Can Education be a Path to Gender Equality in the Labour Market? An Update on Pakistan

Monazza Aslam[a] and Geeta Kingdon[b]

[a]Department of Economics, University of Oxford, UK; [b] Department of International and Lifelong Education, Institute of Education, University of London, UK.

Abstract

This paper investigates some of the economic outcomes of education in Pakistan with a view to understanding if education can act as a vehicle for labour market success. Data from a purpose-designed survey of more than 1000 households in Pakistan are utilised. Earnings functions are estimated for agricultural workers, the self employed and wage earners to estimate the returns to the 'quantity' and the 'quality' of schooling in different occupations, by gender. The paper also estimates the returns to knowing 'English' in the Pakistani labour market separately for men and women.

1. Introduction

Can education be a path to gender equality in the labour market? Pakistan has long been an international outlier in terms of the size of its gender gaps in education. Education can benefit individuals in the labour market by facilitating entry into higher-earning occupations and by raising earnings within them. It can also promote gender equality in the labour market if these two benefits of education accrue to women equally (or more than) to men. But the benefits of education depend on the quality of education. Much evidence shows that what is learned in school matters more than mere years of schooling for people's labour market success[1]. This paper asks whether and to what extent the quantity and quality of education act as vehicles to promote gender equality in the labour market. Aslam, Kingdon and Söderbom (2008) provided one of the first studies addressing this question for Pakistan. This paper updates their analysis to gain further insights into the relationships between education and skills on the one hand and labour market outcomes on the other.

Aslam, Kingdon and Söderbom (2008) addressed this question using the Pakistan Integrated Household Survey data from 1999. They found that, although for men education promotes entry into the more highly remunerative occupations along the range of education levels, for women it does so only beyond ten years of education. Moreover, while possession of cognitive skills facilitates both men's and women's entry into the more highly remunerated

---

[1] There is evidence that cognitive skills have economically large effects on individual earnings and on national growth. This literature is summarized in Hanushek (2005), who cites three U.S. studies showing quite consistently that a one standard deviation increase in mathematics test performance at the end of high school in the United States translates into 12 percent higher annual earnings. He also cites three studies from the United Kingdom and Canada showing strong productivity returns to both numeracy and literacy skills. Substantial returns to cognitive skills also hold across the developing countries for which studies have been carried out, i.e., in Ghana, Kenya, Tanzania, Morocco, Pakistan and South Africa. Hanushek and Zhang (2006) confirm significant economic returns to literacy for 13 countries on which literacy data were available. Other studies in Pakistan also find that cognitive skills have statistically significant pay-offs in the labour market (Behrman et al. 2002, Aslam, Kingdon and Söderbom, 2008 and Aslam, Bari and Kingdon 2010).

occupations, the effect of skills is generally larger for men than women. On the more positive side, however, the earnings increment from an extra year of education is substantially greater for women than men in all occupations except agriculture. As a result, the gender gap in earnings narrows sharply with education. The authors concluded that education *is* a pathway to gender equality in Pakistan's labour market because it reduces gender gaps in earnings. Nonetheless, only a small proportion of Pakistani women take advantage of the equality-promoting benefits of education.

The current study updates the analysis conducted by Aslam, Kingdon and Söderbom (2008) in several ways. Firstly, it is based almost entirely on latest data from Pakistan. Secondly, the availability of these data allows a more nuanced approach by, for example, estimating earnings equations for agricultural workers which are able to control for land size and capital stock.

It also extends previous work by analysing the differential returns to English language (rather than just numeracy and literacy). English retains importance in Pakistan as one of the 'official' languages and is widely used in the management of the affairs of the State, the language in which legislation is drafted and in which important policies and decisions are made. From an individual's perspective English is considered lucrative and necessary for improved economic prospects. Despite this a majority of the population lack even a basic knowledge of English. Its importance is partly reflected in the accelerating demand for so-called 'English-medium' private schools which have mushroomed in recent decades with even very poor parents willing to pay for schooling rather than send their children to free state schools (see Alderman, Orazem and Paterno 2001; Andrabi, Das and Khwaja 2002; and Aslam 2009a). Data limitations have meant that there has been no formal empirical assessment of the role English plays in determining economic outcomes for men and women in Pakistan. Use of purpose-designed data (RECOUP 2007, details later), allow an estimation of the economic returns to English-language skills across the different occupations in Pakistan.

This paper is structured as follows. Section 2 describes the data and presents some descriptive statistics to set the scene. Section 3 examines the education-occupational attainment relationship. Earnings functions are estimated in section 4 and section 5 concludes.

2. Data and Descriptive Statistics

Unless otherwise stated, the data used in this paper come from a household survey conducted in Pakistan between November 2006 and March 2007 which we shall call the RECOUP survey, collected as part of a larger five-year DFID-funded project. The purpose-designed household survey was administered to 1194 urban and rural households. Households were selected randomly through stratified sampling from 9 districts in two provinces – Punjab and Khyber Pakhtunkhwah (KP)[2]. The RECOUP (2007) survey collected rich information on previously unavailable variables. While the roster captured basic demographic, anthropometric, education and labour market status information on all resident household members in the sampled households (more than 8000 individuals), detailed individual-level questionnaires were administered only to those aged between 15 and 60 years. Some 4907

---

[2] KP was then called the North West Frontier Province (NWFP). The districts sampled in Punjab included: Rahimyar Khan, Khanewal, Sargodha, Kasur, Attock and Chakwal and Swat, Charsadda and Haripur were sampled from KP.

individual-level questionnaires were completed. These individuals were also administered tests of literacy, numeracy, health knowledge and English Language and the Ravens Progressive Matrices test (to assess innate ability).

The literacy and numeracy instruments were designed to capture 'basic order' skills and 'higher order' skills. Only if a person could answer three out of the total of five questions correctly in the short test was he/she given the 'long literacy test' which tested more advanced reading and comprehension skills. The numeracy test was also designed similarly. The scores of the short literacy and short maths tests are used as measures of basic literacy and numeracy.[3] The English Language skills test was structured as a set of three questions and tested ability to read and comprehend English in increasing difficulty levels.

Because we are interested in the effect of education on both earnings and occupational attainment, all individuals in the labour market are classified into one of six occupational categories: wage employment, self-employment, agricultural employment, unpaid family[4] workers, unemployment, and out of the labour force.[5] Unemployed individuals are those who seek employment and are available for it, while out of labour force (OLF) individuals are those who do not seek employment, such as housewives and the retired.

 - *Tables 1 and 2 about here* -

Table 1 shows the distribution of the labour force by gender and highlights the extent of gender asymmetry in Pakistan's labour market. Economic activity, as measured by the labour force participation rate, is extremely low for women—only 35 percent of working-age women participate in the labour market, compared with 92 percent of men. There is also a clear difference in the types of occupations men and women choose.

Table 2 summarizes statistics for the full sample and separately for men and women within each of the five occupation categories. It is clear that conditional on employment, men's earnings are substantially higher than women's. This is only partly explained by men being, on average, twice as likely to be literate and numerate and much better educated than women. Wage-working women are *more* educated than men and have the same levels of literacy and numeracy and, despite that, earn about three quarters of what men earn. There appears to have been a positive change over an eight year period in the Pakistani labour market. Aslam, Kingdon and Söderbom (2008) noted that wage-earning women earned half as much as men and were far less educated and had significantly lower skills compared to men. In 2007,

---

[3] The short maths test turned out not to be a very good measure of numeracy in our sample of wage earners (see Aslam, Bari and Kingdon 2010). However, it is a reasonable measure for the self employed and agriculture workers and is used to measure numeracy of persons in the sample. Estimates were also obtained using the 'total' score on the short and long literacy and numeracy tests but the results were often not significant suggesting that 'basic' order skills may determine outcomes more in the labour markets in Pakistan.

[4] This categorisation is slightly different from the Aslam, Kingdon and Söderbom (2008) study as here we classify unpaid workers in a separate category.

[5] Earnings information is available only for the following categories: wage employment, self-employment, and agricultural employment. Although earnings are available at the individual level for all three categories (unlike in the Aslam Kingdon and Söderbom , 2008 study), the analysis is based only on using household-level earnings for the self-employed and agricultural workers. Thus, while earnings functions can be estimated for individual wage employees, household-level functions are estimated for those in self-employment and agriculture (see Kingdon and Söderbom 2007a for further details).

wage-working women were *more* educated than men and had the same level of skills and the gender gap in wage earnings appears to have significantly closed over the 8 year period.

However, even in 2007 there were large differences in earnings across the three major occupations, particularly between wage employment and self-employment, on the one hand, and agriculture, on the other. Within each occupation, earnings differed sharply by gender; being much lower for women (figure 1). The gender gap in earnings is extremely high in both self-employment and wage employment. However, compared to the picture in 1999,the gender gap in earnings seems to have closed somewhat over the 8 year period.

 - Figure 1 about here -

3. Education and occupational attainment

This section examines the relationship between education and occupation for men and women. We distinguish between the young (aged 15-30) and the old (aged 31-60) in the graphical analysis. Because of space constraints only estimates for the young are discussed. Figure 2 illustrates the estimated association between years of education and the predicted likelihoods of occupational outcomes, for young men (panel A) and young women (panel B), evaluated at the sample mean values of the other explanatory variables in the model. These graphs are based on occupational outcomes modelled by means of a simple, parsimoniously specified multinomial logit (wage employment is the base category). The explanatory variables are education, skills and basic individual and family characteristics (age, marital status, number of young children in the household, and number of elderly people in the household), and province and regional dummies. Because education and skills are highly correlated, whenever education is included as an explanatory variable, the literacy and numeracy variables are excluded, and vice versa. All regressions are estimated separately for men and women[6]. For young men the likelihood of being employed for wages has a U-shaped relationship with education level. Until 6-8 years of education, the probability of being in wage work is low (and declines). The probability of engaging in wage work is higher at higher education levels. The likelihood of not working (unemployed) is mildly *increasing* with education. This could be because young men with more education are willing to wait for a good job opportunity before taking paid employment. Overall, education has an impact in determining occupational attainments of men.

 - Figure 2 about here -

For women the picture is very different. Panel B of figure 2 shows that women with up to eight years of education have high chances of not working. Among women with no schooling at all, about 60 percent are out of the labour force, and this increases to almost 80 percent for women with eight to ten years of education. After eight years of education, women's labour force participation becomes increasingly responsive to extra education. However, the only type of occupation they enter is wage employment. (Leaving the OLF state is mirrored exactly by joining wage employment for women in Figure 2). Otherwise, they report being 'unemployed' which suggests queuing in the labour market. The fact that occupational outcomes vary with education level so much for men and so little for women suggests the strong influence of culture, conservative attitudes, and gender division-of-labour norms in Pakistan. Only education beyond about eight to ten years begins to counter the effects of this

---

[6] Underlying regressions are available from the authors on request.

culture, but barely 19 percent of women are fortunate enough to have at least ten years of education. At present, then, education seems to have only limited potential to promote gender equality in the labour market

A static labour market?

Our assessment so far is based on 2006/2007 data, and it is of interest to know whether the role of education in promoting gender equality in the labour market has improved. In this section, a comparison is made using the Pakistan Integrated Household Survey (PIHS 1999-2000). This data set was collected following a two-stage sampling strategy, and provides a nationally representative sample made up of around 16,000 households, which represent roughly 115,000 observations.

To render the two datasets comparable, we limit the PIHS analysis only to Punjab and KP, and restrict analysis to individuals between ages 16 and 60. As before, we distinguish between the young (16–30 years old) and the old (31–60 years old) in the graphical analysis, although findings are reported for the young. Also, the number of occupational categories comparing RECOUP and PIHS is 5 rather than 6 because for the analysis in this section all unpaid workers in RECOUP data are coded as either working in agriculture or a non-farm self employment activity (depending on in which occupation they work as unpaid workers) rather than being classified as 'unpaid'. This is purely for comparison as the PIHS data does not distinguish the unpaid from the self-employed in agriculture.

 - Table 3 about here -

Table 3 presents comparative summary statistics for men and women in 1999 and 2007. It shows a large increase in women's economic activity—from 19 percent in 1999 to 35 percent in 2007. However, gender gaps in education and literacy levels are surprisingly persistent over this eight-year period. While both men and women are more educated now, *gains* in men's education were greater, so that the gender gap in years of education rose (from 2.69 years to 2.98 years). On the positive side, though, gender gaps in literacy have declined from 31 percent to 27 percent, since literacy rate improvement was greater among women than among men (a ten-point increase for women compared with only six points for men).

Figure 3 illustrates the estimated association between years of education and the predicted likelihood of occupational outcomes for young men in 1998/99 (panel A) and in 2006/07 (panel B), evaluated at the sample mean values of the other explanatory variables in the model. With some exceptions, the picture is quite similar between 1999 and 2007 for men. One conspicuous change though is that the probability that highly educated young men stay out of the labour force has increased from 0.48 to about 0.78 across this eight-year period. This suggests much greater levels of discouragement among the highly educated over the past decade, perhaps because of an increase in the supply of skilled workers unmatched by a corresponding increase in demand.

 - Figure 4 about here -

Figure 4 plots the likelihood of occupational attainment with respect to education for young women in 1999 (panel A) and 2007 (panel B). Some encouraging changes over time are: first, the labour force participation rate among non-educated women has increased over this eight-year period. Second, and more important, women's occupational status became more

responsive to education over time. Although in 1999 education beyond ten years was needed for women to increasingly participate in the labour market and then the rate at which education increased these chances was slow, by 2007 education beyond about eight years[7] begins to encourage participation in the labour force, and the rate has increased considerably. As a result, we find that the OLF and wage-employment curves cross each other at about 15 years of education in 2007, rather than at 18 years of education, as in 1999. Although in 1999 a woman with 15 years of education had a 22 percent chance of being wage employed, in 2007 a woman with the same education would have a 35 percent chance. At higher levels of education, up to 19 years, the escalation of employment opportunities between 1999 and 2007 is even more striking.

Overall, while a comparison across the eight-year period reveals a high degree of similarity in the education-occupation relationship between 1999 and 2007 for both men and women, there are some encouraging trends. There is a suggestion that in recent times, education is beginning to impact occupational outcomes of women from eight years onward (rather than from ten years onward, as in 1999) and to have a larger (steeper) impact on their chances of employment, even though wage employment continues to be the only acceptable occupation for women. Another positive change is that the proportion of women with ten years of education or more has risen over the eight-year period (from about 13 percent in 1999[8] to 19 percent in 2007). This suggests that a larger proportion of women can take advantage of the equality-promoting labour market benefits of education.

4. Education, Skills and Earnings

In this section we investigate how the wage increment from each extra year of women's education compares with that from men's education. This is done by estimating and comparing the marginal rate of return to education for men and women, using the Mincerian earnings function where the coefficient on years of schooling measures the rate of return to each additional year of schooling acquired. An equation of the following form is estimated:

$$LnY_i = \beta_0 + \beta_1 S_i + \beta_2 \mathbf{X}_i + \varepsilon_i \qquad (1)$$

So in (1), LnY_i is the natural log of annual earnings of individual i, S_i measures years of completed schooling (or literacy, numeracy or English language test scores), X_i is a vector of observed characteristics of individual i (such as age and its square) and ε_i is an individual-specific error term. In this specification, β_1 reflects a return to schooling, skills or English Language depending on whether S_i measures years of completed schooling or test scores.

While several authors have estimated returns to education in Pakistan (see Aslam 2009b for an annotated list of papers), the analysis is often constrained to the wage employment sector due to data limitations. However, as apparent in Tables 2 and 3, wage employment absorbs

---

[7] In 2007, 21.8 percent of women had more than eight years of education.
[8] The figures estimated only on the Punjab and KP sample of the PIHS (1999).

less than half of the total labour force and a very small proportion of women. The remaining half of the labour force are either employed in agriculture or self employed (or non-remunerated workers either because they are unpaid or unemployed). What are the returns to education in this major, remunerated, part of the labour market?[9]

In the empirical analysis, earnings regressions are based on data from three labour market sub-sectors, namely wage employment, self employment, and agriculture. Individual-level data on earnings (and other variables) are available for the wage employed. Earnings functions are estimated separately for men and women (except in agriculture as that is a male-dominated activity). Notably, self employment and agriculture are often 'household enterprises' in South Asia with several individuals within a family contributing their time and effort and sharing the resultant earnings. Often the oldest male in a family is reported as the 'primary' worker in a self-employment enterprise. It was therefore difficult to identify the main worker/decision-maker in the data. Therefore, while 'individual-level' earnings are available for the self employed and agricultural workers, earnings functions have actually been estimated at the household level, and household-level characteristics averaged for estimating Mincerian earnings for these activities. As a household may engage in more than one self-employment activity, each such activity in the sampled households is considered a single observation[10]. In order to identify the parameters in (1) the explanatory variables were aggregated so that they were defined at the same level of aggregation as the dependent variable. For the earnings variable, income was averaged over the number of family workers. Similarly, mean values were calculated for the other explanatory variables (age and education) within household. Variables of equation (1) can be reinterpreted as: LnY_i is the natural log of average annual earnings per person of the unpaid family labour and main self-employed in observation i, S_i measures their average years of completed schooling, X_i is a vector of observed characteristics in observation i and ε_i is an observation-specific error term. β_1 now reflects the marginal return to average years of schooling. Cognitive skills are also averaged across the members of the household and in effect the returns to skills are the returns to the 'average' skills of persons engaged in a certain activity within a household.

Because the primary objective in this section is to estimate the total returns to education, we do not condition on variables that are determined by education, as this could change the interpretation of the schooling effects. For example, it is likely that an important effect of education is to enable individuals to get high-wage jobs (e.g. managerial positions), get into certain high-wage sectors or firms, or to generate job security and thus work experience. Consequently, we do not condition on occupation, firm-level variables, or other variables sometimes seen on the right-hand side in earnings regressions. Instead, we restrict ourselves to a small set of control variables, where age and gender are those emphasized the most. Moreover, we recognize that the sub-sample analysis of 'wage-earners' is prone to self-selection problems especially for women. For instance, more educated and motivated women may do wage jobs and the estimated returns on these women may be biased as a result. The Heckman-selection model is often used in the literature to address such problems. Because of space constraints these models are not presented. We recognize, however, that the estimated returns to schooling may be upwardly biased as a result.

---

[9] While in common with the literature we use the term "returns to education," strictly speaking the coefficient on the Mincerian earnings function is simply the gross earnings premium from an extra year of education and is not the "return" to education, since it does not take the cost of education into account.

[10] It is important to note that about 8 percent of households report more than one self-employment activity in the data. In some of these households, unpaid labour may be working in more than one of these. So a small amount of incorrect assignment of self-employment to unpaid family workers could not be avoided.

- *Table 4 about here* –

Table 4 presents ordinary least squares estimates of the economic returns to education in Pakistan, by occupation and gender[11]. Returns to education are significantly and substantially greater for women than men in both occupations where a gender-differentiated estimation is possible. Within any given occupation, the increase in women's earnings with respect to education is much greater than the increase for men. This could reflect the scarcity of educated women combined with the existence of jobs that require (or that are largely reserved for) educated women, such as nursing and primary school teaching The reasons for higher earnings premium for women in self-employment are less clear. These findings mirror the evidence found by Aslam, Kingdon and Söderbom (2008) using PIHS data from 1999.

- *Table 5 and 6 about here* -

Next we turn to earnings equations where education is replaced by our measures of cognitive skills. Table 5A estimates different models varying from including education and all the skills together to estimating the direct return of an individual skills test (such as literacy etc.) in an earnings equation. Because literacy, numeracy, English and years of schooling are so highly correlated, we discuss the 'direct' returns reported in columns (e), (f) and (g). The key finding is that the returns to all skills are dramatically larger for women than men, among both wage earners and the self employed. This finding mirrors the fact that returns to additional years of education are also substantially higher for women than men and corroborates previous evidence from Pakistan (Aslam, Kingdon and Söderbom 2008) where the returns to literacy among women using PIHS data from 1999 were more than six times as high as those for men in wage employment and about three times as high in self-employment. The change over time in the magnitude of returns to numeracy could reflect a changing nature of the labour market with an increase in self employment opportunities (and a consequent scarcity premium) for women with better numeracy skills.

Table 6 captures the magnitude of the effect of education and skills on earnings by computing the effect on earnings of an increase in schooling or skills by one standard deviation. There are some very interesting findings. Firstly, men and women are rewarded highly for being schooled, literate, and numerate and for possessing English Language skills in the Pakistani labour market. Secondly, the rewards to wage working and self-employed women are consistently higher than to men from both schooling and cognitive skills. Thirdly, among wage earners, for both men and women in Pakistan, highest rewards accrue from schooling, followed closely by literacy for both genders. Fourthly, among self-employed men, there are returns only to being literate and knowing English. Among women, however, there are large returns to all skills and schooling. Finally, a standard deviation increase in English Language skills increases wage-working women's earnings by 32 per cent (and as much as 43 per cent if they are self employed) and men's earnings by far less but by a substantial 13 per cent (12 per cent if they are self employed).

---

[11] While only OLS estimates are reported here, where possible, household fixed effects, Instrumental Variable estimation and Heckman correction models were estimated for underling earnings functions to address issues of sample selectivity and endogeneity biases. These are not reported in detail as the estimates show identical gender patterns on estimated returns to education/skills compared to the OLS results.

In sum, women's schooling, literacy, numeracy and English language skills are very highly rewarded in wage work and in self-employment. While there are no returns to literacy skills in self-employment for men, the effects on women's potential earnings are large. This suggests that the kinds of self-employment activities women engage in are not traditional. The fact that returns to education and to cognitive skills are substantially larger for women than men presents the cheering scenario that education can be a path to gender equality in the labour market. It also suggests that there are really strong economic incentives for investment in girls' schooling, which ought to lead to gender equality in education or, if anything, to *pro-female* gender gaps in education, rather than what we actually observe—large pro-male gaps. This raises a puzzle as to why women have low levels of education when the economic incentives for educating them are so much stronger than for educating men. One potential explanation is that the returns *accruing to parents* from a daughter's education are lower than those from a son's education. An alternative explanation is that while the return to each extra year of education and to cognitive skills may be much higher for women than men, the *total* labour market return from employment is much lower for women than for men since overall, employed women earn far less money than employed men. This is clear from the graph of predicted earnings for wage employees in figure 5. Although the slope of the education-earnings relationship is three times as steep for women as for men, the intercept of the wage regression is much higher for men; men enjoy earnings premiums at all levels of education. Aslam (2009b) shows that a large part of the gender gap in earnings is due to potential discrimination in the labour market and is not explained by differences in men's and women's productivity endowments, such as education and experience.

- Figure 5 about here -

The gender gap in earnings is widest among workers with no education and narrows as completed years of education increase, as seen in figure 5. This suggests that education *is* a pathway to reducing gender inequalities in Pakistan's labour market, because the gender gaps in earnings are substantially smaller among those with higher levels of education. Thus, education has mixed success as a vehicle to promote gender equality in the labour market. While women's occupational attainment is relatively invariant to education (except beyond eight years of schooling), limiting the extent to which education can mitigate gender inequalities, education does reduce gender gaps in earnings among those who are employed and thus plays a vital role in attenuating gender inequalities in labour market earnings. Aslam, Kindon and Söderbom (2008) noted a similar finding using older data. However, there are some positive changes over the 8 year period. In particular, we note that the *gap* in earnings between men and women (as measured by the intercept term) appears to have declined over the 8 year period. Also, while Aslam, Kingdon and Söderbom found that the gap in earnings was eliminated at about 14 years of schooling (equivalent to a Bachelors degree) in 1999, the 2007 data shows that earning gaps are reduced at about 12 years of schooling (Higher Secondary) in 2007. This narrowing of the gap at lower levels of schooling is a positive change over the 8 year period[12].

5. Conclusion

---

[12] Some caution is needed in interpreting these results because the Aslam, Kingdon and Söderbom (2008) graph (Figure 7) which is being compared to Figure 5 of this study compares wage earners and distinguishes between the 'young' and the 'old' by gender. Figure 5 looks only at wage earners aged 25 to 60.

In this paper we have used RECOUP household data from Pakistan to investigate the relationship between education/skills and labour market outcomes for men and women. We find firstly that women's education increases their chances of being in the labour force only beyond about eight years of schooling; with less education, women's probability of labour-force participation does not change with additional schooling. Thus, if education is to enable Pakistani women to take advantage of the opportunities offered by the labour market, it has to be more than eight years of schooling, and the greater the level of schooling beyond eight, the higher the chances of women's labour force participation. However, this finding provides hope to women as the study by Aslam, Kingdon and Söderbom (2008) using data from 1999 found that only women with 10 years of schooling were able to take advantage of the opportunities offered by the labour market, suggesting a positive change over the 1999-2007 period.

Secondly, we find that education and skills both improve occupational attainment, with more educated persons having greater access to the better-paid occupations. The *type* of skills that promote entry into the well-paying occupations differ by gender; possessing English Language and numeracy skills increases chances of waged-work entry for women while possessing numeracy skills improves men's chances of entering self-employment.

Thirdly, we find that education and skills both raise labour-market earnings in employment but the extent to which they boost earnings is significantly greater for women than for men. This is particularly true for literacy and English Language skills for women. This suggests that education and skills are powerful tools for achieving greater gender equality in economic outcomes, since the market rewards women's education and skills at a higher rate than men's. Nevertheless, whilst this is so, the absolute level of mean earnings in all major occupations is very substantially greater for men than women. Thus, although the return to additional education is higher, the total return to employment is lower for women than men. This finding is of particular concern as it mirrors the earlier results using data from 1999 (Aslam, Kingdon and Söderbom (2008)). There appear to be some positive changes over the period including a reduction in the gap in earnings and the elimination of the gender gap at 12 rather than 14 years of schooling. However, the fact that there are still large gaps in earnings, particularly at lower levels, reflects persistent gender differentiation in Pakistan's labour market.

References

Alderman, H., P. F. Orazem, and E. M. Paterno. 2001. "School Quality, School Cost, and the Public/Private School Choices of Low-Income Households in Pakistan." *The Journal of Human Resources* 36 (2): 304–326.

Andrabi, T., J. Das, and A. Khwaja. 2002. "The Rise of Private Schooling in Pakistan: Catering to the Urban Elite or Educating the Rural Poor?" Background Paper for the *Pakistan Poverty Assessment*. World Bank, Washington, D.C.

Aslam, M. 2009a. 'The Relative Effectiveness of Government and Private Schools in Pakistan: Are Girls Worse Off?" *Education Economics*, 17 (3), pp. 329-353.

———. 2009b. "Education Gender Gaps in Pakistan: Is the Labour Market to Blame?" *Economic Development and Cultural Change*, 57 (4), pp. Pp. 747-784.

Aslam, M., F. Bari and G. Kingdon (2010), "Returns to Schooling, Ability and Cognitive Skills in Pakistan", *Education Economics* (forthcoming).

Aslam, M., De. A., Kingdon, G. and Kumar, R. (2010), "Economic Returns to Schooling and Skills: An Analysis of India and Pakistan", University of Oxford (Mimeo).

Aslam, M., Kingdon, G. and Söderbom, M. (2008), "Is Education a Path to Gender Equality in the Labour Market? Evidence from Pakistan", in Tembon, M. and L. Fort (eds.) Educating Girls for the 21st Century: Gender Equality, Empowerment and Economic Growth, 2008. Washington D.C: The World Bank.

Aslam, M., and G. G. Kingdon. 2008. "Gender and Household Education Expenditure in Pakistan." *Applied Economics*, 40 (2), pp. 2573-2591.

Behrman, J., D. Ross, and R. Sabot. 2002. "Improving the Quality Versus Increasing the Quantity of Schooling: Evidence from Rural Pakistan." University of Pennsylvania (Mimeo).

Hanushek, Eric A. 2005. "The Economics of School Quality." *German Economic Review* 6 (3): 269–286.

Hanushek, Eric A., and Lei Zhang. 2006. *Quality Consistent Estimates of International Returns to Skill*. NBER Working Paper 12664. Cambridge, Mass.: National Bureau of Economic Research.

Kingdon, G. G., and M. Söderbom. 2007a. "Education, Skills and Labour Market Outcomes: Evidence from Pakistan." Background Paper prepared fpr "Linkin Education Policy to Labour Market Outcomes" Forthcoming in HDNED Working Paper Series).

———. 2007b. "Education, Skills and Labour Market Outcomes: Evidence from Ghana." Evidence from Pakistan." Background Paper prepared fpr "Linkin Education Policy to Labour Market Outcomes" Forthcoming in HDNED Working Paper Series).

Tables

Table 1. Employment and education characteristics of persons age 15–60 who are not enrolled in school in Pakistan, by gender, 2007 (RECOUP)

	All	**Male**	**Female**
PAKISTAN			
Out of the Labour Force	39	8	65
In the Labour Force	61	92	35
Among those in the LF:			
Unemployed	13	7	31
Unpaid Family Worker	18	12	34
Agriculture	8	11	0.3
Self Employed	20	22	15
Wage Worker	41	48	20

Note: Earnings measured in 2006/07 Pakistani rupees. Sampling weights are used for these calculations.
Source: RECOUP (2006-2007).

Table 2. Employment and education characteristics of persons age 15–60 who are not enrolled in school in Pakistan, by gender and occupational status, 2007 (RECOUP)

	All		Out of Lab. Force		Unemployed		Unpaid Workers		Agriculture		Self Employed		Wage Workers	
	M	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
PAKISTAN														
Annual Earnings (Mean)	65450	40534	-	-	-	-	-	-	53917	-	73078	30501	64424	49004
Annual Earnings (Median)	54000	24000	-	-	-	-	-	-	42000	-	60000	18000	54000	31200
Years of education	6.4	3.4	5.6	3.2	7.3	4.2	6.1	1.2	4.8	-	6.5	4.0	6.7	7.2
Smaths	3.9	3.3	3.9	3.2	4.2	3.6	3.7	3.1	3.6	-	4.2	3.5	4.0	4.0
Sliteracy	2.9	1.5	2.8	1.4	3.5	1.8	2.8	0.6	2.2	-	3.1	1.8	2.8	2.6
English	6.7	3.0	5.8	2.7	9.1	4.1	6.5	1.0	4.8	-	7.2	3.7	7.0	8.0

Observations	1895	2065	146	1418	116	198	212	218	204	2	380	100	837	129
Earnings Observations	1308	222	0	0	0	0	0	0	168	2	359	99	781	121

Note: Data are means unless otherwise noted. Earnings are measured in 2006/2007 Pakistan rupees. Smaths denotes test score in short maths test (max=5), Sliteracy denotes test score in short literacy test (max=5), English denotes test score in English Language test (max=19);
Source: RECOUP (2006-2007).

Table 3. Employment and education characteristics of persons age 16–60 who are not enrolled in school in Punjab and North West Frontier Province, by gender, 1999 (PIHS) and 2007 (RECOUP)

	Men		*Women*	
Variable	*1999*	*2007*	*1999*	*2007*
Labour force participation (%)	89	92	19	35
Years of education	4.89	6.41	2.20	3.43
Literate (%)	58	64	27	37
Married (%)	64	64	73	72

Note: Sampling weights are used for 1999 calculations. "Literate" is a dummy variable measuring whether individuals can read or write (1999 data) and whether individuals achieved a score of 1 or more in a short test of literacy administered to each individual.
Source: Author's calculations based on PIHS data from 1998-1999 and RECOUP 20006-2007.

.

Table 4. Effect of age and education on earnings, by employment status and gender (RECOUP)

	Wage employment		**Self –employment**		**Agricultural employment**	
Education	*Men*	*Women*	*Men*	*Women*	*Men*	*Women*
Education	0.039	0.084	0.004	0.084	0.069	-
	(8.56)***	(4.30)***	(0.21)	(2.84)***	(2.33)**	
Age	0.085	0.076	0.087	0.114	0.003	-
	(6.79)***	(1.09)	(2.50)**	(1.26)	(0.04)	
Age squared	-0.001	-0.001	-0.001	-0.002	-0.0001	-
	(-5.74)***	(-0.73)	(-2.58)***	(-1.23)	(-0.07)	
No. of individuals	768	117	295	61	166	-
R^2	0.319	0.443	0.177	0.345	0.060	

[+] significant at 10 percent level; [*] significant at 5 percent level; [**] significant at 1 percent level.
Note: Controls include: age, age2, Punjab, Urban (except in Agriculture); the self employment regressions include (average) household capital stock and agricultural regression also contains area of agricultural land owned by household. The estimation method is ordinary least squares.

Table 5A. Effect of skills on earnings, by gender: Wage workers (RECOUP)

Male

	(a)	(b)	(c)	(d)	(e)	(f)	(g)
Education	0.053 (4.94)***	-	-	0.056 (6.70)***	-	**-**	-
Smaths	-0.008 (-0.31)	0.031 (1.29)	0.033 (1.37)	-	-	0.094 (5.52)***	-
Sliteracy	0.016 (0.82)	0.055 (3.03)***	0.059 (3.74)***	-	-	-	0.074 (6.71)***
English	-0.011 (-2.03)**	0.002 (0.40)	-	-0.010 (-1.86)*	0.017 (4.88)***	-	-
# Individuals	**514**	**514**	**515**	**524**	**514**	**515**	**515**
R^2	0.203	0.163	0.100	0.202	0.134	0.138	0.161

Female

	(a)	(b)	(c)	(d)	(e)	(f)	(g)
Education	0.135 (2.33)**	-	-	0.184 (3.86)***	-	-	-
Smaths	0.043 (0.26)	0.097 (0.58)	-0.017 (-0.10)	-	-	0.334 (3.05)***	-
Sliteracy	0.134 (1.36)	0.266 (2.91)***	0.220 (2.64)***	-	-	-	0.213 (4.28)***
English	-0.094 (-2.79)***	-0.037 (-1.55)	-	-0.091 (-2.45)***	0.041 (2.50)**	-	-
# Individuals	**114**	**114**	**114**	**114**	**114**	**114**	**114**
R^2	0.217	0.132	0.153	0.204	0.040	0.062	0.090

All

Note: Robust t-statistics are in parentheses. * denotes significance at 10% level, ** significance at 5% level and *** significance at 1% level or more; Controls include: age, age2, Punjab and Urban; Smaths denotes test score in short maths test (max=5), Sliteracy denotes test score in short literacy test (max=5), English denotes test score in English Language test (max=19); Controls include: age, age2, Punjab and Urban; The estimation method is OLS; The mean and standard deviation of education and tests for wage earning **men** are as follows: years of schooling, educ (mean, sd): (6.74, 4.69), test (mean, sd): Smaths (3.96,1.45), Sliteracy (2.83,2.28), English (6.97,7.68) and for wage earning **women**: years of schooling, educ: (mean, sd): (7.24, 6.16), Smaths (4.04,1.07), Sliteracy (2.63,2.27), English (8.02,7.87).

Table 5B. Effect of skills on earnings, by gender: Self employed (RECOUP)

Male

	(a)	(b)	(c)	(d)	(e)	(f)	(g)
Education	-0.042 (-1.20)	-	-	-0.026 (-1.05)	-	**-**	-
Smaths	-0.002 (-0.03)	-0.021 (-0.38)	-0.013 (-0.23)	-	-	0.043 (1.09)	-
Sliteracy	0.051 (0.98)	0.019 (0.42)	0.051 (1.54)	-	-	-	0.046 (1.98)**
English	0.024 (1.73)*	0.015 (1.13)	-	0.028 (2.17)**	0.017 (2.19)**	-	-
# Individuals	**280**	**280**	**280**	**280**	**280**	**280**	**280**
R^2	0.063	0.060	0.052	0.060	0.056	0.050	

Female

	(a)	(b)	(c)	(d)	(e)	(f)	(g)
Education	0.113 (1.77)*	-	-	0.132 (2.65)***	-	-	-
Smaths	-0.062 (-0.29)	-0.046 (-0.23)	0.047 (0.27)	-	-	0.336 (2.31)**	-
Sliteracy	0.056 (0.56)	0.159 (1.96)**	0.191 (2.28)*	-	-	-	0.210 (3.31)***
English	-0.013 (-0.29)	0.037 (0.89)	-	-0.020 (-0.47)	0.070 (2.36)**	-	-
# Individuals	**64**	**64**	**64**	**64**	**64**	**64**	**64**
R^2	**0.233**	**0.206**	**0.191**	**0.230**	**0.163**	**0.133**	**0.192**

Note: Robust t-statistics are in parentheses. * denotes significance at 10% level, ** significance at 5% level and *** significance at 1% level or more; Controls include: age, age2, Punjab and Urban; Smaths denotes test score in short maths test (max=5), Sliteracy denotes test score in short literacy test (max=5), English denotes test score in English Language test (max=19); Controls include: age, age2, Punjab and Urban; The estimation method is OLS; The mean and standard deviation of education and tests for self employed **men** are as follows: years of schooling, educ (mean, sd): (6.51, 4.16), test (mean, sd): Smaths (4.15, 1.34), Sliteracy (3.07, 2.20), English (7.13, 7.19) and for self employed **women**: years of schooling, educ: (mean, sd): (4.13, 4.87), Smaths (3.52, 1.02), Sliteracy (1.81, 2.09), English (3.76,6.15).

Table 5C. Effect of skills on earnings: Agricultural workers (RECOUP)

| | Male | | | | | | |
	(a)	(b)	(c)	(d)	(e)	(f)	(g)
Education	0.019	-	-	0.040	-	**-**	-
	(0.34)			(0.99)			
Smaths	0.026	0.036	0.038	-	-	0.101	-
	(0.21)	(0.32)	(0.34)			(1.14)	
Sliteracy	0.053	0.067	0.078	-	-	-	0.094
	(0.69)	(0.98)	(1.05)				(1.60)
English	0.002	0.010	-	0.010	0.024	-	-
	(0.01)	(0.20)		(0.25)	(1.04)		
# Individuals	**154**	**154**	**154**	**154**	**154**	**154**	**154**
R^2	0.064	0.063	0.063	0.062	0.060	0.060	0.062

Note: Robust t-statistics are in parentheses. * denotes significance at 10% level, ** significance at 5% level and *** significance at 1% level or more; Controls include: age, age2 and Punjab; Smaths denotes test score in short maths test (max=5), Sliteracy denotes test score in short literacy test (max=5), English denotes test score in English Language test (max=19); Controls include: age, age2 and Punjab; The estimation method is OLS; The mean and standard deviation of education and tests for **men** in agriculture are as follows: years of schooling, educ (mean, sd): (4.85, 4,35), test (mean, sd): Smaths (3.59, 1.56), Sliteracy (2.21, 2.19), English (4.84, 6.91)

Table 6- Effect of Schooling, Literacy and English on earnings of wage workers and the self employed, by gender (RECOUP)

	Male	Female
Wage Workers		
1 SD increase in **schooling**	18	52
1 SD increase in **maths**	14	36
1 SD increase in **Literacy**	17	48
1 SD increase **English**	13	32
Self Employed		
1 SD increase in **schooling**	-	41
1 SD increase in **maths**	-	34
1 SD increase in **Literacy**	10	44
1 SD increase **English**	12	43

Note: Only significant coefficients from Tables 5A and 5B reported. Nothing reported for agricultural workers as no coefficients significant in Table 5C.
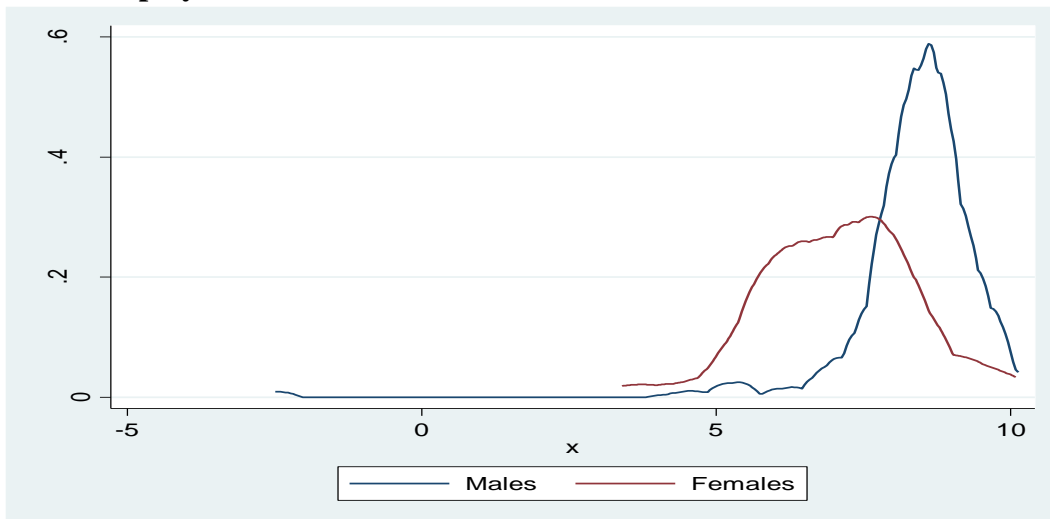
Figures

Figure 1. Kernel densities of log earnings, by employment status and gender (RECOUP)
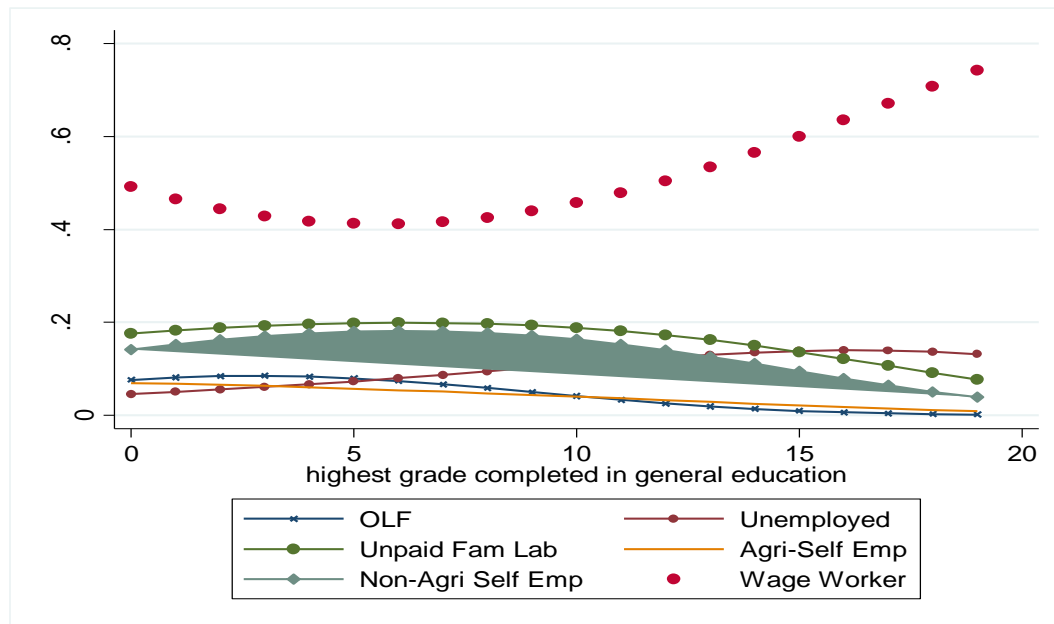
A. Wage employment
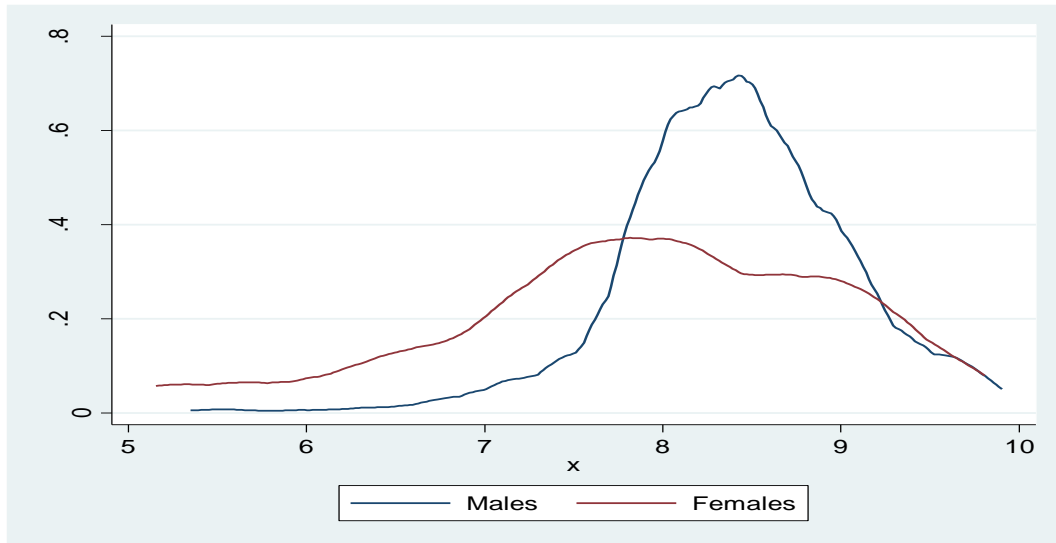
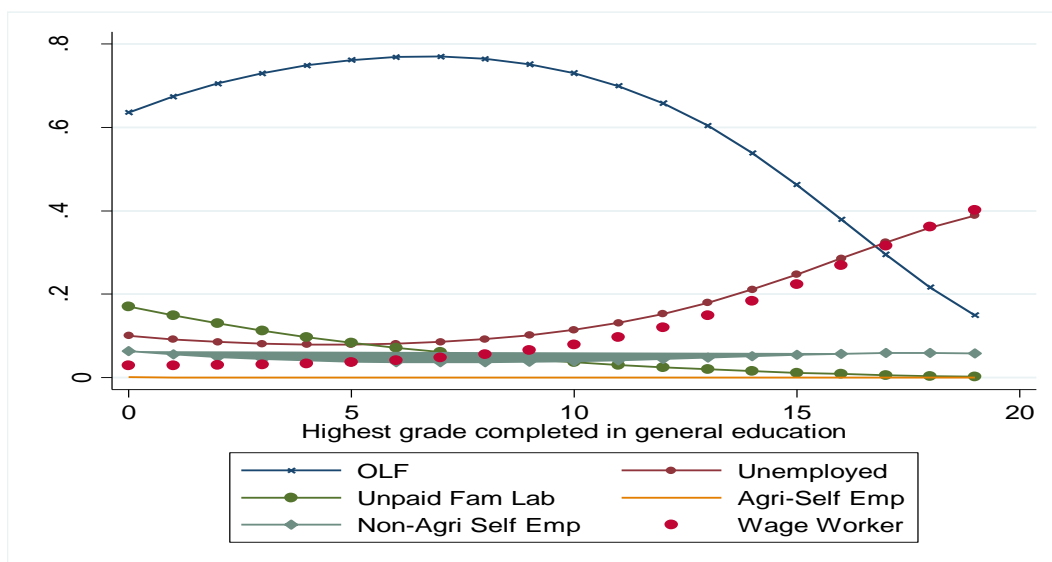### B. Self-employment

Figure 2. Estimated probability of occupation and education for young men and women in Pakistan (RECOUP)
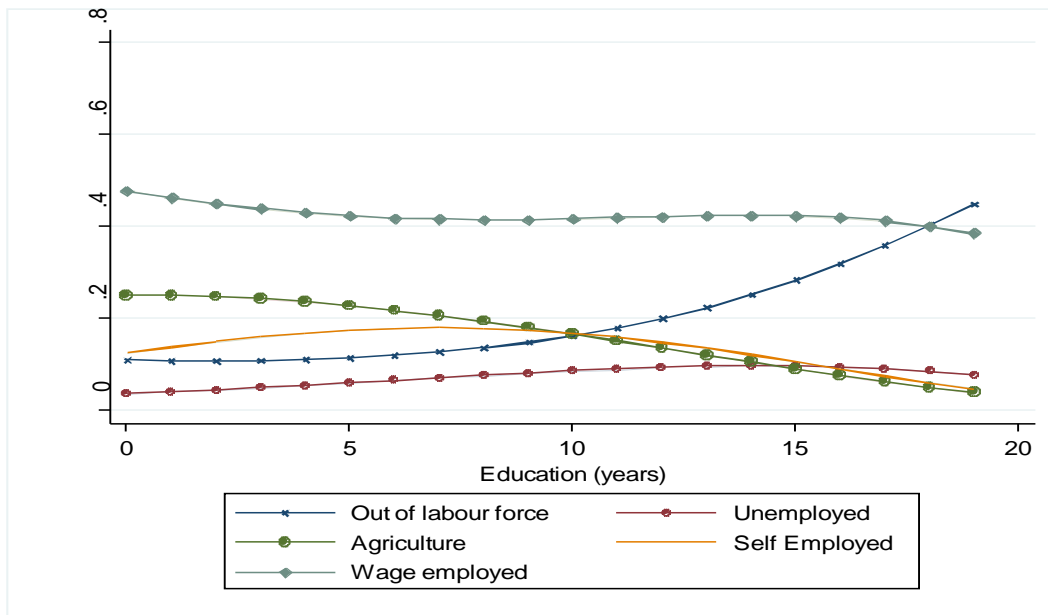
   A. Young men

B. Young women

Source: Based on multinomial logits not reported here but available from the authors on request.
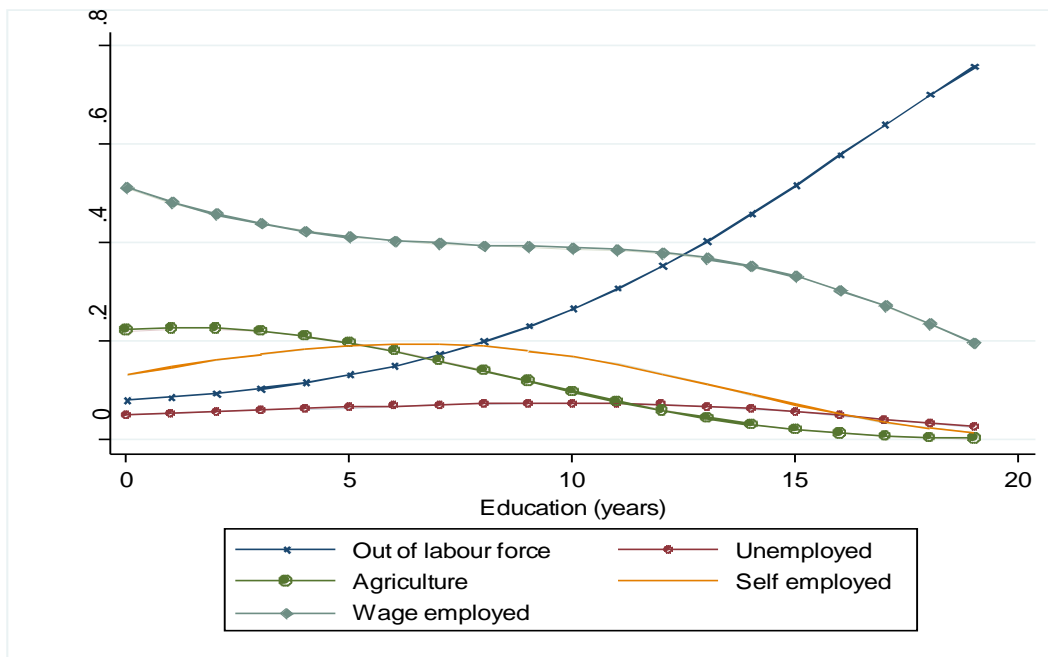
Figure 3. Estimated probability of occupation and education for young men, 1999 (PIHS) and 2007 (RECOUP)
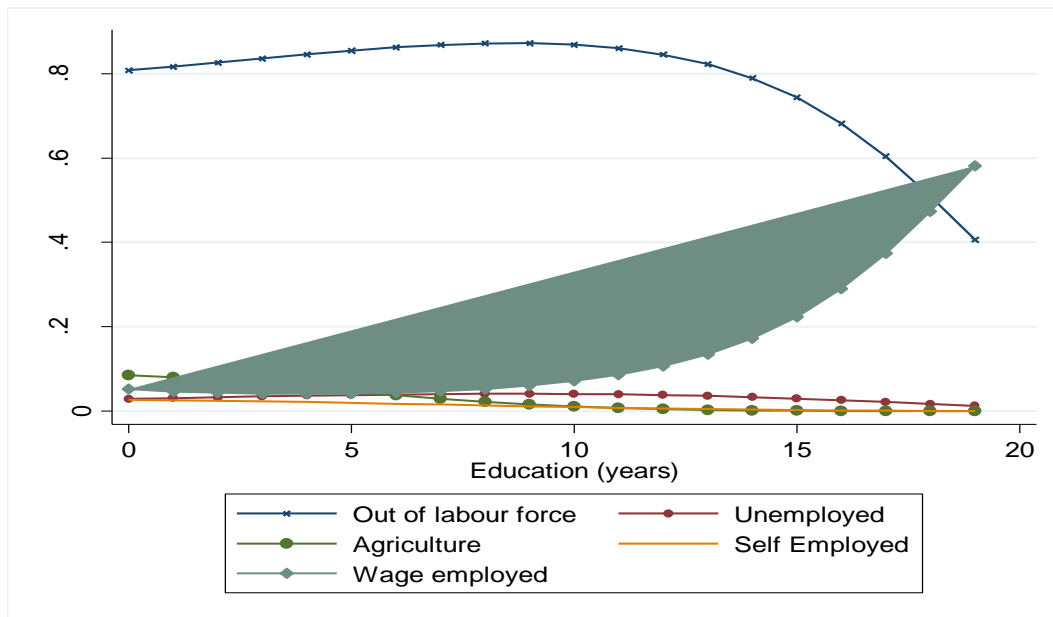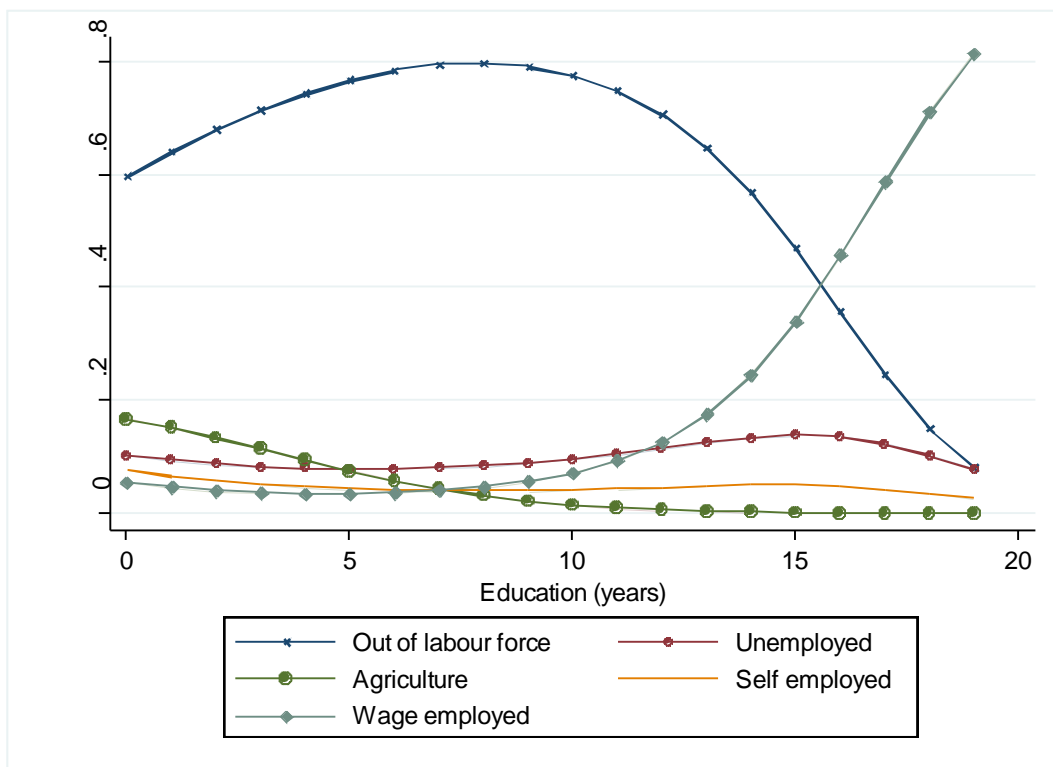**A. 1999**

B. 2007

Source: Based on the multinomial logits available from the authors.

Figure 4: Estimated probability of occupation and education for young women, 1999 (PIHS)and 2007 (RECOUP)
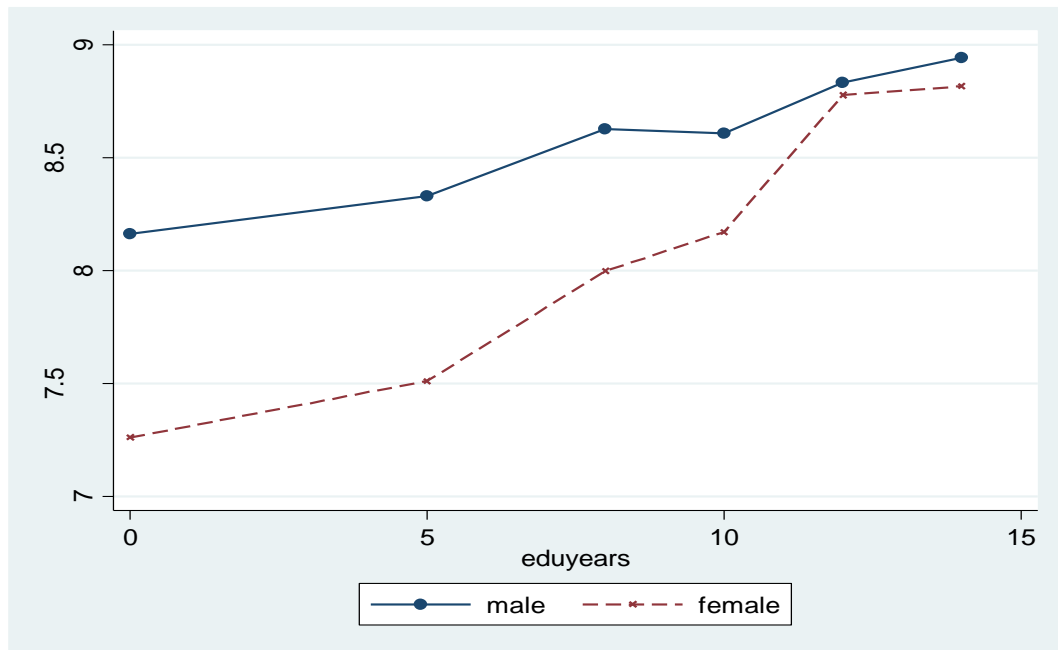
A. 1999

B. 2007

Source: Based on the multinomial logits available from the authors.

Figure 5. Predicted earnings and level of education for wage employment (RECOUP)

RECOUP Pakistan - Wage earners aged 25 and over

Source: Based on the results reported in table 5.