	5.055	.907*	5.296	1.5	3.79*	.755	.124	.630*
61-65	5.72	4.35	1.365*	5.01	.955	4.06*	.455	.0655	.389*

Table A.13

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

	15-30	31-40	41-50	51-65
No Schooling	.8610*	1.16*	1.2*	.94*
Primary	.76*	1.19*	1.038*	.91*
Secondary	.723*	.907*	.5697*	.396***
Tertiary	.566*	.3607*	.033*	-.117

Table A.14

*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	.67*	.779*	.751*	.534*
Primary	.636*	.823*	.833*	.627*
Secondary	.431*	.814*	.803*	.615*
Tertiary	.343*	.624*	.568*	.410*

Table A.15

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

		Male			Female		
		Logwage	Yrs sch.	Work	Logwage	Yrs sch.	Work
Punjab	Rural	5.52	5.64	.743	4.61	3.21	.236
	Urban	5.85	7.66	.71	4.99	6.71	.113
Sindh	Rural	5.44	5.04	.77	1.37	4.55	.17
	Urban	5.86	7.960	.731	5.81	5.01	.094
KPK	Rural	5.65	6.48	.614	4.961	2.19	.080
	Urban	5.76	8.08	.641	5.24	4.85	.068
Balochistan	Rural	5.69	4.26	.763	5.06	.717	.033
	Urban	5.91	7.24	.678	5.62	2.98	.047
Pakistan	Rural	5.56	5.44	.729	4.61	2.23	.159
	Urban	5.86	7.86	.703	5.09	5.82	.092

Table A.16

*Mincerian Earnings Functions, (Males and Females), with Years of Education and Levels of Education (15–65)*

Variables	Male				Female			
	Years		Level		Years		Level	
	OLS	Fixed	OLS	Fixed	OLS	Fixed	OLS	Fixed
Constant	3.59 *	-0.00	3.66*	-0.00	3.62 *	0.00	3.748*	0.00
Yrs Sch	.0476*	.009**			.083 *	.0106		
Primary			.1216*	.004			.220*	-.027
Secondary			.334*	-.0092			.52*	-.187
Tertiary			.8777*	.122			1.357*	.210
Age	.081 *	.0307*	.0809*	.030*	.0318 *	.008	.028*	.002
Age Square	-.0008 *	-0.00	-.0008*	-0.00	-.0001	0.00	-.0001	0.00
Urban	.199 *		.207*		.046		.087	
Punjab	.0087 *		.011		-.144 *		-.138**	
KPK	.063 *		.062**		-.086		-.090	
Balochistan	.169 *		.158*		.292**		.335	
R sq	0.3610	0.104	0.3654	0.1043	0.316	0.0083	0.3227	0.10
N	17402	3617	17403	3617	2047	208	2047	208

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

Table A.17

*Summary of Private Rate of Returns (OLS/FE)*

	Male		Female	
	OLS	FE	OLS	FE
Years	.0476	0.009	.083	.0106
Primary	0.1216	0.004	0.22	-.027
Secondary	0.2124	-0.0132	0.3	-0.16
Tertiary	0.5437	0.1312	0.837	0.3970

Table A.18

*Estimates of Earnings Functions by Cohorts for Males, Years and Levels of Education (OLS)*

	15-20		21-30		31-40		41-50		51-65	
	Year	Level	Year	Level	Year	Level	Year	Level	Year	Level
Const.	.58	.64	4.62*	4.76*	3.47**	3.10***	5.22***	4.94***	3.56	1.92
Yrs	.011*		.035*		.051*		.057*		.069*	
Prim.		.0574		.036		.134*		.156*		.188*
Sec		.102*		.20*		.390*		.46*		.534*
Tert.		.028		.679*		.868*		.96*		1.25*
Age	.41**	.40***	.011	.006	.075	.1	.009	.02	.086	.142
Age Square	-.009	-.008	.0004	.0005*	-.0006	-.001	-.00	-.00	-.00	-.001
Urban	-.005	-.004	.148*	.152*	.24*	.246*	.28*	.30*	.286*	.30*
Punjab	-.009	-.014	.05**	.05**	.029	.034	-.04	-.036	-.00	.009
KPK	.026	.022	.07**	.07**	.06***	.055	.11*	.09**	.13***	.137*
Bal.	.222	.226*	.157*	.144*	.21*	.196*	.10*	.11*	.21***	.19*
R sq.	0.087	0.087	0.177	0.19	0.301	0.299	0.34	0.337	0.37	0.375
N	2274	2275	5262	5262	4243	4243	3419	3419	2204	2204

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

Table A.19

*Estimates of Earnings Functions by Cohorts for Females, Years and Levels of Education (OLS)*

	15-20		21-30		31-40		41-50		51-65	
	Year	Level	Year	Level	Year	Level	Year	Level	Year	Level
Const.	.58	.64	3.02	3.84	6.84	5.94	-10.3	-8.05	-3.7	-2.67
Yrs	.0108*		.069*		.097*		.122*		.142*	
Prim.		.057		.087		.173		.20		.359
Sec		.102*		.389*		.581*		.866*		1.05*
Tert.		.028		1.002*		1.65*		1.98*		2.50*
Age	.4***	.4***	.059	.003	-.187	-.136	.64	.549	.323	.293
Age Square	-.009	-.008	-.0001	.0008	.003	.002	-.006	-.005	-.003	-.003
Urban	-.005	-.004	.025	.089	-.018	.017	.138	.22***	-.047	-.07
Punjab	-.009	-.014	-.18**	-.146**	-.033	-.035	-.113	-.089	-.246*	-.288**
KPK	.026	.02	-.12	-.06	.005	-.018	-.166	-.157	.410	.459
Bal.	.22*	.22*	.32**	.46***	.24	.223	.110	.225	-.489**	-.545**
R sq.	0.087	0.087	0.30	0.295	0.355	0.374	0.494	0.494	0.5029	0.51
N	2274	2275	684	684	554	554	339	339	208	208

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

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