

3. Education, skills, and labor market outcomes

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Can education be a path to gender equality in the labor market? The labor market benefits of education accrue both by increasing a person's knowledge and skills needed for entry into the more lucrative occupations and by raising a person's earnings within any given occupation. For education to promote gender equality, however, it must benefit women equally if not more than men, given the history of discrimination against women and girls in schooling. We examine the case of Pakistan, where discrimination has been especially rampant, to gain insights into the relationships between education and labor market outcomes for women.

Pakistan has long been an international outlier in gender gaps in education. Girls lag behind boys in education access, in the quality of schooling available, and in the outcomes of education. Far from narrowing over time, the gender gap in primary enrollment rose by 30 percentage points between 1985 and 1995, superseding even Afghanistan where the corresponding gap rose by 18 percentage points over the same period (computed from Conly 2004). Although Pakistan's gender gap in gross primary enrollment fell from 27 percent to 24 percent between 2000 and 2005),¹ it remains stubbornly high. This persistence of gender inequality in access to schooling jeopardizes achievement of the Millennium Development Goals for education in Pakistan.

Given the magnitude of education disparities, it is unsurprising to find stark gender differences in adult labor market outcomes, too: Pakistani women lag far behind men in labor force participation, are concentrated in a much narrower set of occupations, perform mostly unskilled jobs, and have substantially lower earnings in employment than men, as we will show later. Low education levels trigger a vicious cycle, wherein poorly educated women are left ill-equipped to obtain well-paid jobs and this, in turn, reduces incentives for parents to invest in girls' schooling.

What can be done to reverse this trend? Education can benefit individuals in the labor market by facilitating entry into higher-earning occupations and by raising earnings within an occupation. It can also promote gender equality in the labor 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. There is now almost universal agreement that what is learned in school matters as much as, if not more than, the years of schooling acquired.² The objective of this study is achieved, therefore, by investigating whether education and the quality of education (as measured by cognitive skills) act as vehicles of labor market success of both men and women.

We find 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. This is because women's labor force participation increases with education 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 occupations, the effect of skills is generally larger for men than women. On the more positive side, however, the economic returns to education and skills (the earnings increment from an extra year of education) are substantially greater for women than men in all occupations except agriculture. As a result, the gender gap in earnings narrows sharply with education. Thus, we conclude that education

is a pathway to gender equality in Pakistan's labor 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. This is because only 17 percent of women participate in the labor force and only 10 percent have ten or more years of education, the level above which women's chances of wage employment increase with education. We also examine whether and how much the education-labor market relationship (by gender) has changed over an eight-year period from 1999 to 2007. Our findings show that education continues to have a limited impact on women's occupational choices in the labor market, though it has a slightly bigger role in 2007 than it did in 1999.

Examining the education-occupation relationship in Pakistan

Unless otherwise stated, the data used in this chapter come from the third round of the Pakistan Integrated Household Survey (PIHS) conducted in 1998–1999. Following a two-stage sampling strategy, the PIHS provides a nationally representative sample made up of around 16,000 households, which represent roughly 115,000 observations. The household questionnaire is composed of a number of detailed modules on such characteristics as income, education, health, maternity and family planning, consumption and expenses, housing conditions, and available services. In addition, there are modules that concentrate on household enterprises and agricultural activities—including associated expenses and revenues. Unless otherwise stated, the sample used throughout this study consists of individuals between 16 and 70 years old and not currently in school.

Because we are interested in the effect of education on both earnings and occupational attainment, all individuals in the labor market are classified into one of five occupational categories: wage employment, self-employment, agricultural employment, unemployment, and out of the labor force.³ Unemployed individuals are those who seek employment and are available for it, while out of labor force (OLF) individuals are those who do not seek employment, such as housewives and the retired.

The cognitive skills variable is based on a self-reported measure of whether the respondent can read and write (literacy) and do simple sums (numeracy). The link between skills and labor market outcomes among the relatively young deserves special policy attention. Accordingly, in most cases, we analyze labor market outcomes for the young age group (16- to 30-year-olds) separately from that for the old age group (31- to 70-year-olds). However, because of space constraints, not all findings for the old are shown.

Table 3.1 shows summary statistics for selected variables highlighting the extent of gender asymmetry in Pakistan's labor market. Economic activity, as measured by the labor force participation rate, is extremely low for women—only 17 percent of working-age women participate in the labor market, compared with 87 percent of men. Conditional on employment, men's earnings are substantially higher than women's. This is partly explained by men being, on average, twice as likely to be literate and numerate and much better educated than women.

Table 3.1. Employment and education characteristics of persons age 16–70 who are not enrolled in school in Pakistan, by gender, 1999

<i>Variable</i>	<i>All</i>	<i>Men</i>	<i>Women</i>
Labor force participation	49	87	17

(percentage)			
Annual earnings (Mean)	30, 277	34,338	13,327
Median)	24,125	29,573	7,775
Years of education	3.35	4.85	2.07
Maths skills (percentage)	61	75	49
Reading and writing skills (percentage)	40	57	25
Married (percentage)	70	67	73

Note: Earnings measured in 1998/99 Pakistani rupees. Sampling weights are used for these calculations.

Source: PIHS (1989-1999).

Table 3.2 summarizes statistics for the full sample and separately for men and women within each of the five occupation categories. Occupational attainment clearly differs much by gender. Among the 17 percent of women who participate in the labor force, roughly the same proportions work in agriculture (8 percent) as in wage employment (6 percent). Only 1 percent are self-employed. Men, in contrast, are concentrated in the relatively more lucrative wage employment sector (47 percent), followed by agriculture (23 percent), and self-employment (14 percent).

Table 3.2. Employment and education characteristics of persons age 16–70 who are not enrolled in school in Pakistan, by gender and occupational status, 1999

	<i>All</i>		<i>Self-employment</i>		<i>Agricultural employment</i>		<i>Wage employment</i>		
	<i>Men</i>	<i>Women</i>	<i>Men</i>	<i>Women</i>	<i>Men</i>	<i>Women</i>	<i>Men</i>	<i>Women</i>	
Annual earnings									
Mean	34,338	13,327	40,697	9,175	24,037	12,514	38,318	15,849	
Median	29,573	7,775	30,444	6,137	14,400	7,788	34,800	9,000	
Log earnings									
Mean	10.02	8.77	10.17	8.27	9.47	8.87	10.30	8.79	
Median	10.29	8.96	10.32	8.72	9.57	8.96	10.46	9.10	
Years of education	4.81	1.87	5.03	1.71	3.26	0.50	5.65	3.95	
Age	35.69	33.89	36.50	31.22	38.27	35.02	33.89	33.07	
Math skills (percentage)	75	47	83	46	66	40	78	59	
Reading and writing skills (percentage)	57	21	62	22	43	09	63	37	
Number of children younger than 12 in household	2.62	2.61	2.75	2.19	2.72	2.84	2.51	2.40	
Number of persons older than 65 in household	0.21	0.22	0.20	0.14	0.25	0.25	0.19	0.19	
Married (percentage)	70	72	73	63	71	79	68	63	
Observations	22,041	25,763	3,013	320	4,990	2,076	10,283	1,479	
Earnings observations	18,286	3,874	3,012	320	4,990	2,076	10,283	1,479	

Note: Data are means unless otherwise noted. Earnings are measured in 1998/99 Pakistan rupees. The USD exchange rate over the sampling period is approximately 50. Sampling weights are used for these calculations.

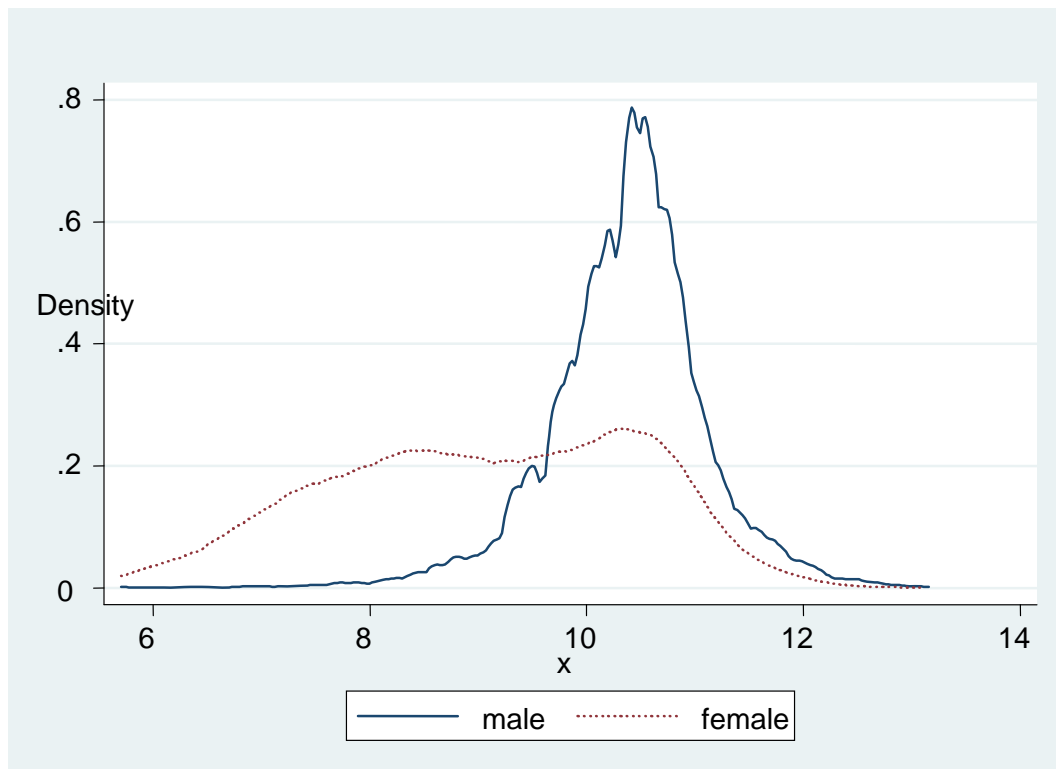
Source: PIHS (1989-1999).

There are 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 differ sharply by gender, much lot lower for women; (figure 3.1). For women, earnings are highest in wage employment, followed by agriculture, and they are lowest in self-employment. Among men, those in self-employment and wage employment earn on average 67 percent more than those in agriculture, and this is mirrored by a similar differential in education and literacy and numeracy scores. Among women, the

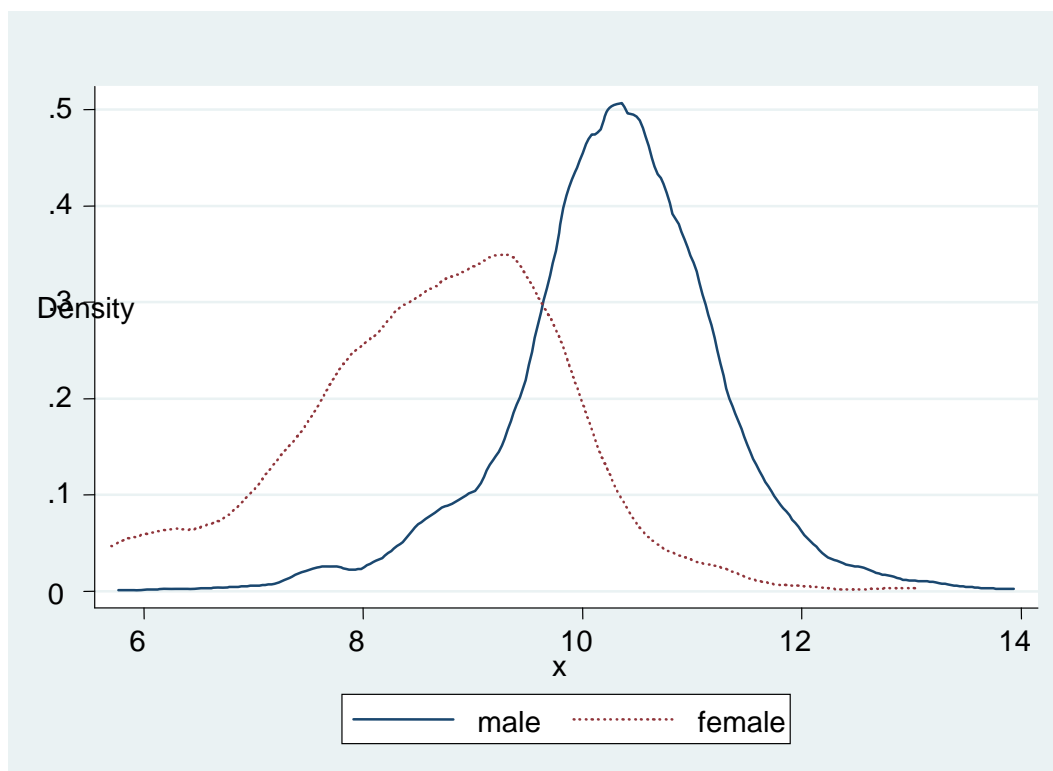
picture is not so clear-cut. In wage employment (where earnings are highest), women are also most educated and more literate and numerate than their counterparts in the other two occupations. However, despite being better educated or skilled than those in agriculture, self-employed women are paid significantly less than those in agriculture. This is partly because for women self-employment is very different than for men, involving mostly home-based, low-paid work. Women working in agriculture are less educated and have poorer literacy and numeracy skills compared even with women who are out of the labor force. The gender gap in earnings is extremely high in both self-employment and wage employment.

Figure 3.1. Kernel densities of log earnings, by employment status and gender

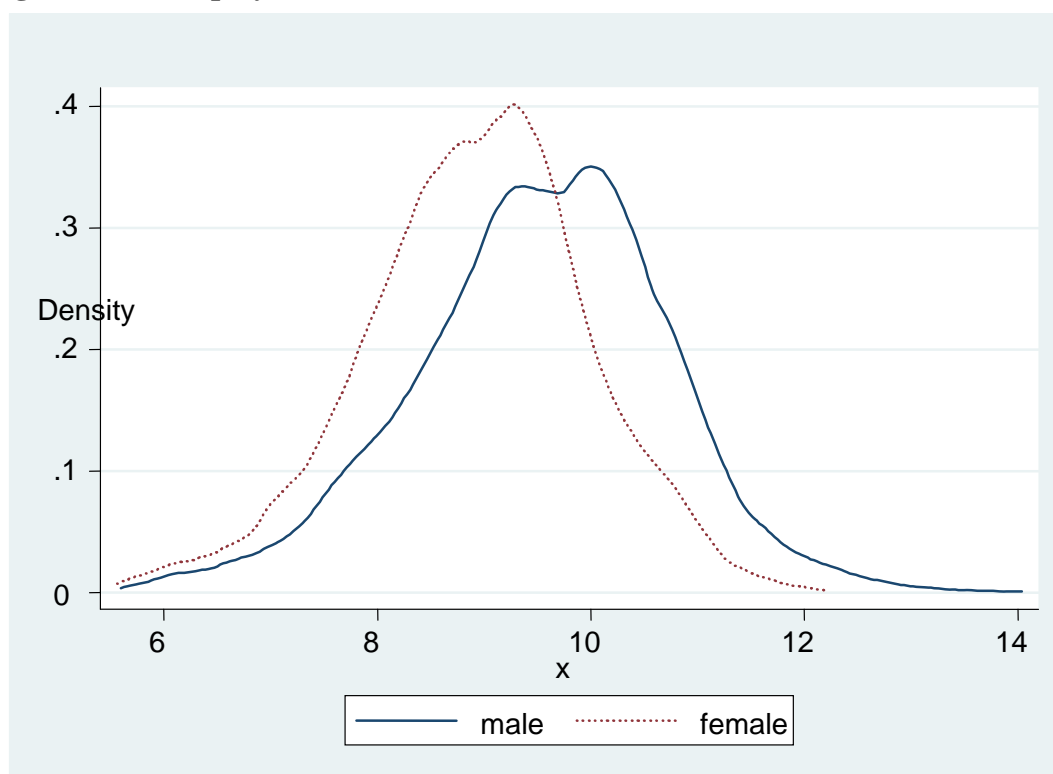
A. Wage employment



B. Self-employment



C. Agricultural employment



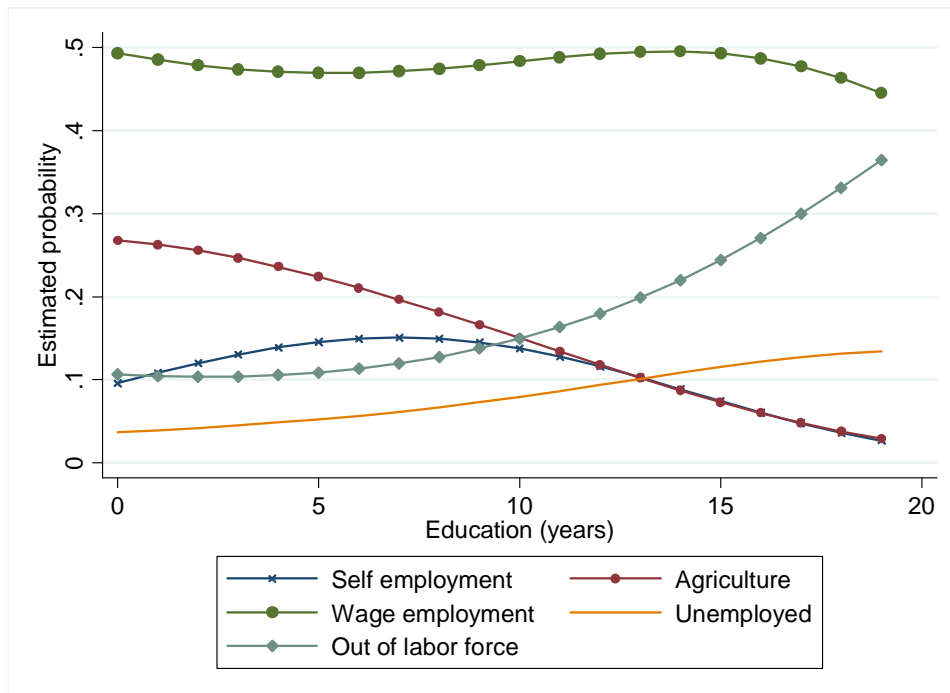
Although five occupation categories are distinguished in the data, for men the main difference with regard to skills and earnings is between wage employment and self-employment, on the one hand, and agriculture and OLF status, on the other. For men, therefore, skills matter a lot in determining which of these two broadly defined occupation groups individuals end up in. Unemployed men are well educated and clearly queue for suitable job opportunities in the labor market. Among women, there are substantial differences in skills and earnings across the three occupations, and the characteristics of women who are out of the labor force or unemployed are somewhat similar to the self-employed. We now investigate the correlates of occupational outcomes in more detail.

Education, labor market transitions, and occupational attainment

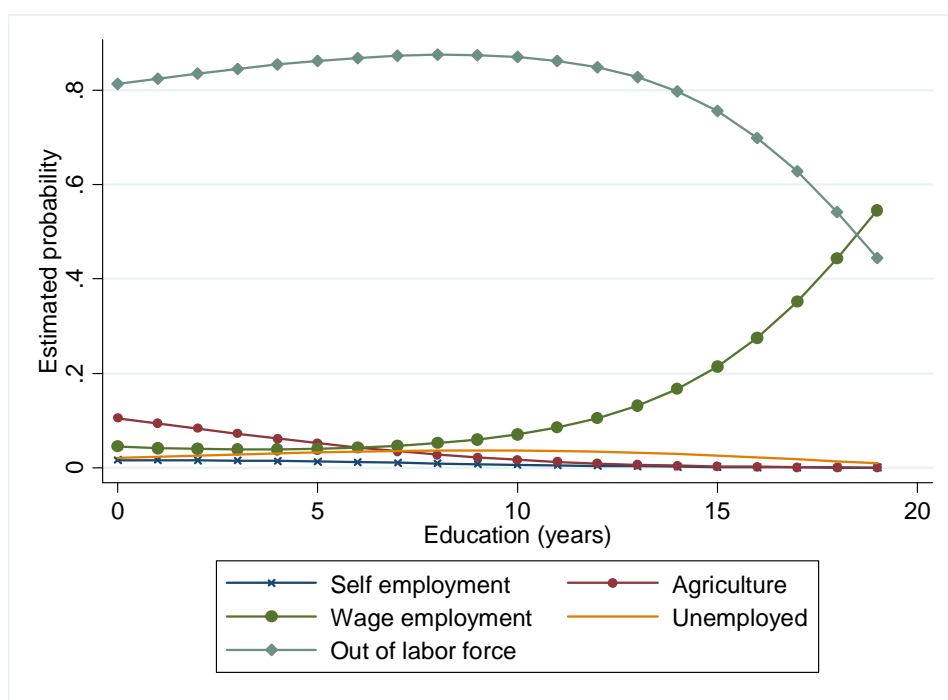
This section examines the relationship between education and occupation for men and women. Figure 3.2 illustrates the estimated association between years of education and the predicted likelihoods of occupational outcomes, for young men (panel A) and young women (panel B), evaluated at the sample mean values of the other explanatory variables in the model.⁴ It is clear that for young men the likelihood of being employed for wages is relatively invariant to education level. By contrast, education is clearly associated with a lower likelihood of being involved in agriculture. Strikingly, the likelihood of not working (because of being either unemployed or out of the labor force) is *increasing* with education. One possible reason for this is that individuals with a lot of education are willing to wait for a good job opportunity before taking paid employment. The likelihood of self-employment can be modeled as an inverse U-shaped curve, peaking at about eight years of education. Education clearly has an impact in determining occupational attainments of men.

Figure 3.2. Estimated probability of occupation and education for young men and women in Pakistan

A. Young men



B. Young women



Source: Based on the multinomial logits reported in appendix 1 in Kingdon and Söderbom (2007a).

For women the picture is very different, indeed. Panel B of figure 3.2 shows that women with up to ten years of education have high chances of not working. Among women with no schooling at all, about 80 percent are out of the labor force, and this increases to 90 percent for women with eight to ten years of education. After ten years of education, women's labor force participation becomes increasingly responsive to extra education: as education increases beyond ten years, women begin to join the labor force in larger numbers. However, the only occupation they enter is wage employment. (Coming out of the OLF state is mirrored exactly in joining wage employment for women in Figure 3.2.) A probability that a woman with a postgraduate degree (approximately 18 years of education) has a wage job is approximately 50 percent. However, only about 10 percent of women had ten years of education or more in 1998/99.

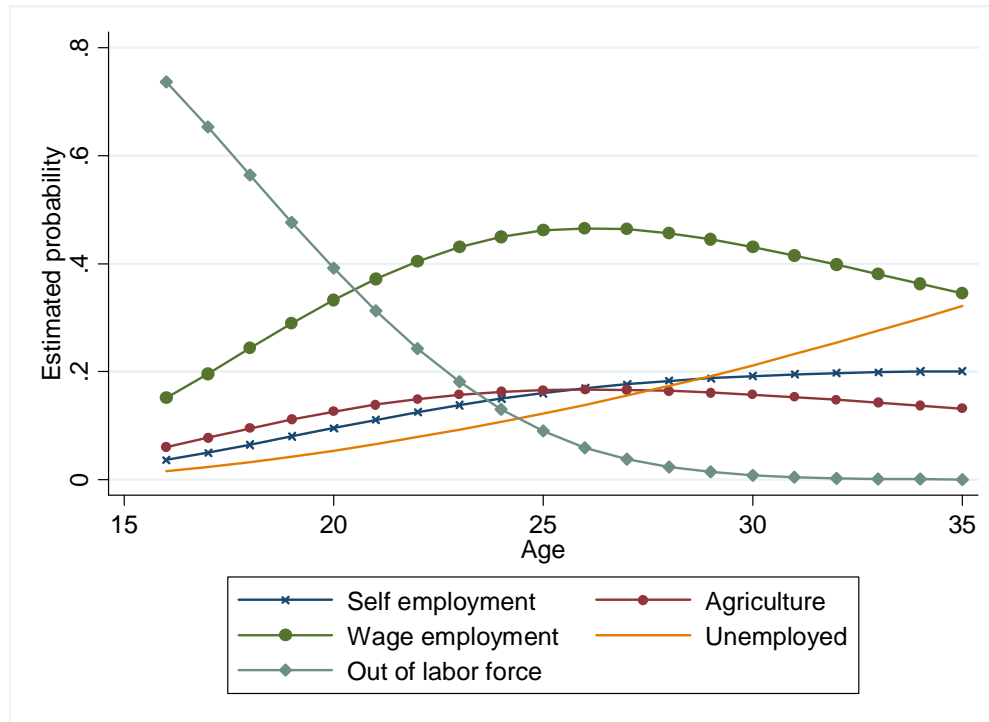
The fact that occupational outcomes vary with education level so much for men and so little for women suggests the strong influence of culture, conservative attitudes, and gender division-of-labor norms in Pakistan. Only education beyond ten years begins to counter the effects of culture, but barely 10 percent of women are fortunate enough to have at least ten years of education. This provides one element of the answer to the key question in this chapter: education has only limited potential to effect gender equality in the labor market because, as a result of cultural norms, occupational choices are invariant with respect to education up to the end of lower secondary education, and only a small minority of Pakistani women have greater than ten years of education.

Do transitions from education into the labor market differ substantially for men and women? Figure 3.3 plots the estimated occupation probabilities as a function of *age* for young adults, holding all other explanatory variables fixed at the sample mean values. Transitions into the labor market are noticeably different by gender. We see that occupation status changes a good deal with age for men but hardly at all for women. Although women very gradually begin to enter gainful employment after about age 25, men enter the labor force rapidly, so

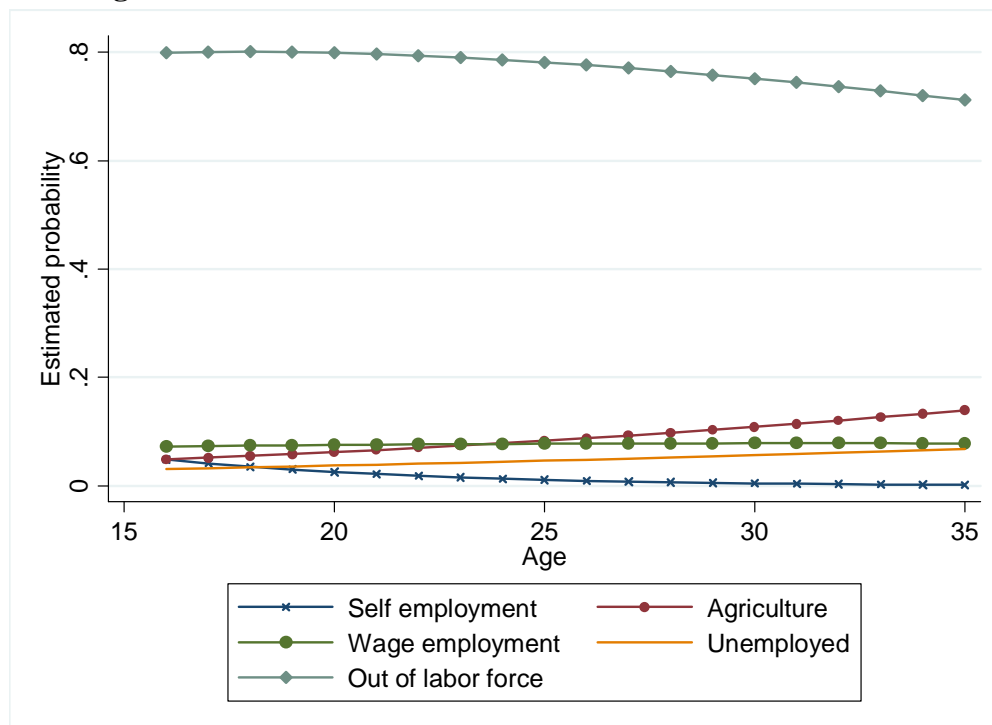
that by age 25, almost all men are labor force participants. (The OLF curve falls sharply between age 15 and 25 for men and falls only very slowly for women, even after age 25.)

Figure 3.3. Estimated probability of occupation and age for young men and women in Pakistan

A. Young men



B. Young women



B

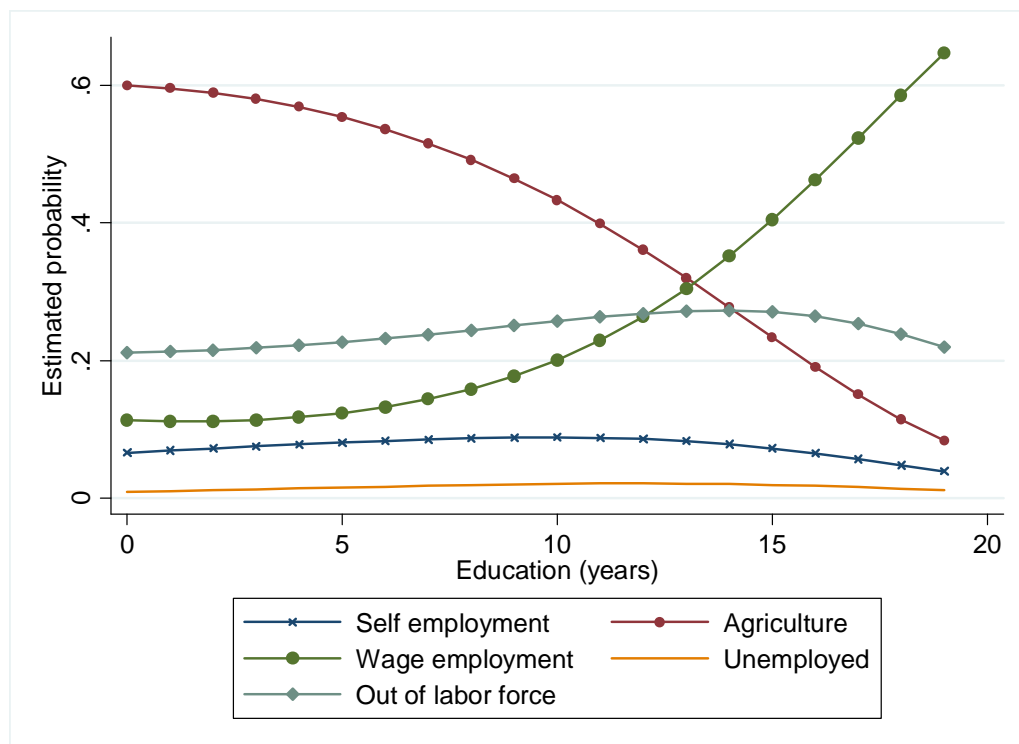
Source: Based on the multinomial logits reported in appendix 2 in Kingdon and Söderbom (2007a).

Thus, we find that both the transition from education to work and the relationship between education and occupational attainment vary dramatically by gender in Pakistan. These trends reflect entrenched conservative attitudes toward women's work. Only wage employment appears to be an "acceptable" occupation for women and even then only for women with high levels of education. Given that a very small proportion of women (only 10 percent) have acquired ten years of schooling or more suggests that the extent to which education can become a pathway to gender equality in economic outcomes is limited in Pakistan.

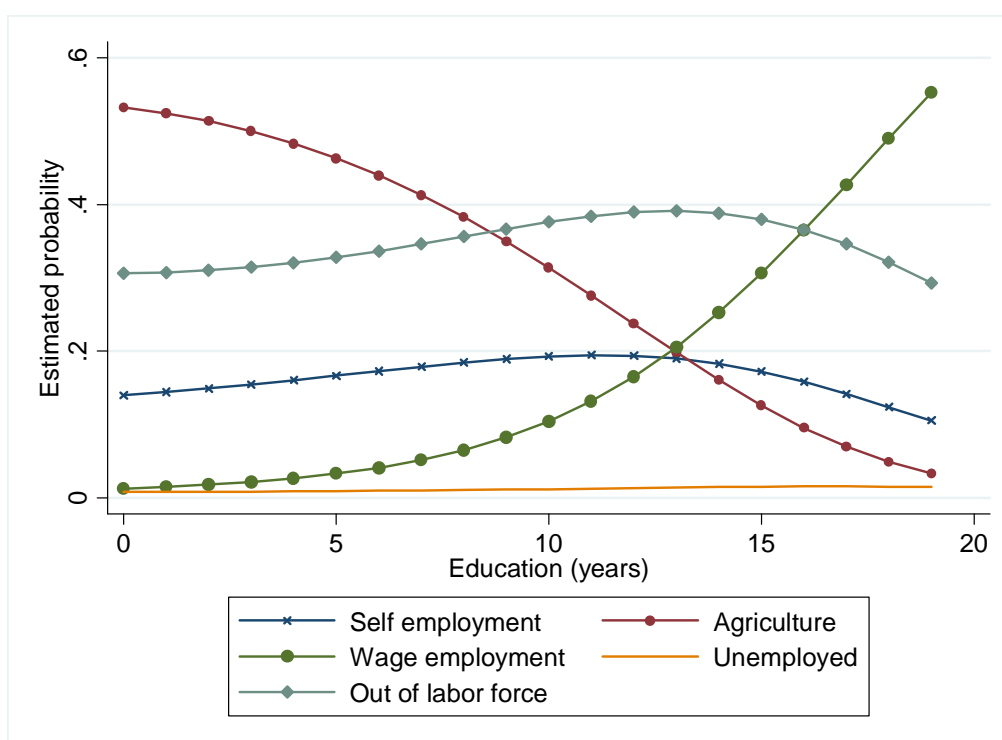
Are these findings applicable elsewhere? Figure 3.4 shows the relationship between years of education and the predicted likelihoods of being in different labor market states for men (panel A) and women (panel B) in Ghana, an African country for which we had comparable data.⁵ Even though a direct comparison is not possible (since for Pakistan, we distinguish between the young and old, but not for Ghana because of its smaller sample size), it is clear that the role of education in occupational attainment in Ghana is extremely different from that in Pakistan. It is visually clear from figure 3.4 that the relationship between education and occupational choice is far more similar for men and women in Ghana than in Pakistan. These findings indicate a much lower degree of segmentation by gender in Ghanaian than in Pakistan and suggest that in Ghana education is as much a vehicle for labor market success for men as it is for women.

Figure 3.4. Estimated probability of occupation and education for men and women in Ghana

A. Men



B. Women



Source: Based on the multinomial logits reported in Appendix 1 in Kingdon and Söderbom (2007b).

A static labor market?

Our assessment so far is based on 1998/99 data, and it is of interest to know whether the role of education in promoting gender equality in the labor market has improved in recent years. In this section, a comparison across time is made using data collected in Pakistan in 2006/07 under the auspices of the Research Consortium on Educational Outcomes and Poverty (RECOUP). These household-level data were collected using stratified random sampling in two provinces of Pakistan—Punjab and the North West Frontier Province (NWFP)—and yielded information on 1,194 households across nine districts. As one of the main objectives of data collection was to analyze economic outcomes of education, the questionnaire contains detailed information on the labor market status of all household members (and detailed information for individuals age 15–60).

To render the Pakistan Integrated Household Survey (1998/99) and RECOUP (2006/07) datasets comparable, we limit the PIHS analysis only to Punjab and NWFP, and in both datasets we restrict analysis to individuals between ages 16 and 60.⁶ As before, we distinguish between the young (16–30 years old) and the old (31–60 years old), although because of space constraints, we report findings only for the young.

Table 3.3 presents 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, one wonders whether the large increase in female labour force participation over time is a 'real' change or driven by differences in sampling across the two data sets for instance by oversampling urban areas in the RECOUP data set where women's labour market participation is actually greater. However, we note that while 62 per cent of the individuals in

Punjab and NWFP in the PIHS sample are from rural areas, the proportion of rural individuals sampled in RECOUP is 72 per cent – if anything, rural areas have been oversampled in the RECOUP data set. Deflating women’s labour force participation rate by the proportion by which rural areas are oversampled (1.2) still yields a high ‘true’ participation rate of 29.2 per cent for women. Despite the increase in women’s economic activity, however, the 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).

Table 3.3. 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 and 2007

Variable	Men		Women	
	1999	2007	1999	2007
Labor 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

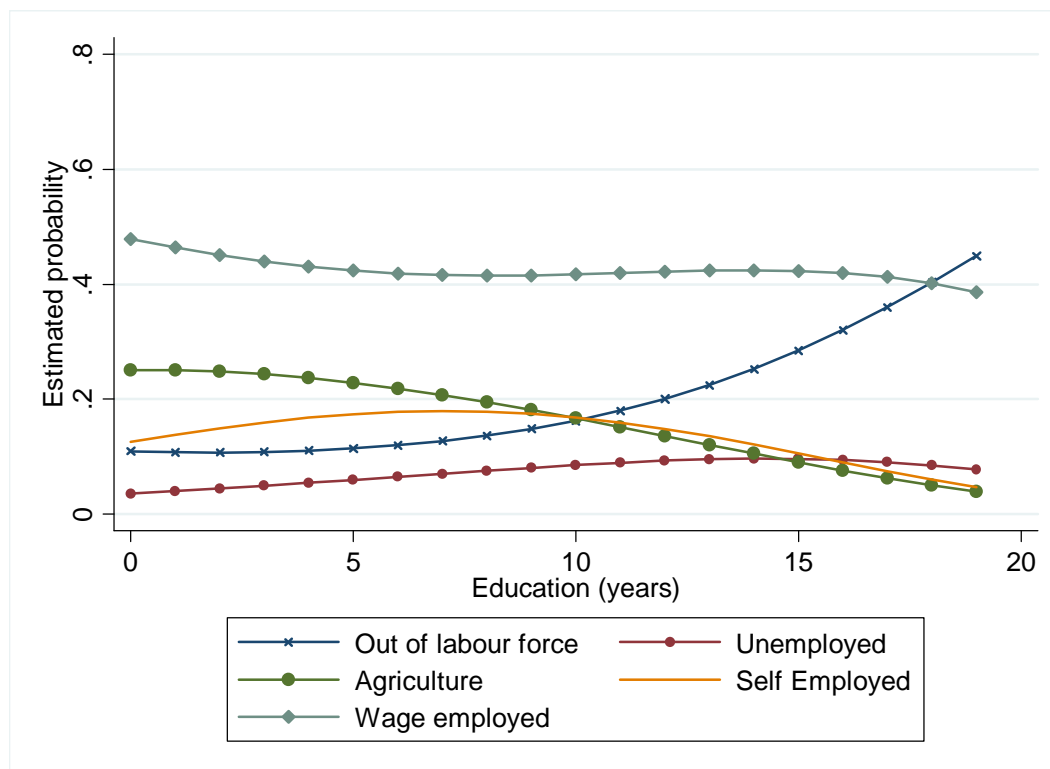
Note: Sampling weights are used for 1999 calculations. “Literate” is a dummy variable measuring whether individuals can read or write (1999 data) and whether individuals achieved a score of 1 or more in a short test of literacy administered to each individual.

Source: Author’s calculations based on PIHS data from 1998-1999.

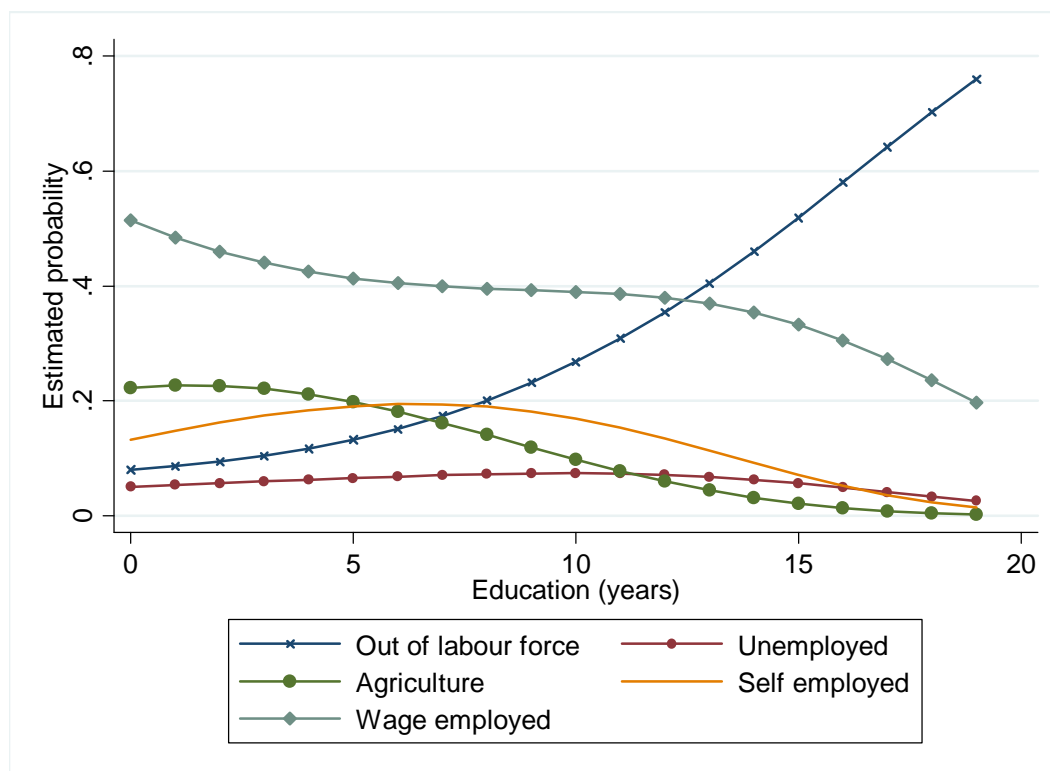
Figure 3.5 illustrates the estimated association between years of education and the predicted likelihood of occupational outcomes for young men in 1998/99 (panel A) and in 2006/07 (panel B), evaluated at the sample mean values of the other explanatory variables in the model.⁷ With some exceptions, the 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 labor 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. Instead of remaining in the labor force and openly unemployed, highly educated young men appear to prefer to wait out of the labor force.

Figure 3.5. Estimated probability of occupation and education for young men, 1999 and 2007

A. 1999



B. 2007



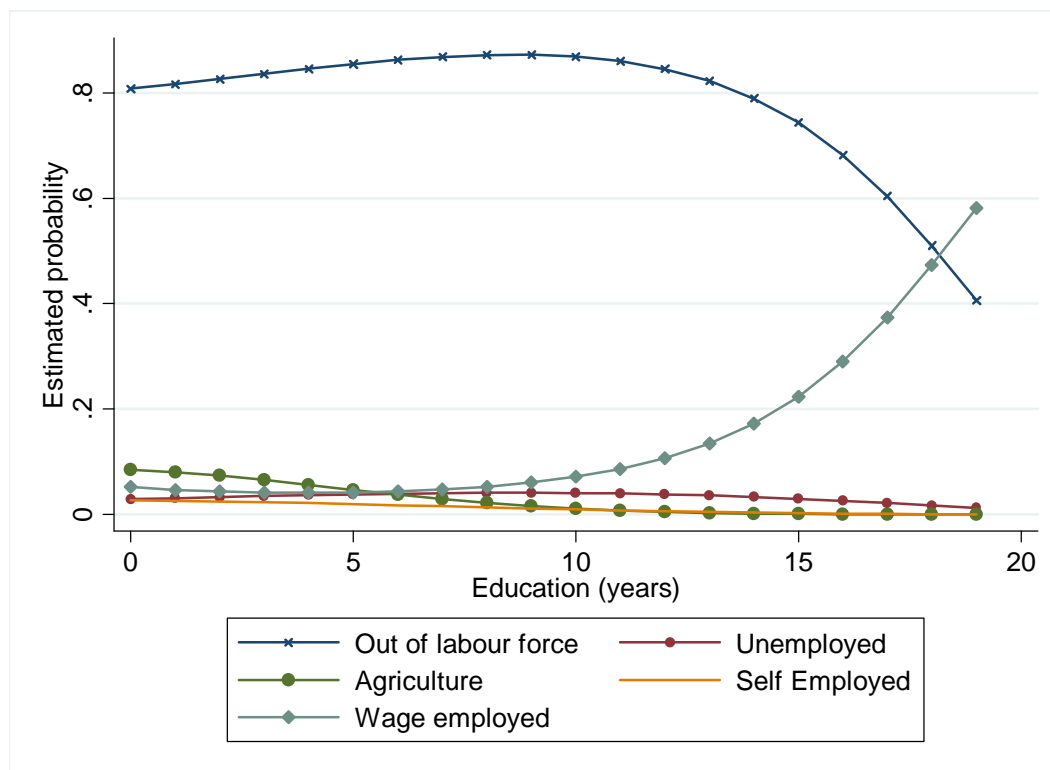
Source: Based on the multinomial logits available from the authors.

Figure 3.6 plots the likelihood of occupational attainment with respect to education for young women in 1999 (panel A) and 2007 (panel B). Here, there is suggestion of some encouraging changes over time. First, while 80 percent of women with no education were out of the labor

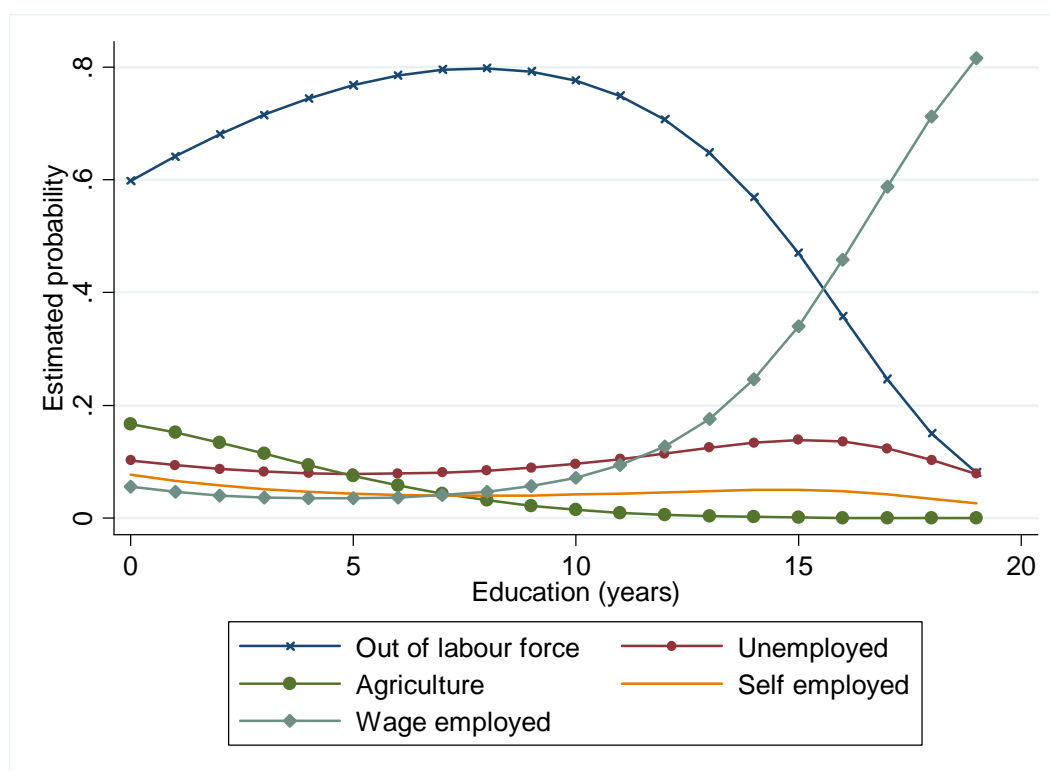
force in 1999, by 2007 only 60 percent of such women were out of the labor force; that is, the labor force participation rate among non-educated women increased much over this eight-year period. Second, and more important, women's occupational status became more responsive to education over time. Although in 1999 education beyond ten years was needed for women to increasingly participate in the labor market and then the rate at which education increased the chances of labor force participation was slow, by 2007 education beyond about eight years⁸ begins to encourage participation in the labor force, and the rate at which it does so has also 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 15 years of education was about 35 percent likely to be wage employed. At higher levels of education, up to 19 years, the escalation of employment opportunities between 1999 and 2007 is even more striking.

Figure 3.6. Estimated probability of occupation and education for young women, 1999 and 2007

A. 1999



B. 2007



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

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. In particular, 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 as the only acceptable occupation for women. Another silver lining in the cloud 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 1999⁹ to 19 percent in 2007). This suggests that a larger proportion of women can take advantage of the equality-promoting labor market benefits of education. Even if some of the 1998-2007 difference is attributable to sample differences between PIHS and RECOUP datasets, a relatively large proportion (29.2 per cent) is still due to changes over time in the way that education affects women's labour force participation in Pakistan.

Skills and occupational attainment

What is learned in school may be more important than the years of schooling acquired. It is of interest to ask to what extent literacy and numeracy skills promote entry into the more remunerative occupations. Table 3.4 presents the marginal effects of basic literacy and numeracy on the likelihood of being in different occupations (estimates based on PIHS 1999). The descriptive statistics discussed in table 3.2 made clear that for men wage and self-employment are the well paying parts of the labor market in Pakistan and that agriculture is not. For women, wage employment offers the highest earnings, with agriculture coming in second best and self-employment faring worst.

Table 3.4. Effects of literacy and numeracy on occupational outcome, by gender and age group

<i>Occupational status and skill level</i>	<i>Young</i>		<i>Old</i>	
	<i>Men</i>	<i>Women</i>	<i>Men</i>	<i>Women</i>
Self-employment				
Can solve simple math problem	0.028	−0.005	0.067	−0.001
	(2.18)**	(2.45)*	(5.95)**	(0.46)
Can read and write	0.020	−0.005	−0.002	−0.004
	(1.93) ⁺	(2.09)*	(0.20)	(1.98)*
Agricultural employment				
Can solve simple math problem	0.010	0.013	0.006	0.003
	(0.78)	(2.19)*	(0.60)	(0.59)
Can read and write	−0.110	−0.078	−0.167	−0.081
	(11.42)**	(25.77)**	(21.37)**	(29.38)**
Wage employment				
Can solve simple math problem	−0.020	−0.003	−0.025	−0.003
	(1.14)	(0.47)	(1.90) ⁺	(0.63)
Can read and write	0.017	0.031	0.119	0.041
	(1.15)	(4.05)**	(9.81)**	(4.80)**
Unemployed				
Can solve simple math problem	0.010	0.001	−0.002	−0.006
	(0.95)	(0.26)	(0.64)	(2.00)*
Can read and write	0.030	0.014	0.009	0.008
	(3.16)**	(2.71)**	(1.99)*	(1.65) ⁺
Out of the labor force				
Can solve simple math problem	−0.028	−0.005	−0.045	0.007
	(2.28)*	(0.59)	(5.94)**	(0.82)
Can read and write	0.042	0.038	0.041	0.036
	(3.53)**	(4.05)**	(4.69)**	(3.63)**

⁺ significant at 10 percent level; * significant at 5 percent level; ** significant at 1 percent level.

Source: Results based on the multinomial logits reported in appendix 1 in Kingdon and Söderbom (2007a).

Table 3.4 shows that possession of literacy promotes entry into a well-paying part of the labor market, namely, wage employment, for all groups except young men. In the older group, the effect is three times as large for men as for women. Literacy skills strongly reduce the chances of ending up in the worst-paying part of the labor market for men (namely, in agriculture), and the effect is significantly higher for men than for women in both age groups. Moreover, although the effect is small, literacy reduces the likelihood of women (young and old) entering the worst-paying self-employment sector, while there is a weak suggestion that literacy promotes young men's entry into self-employment.

Surprisingly, being literate is associated with significantly *increased* chances of being either out of the labor force or unemployed for all groups. Literate women either work in wage employment—which may be viewed as the respectable part of the labor market—or remain out of the labor force (and to a less extent unemployed), perhaps as a result of cultural norms or their greater efficiency in the production of home goods.

Numeracy, in contrast, is not related to the chances of being in wage employment, suggesting that many wage jobs are unskilled, not requiring numerate individuals. But numeracy has a

high association with the chances of being in self-employment for men. This could be either because numeracy promotes entry into self-employment or because people in self-employment end up becoming numerate; that is, numeracy is learned on the job. For women, as with literacy, numeracy reduces the likelihood of young women entering the ill-paying self-employment sector. Numeracy also reduces the chances of being out of the labor force for men, but not for women. This could be due to cultural norms or due to the earnings rewards of numeracy differing for men and women. We turn to these in the next section.

Education and earnings

Thus far, we have examined whether and to what extent education can be a pathway to promoting gender equality through improving women's occupational attainment. However, the labor market benefits of education also accrue through a second channel, namely, by raising earnings within any given occupation. Education must raise women's earnings equally if not *more* than men's if it is to assist in reducing gender inequalities in the labor market.

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 familiar Mincerian earnings function approach and the predictions of human capital theory. In an earnings equation, the coefficient on years of schooling measures the rate of return to each additional year of schooling acquired.

While returns to education have been estimated for almost every country in the world (see Psacharopoulos 1994; Psacharopoulos and Patrinos 2004), estimates by gender are less common, and the evidence is mixed. Among developed countries, although returns to women's education are significantly higher than men's in the United Kingdom, Ireland, Germany, Greece, and Italy, they are lower in Denmark, the Netherlands, Austria, and Sweden (Harmon, Oosterbeek, and Walker 2000). The developing country evidence is equally mixed. Some studies find that returns to schooling do not differ significantly by gender (Behrman and Wolfe 1984; Schultz 1993). However, studies in Indonesia (Behrman and Deolalikar 1995), India (Kingdon 1998; Kingdon and Unni 2001), Bangladesh (Asadullah 2006), and Pakistan (Aslam 2007) find the opposite, namely, that returns to women's schooling are higher than men's.

While several authors have estimated returns to education in Pakistan (see Aslam 2007a for an annotated list of papers), in line with much of the international literature on economic returns to education, these studies have estimated returns to education solely in wage employment. However, as we see from table 3.2, wage employment absorbs only about half of the total labor force and a very small proportion of women. The remaining half of the labor force is engaged in self-employment, both agricultural and nonagricultural. What are the returns to education in this major part of the labor market?¹⁰

Table 3.5. Effect of age and education on earnings, by employment status and gender

<i>Age and education</i>	<i>Wage employment</i>		<i>Self-employment</i>		<i>Agricultural employment</i>	
	<i>Men</i>	<i>Women</i>	<i>Men</i>	<i>Women</i>	<i>Men</i>	<i>Women</i>
Young						
Education	0.033	0.149	0.048	0.105	0.053	0.041

	(17.08)**	(20.02)**	(5.77)**	(3.39)**	(5.27)**	(1.17)
Age	0.165	0.021	0.043	0.130	0.152	0.331
	(6.31)**	(0.18)	(0.41)	(0.43)	(1.29)	(1.42)
Age squared	-0.002	0.001	0.000	-0.002	-0.001	-0.006
	(4.18)**	(0.24)	(0.08)	(0.30)	(0.56)	(1.28)
No. of individuals	4,844	732	1,230	161	2,027	973
Old						
Education	0.066	0.172	0.070	0.170	0.074	0.188
	(47.96)**	(28.99)**	(13.64)**	(6.92)**	(9.83)**	(4.07)**
Age	0.095	0.079	0.042	0.012	-0.019	0.016
	(11.98)**	(1.86)	(1.76)	(0.14)	(0.75)	(0.25)
Age squared	-0.001	-0.001	-0.001	0.000	0.000	-0.000
	(11.55)**	(1.68)	(2.10)*	(0.16)	(0.74)	(0.32)
No. of individuals	5,439	747	1,783	159	2,963	1,103

⁺ significant at 10 percent level; * significant at 5 percent level; ** significant at 1 percent level.

Note: Province dummy variables are included in all regressions. The estimation method is ordinary least squares.

Table 3.5 presents ordinary least squares estimates of the economic returns to education in Pakistan, by occupation, gender, and age group¹. It shows that the returns to education are very precisely determined, even in cases where sample sizes are very small. It is clear that returns to education are significantly and substantially greater for women than men in all occupations and in both age groups (except among the young in agriculture). In other words, within any given occupation, the increase in women's earnings with respect to education is much greater than the increase for men. The fact that returns to education in *wage* employment in Pakistan are about three to four times as high for women as for men (both young and old) 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, which are predominantly female jobs. However, the reasons for the higher earnings premium for women than men in self-employment are less clear, even though the female premium over the male is not so high in self-employment as in wage employment.

Next we turn to earnings equations where education is replaced by our measures of cognitive skills. Table 3.6 shows strong returns to literacy among men and women in wage and self-employment and for men in the agriculture. In most cases, the returns to literacy are dramatically larger for women than men, and this finding mirrors that of returns to additional years of education. The returns to literacy for women are more than six times as high as those for men in wage employment and about three times as high in self-employment. Part of the explanation for this finding is a scarcity premium, since far fewer women than men are literate. Fewer women than men have the years of schooling required to develop literacy skills, and women are likely to have attended poorer schools than men in Pakistan.¹¹ Significant positive returns to *numeracy* skills accrue to both old men and women in agriculture. The size of these returns is identical across gender.

¹ While only OLS estimates are reported here, household fixed effects, Instrumental Variable estimation and heckman correction models were estimated for underlying 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.

Table 3.6. Effect of literacy and numeracy on earnings, by employment status and gender

Age and skills	Wage employment		Self-employment		Agricultural employment	
	Men	Women	Men	Women	Men	Women
Young						
Can solve simple math problem	0.036	0.184	0.039	−0.433	0.339	0.077
	(1.06)	(1.13)	(0.28)	(1.35)	(2.48)*	(0.41)
Can read and write	0.216	1.393	0.371	1.053	0.271	0.209
	(7.17)**	(8.97)**	(3.34)**	(2.86)**	(2.23)*	(0.82)
Age	0.192	0.180	0.089	0.080	0.186	0.336
	(7.21)**	(1.39)	(0.82)	(0.26)	(1.57)	(1.43)
Age squared	−0.003	−0.002	−0.001	−0.001	−0.002	−0.006
	(4.93)**	(0.84)	(0.33)	(0.12)	(0.81)	(1.30)
Number of individuals	4,844	732	1,230	161	2,027	973
Old						
Can solve simple math problem	0.076	0.047	0.132	0.208	0.341	0.356
	(3.22)**	(0.37)	(1.60)	(0.88)	(4.36)**	(2.34)*
Can read and write	0.486	1.901	0.454	1.285	0.251	0.445
	(22.65)**	(14.32)**	(6.86)**	(4.11)**	(3.26)**	(1.67)
Age	0.097	0.084	0.049	0.020	−0.017	0.016
	(11.21)**	(1.86)	(2.04)*	(0.22)	(0.65)	(0.25)
Age squared	−0.001	−0.001	−0.001	0.000	0.000	−0.000
	(11.11)**	(1.74)	(2.38)*	(0.04)	(0.59)	(0.33)
Number of individuals	5,439	747	1,783	159	2,963	1,103

+ significant at 10 percent level; * significant at 5 percent level; ** significant at 1 percent level.

Note: Province dummy variables are included in all regressions. The estimation method is ordinary least squares.

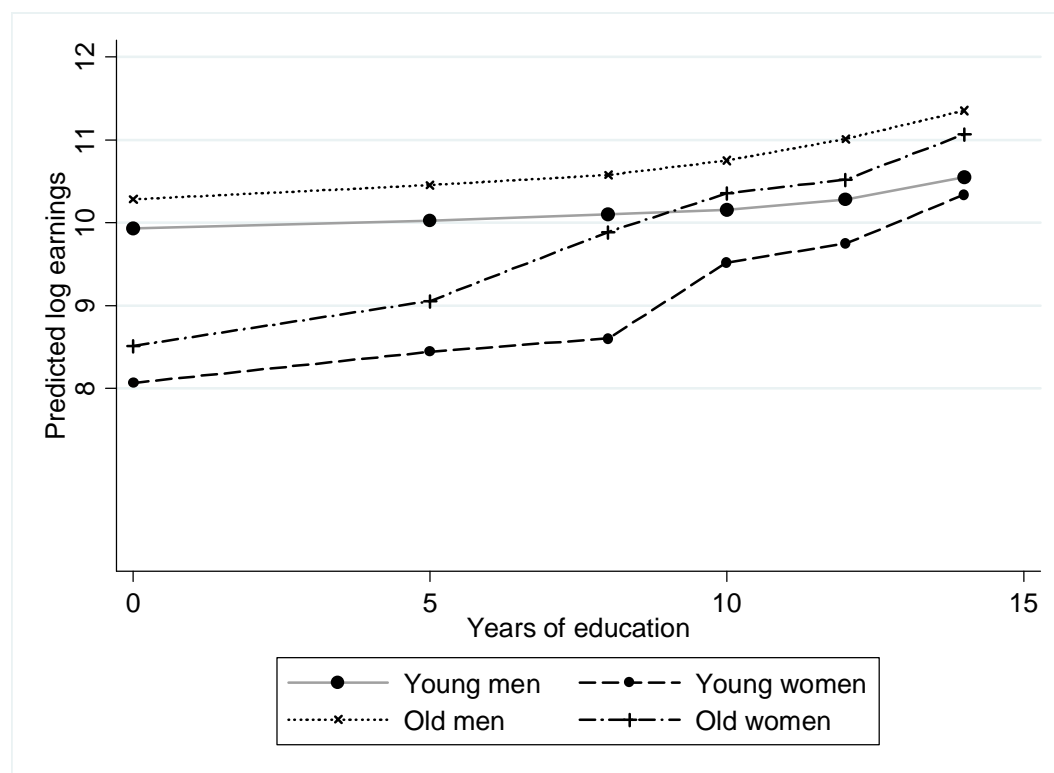
The fact that returns to education and to cognitive skills are substantially larger for women than men presents the cheering scenario that education can be a path to gender equality in the labor market. It also suggests that there are really strong economic incentives for investment in girls' schooling, 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 parents may allocate less education to daughters than sons, even if the labor market rewards women's education more, since the returns *accruing to parents* from a daughter's education are lower than those from a son's education. Absence of social security systems for old-age support, coupled with the social norm that girls live with their in-laws, imply that any economic benefits of education investments in daughters are reaped by their in-laws, while economic benefits of education investments in sons are reaped

by parents in the form of old-age support. Thus, economic necessity may prompt greater investments in boys' education, despite higher labor market returns to women.

A second explanation for the puzzle 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* labor 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 3.7. 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 (2007) shows that a large part of the gender gap in earnings is due to potential discrimination in the labor market and is not explained by differences in men's and women's productivity endowments, such as education and experience. Education of women helps to reduce that earnings gap—there is less gender discrimination among the educated in the Pakistan labor market.

Figure 3.7. Predicted earnings and level of education for wage employment



Source: Based on the results reported in table 3.5.

The gender gap in earnings is widest among workers with no education and narrows as completed years of education increase, as seen in figure 3.7. This suggests that education *is* a pathway to reducing gender inequalities in Pakistan's labor 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 labor market. While women's occupational attainment is relatively invariant to education (except beyond ten years of schooling), limiting the extent to which education can mitigate gender inequalities, education clearly does reduce gender gaps in earnings among those who are employed and thus plays a vital role in attenuating gender inequalities in labor market earnings.

Conclusion

The central research question addressed in this chapter is whether education and the quality of education (as measured by cognitive skills) are paths to reducing gender inequality in the labor market, either by promoting women's entry into lucrative occupations or by raising their earnings within a given occupation at least equally, if not more, than for men. Our findings suggest that in Pakistan education does increase gender equality in labor market outcomes both through improved occupational attainment of women and through reduced gender gaps in earnings in any given occupation. Nonetheless, these positive effects of education are limited by cultural norms that prevent a woman's occupational choice from being responsive to education until she has about ten years of education and by possible discrimination that a woman faces in both education and employment.

Based on the Pakistan Integrated Household Survey data from 1999 our results show that, while education plays an important role in occupational outcomes for men from very low levels of education, women only begin to take advantage of the benefits of education in earnest after about ten years of schooling when they begin to join the labor force and enter wage employment. Given the very small proportion of women (about 10 percent) who have completed ten years or more of schooling, however, the extent to which education can promote gender equality within the labor market is limited. A comparison across an eight-year period using latest household data (RECOUP 2007) shows that education continues to have a limited impact on women's occupational choices in the labor market, though it has a slightly bigger role in 2007 than in 1999. Moreover, wage employment continues to be the only acceptable occupational choice for better-educated women. On a more positive note, however, in 2007 women's wage work participation is responsive to education from about eight years of education onward, suggesting some loosening of cultural norms. The proportion of women with ten or more years of education has also risen over time, suggesting a larger number of women can take advantage of the labor market benefits of education.

While occupational attainment is largely invariant to years of schooling for women, cognitive skills are found to have substantially high payoffs. This is true for both men and women. In particular, literacy promotes entry into the lucrative parts of the labor market for both men and women, though the effect is larger for men, which once again limits the extent to which skills acquisition can help alleviate gender inequalities in the labor market.

A second channel through which education may promote gender equality in labor market outcomes is by narrowing gender gaps in earnings within any given occupation (by rewarding women's education and skills more than men's). We find that the economic returns to women's schooling and skills are indeed invariably and substantially higher than to men's in all occupations and among both age groups, so that the gender gap in earnings is substantially smaller among those with higher levels of education. Hence, education clearly reduces gender gaps in earnings and can play a vital role in attenuating inequalities in earnings in the labor market.

If education is to become a strong pathway to gender equality in the labor market, Pakistan will need, first of all, to address the conservatism of attitudes on the division of labor between men and women and the participation of women in the paid labor force. This may be possible through, for example, public education campaigns and media messages, including putting forward successful female role models. Second, given the suggestion of gender discrimination in the labor market, Pakistan can benefit from reforming labor market policies

in ways that reduce gender-differentiated treatment by employers. Third, to strengthen the labor market equality-promoting benefits of education, Pakistan will need to ensure that a greater proportion of its women acquire secondary education and beyond. For this, it may need to improve the supply of secondary and tertiary education and also to ease credit constraints for girls, such as by providing attendance-contingent cash transfers for staying enrolled in school.

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Notes

¹ Computed from <http://stats.uis.unesco.org>.

² There is evidence that cognitive skills have economically large effects on individual earnings and on national growth. This literature is summarized in Hanushek (2005). Hanushek (2005) 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. Hanushek 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. A study in Pakistan (Behrman et al. 2002) also finds that cognitive skills have statistically significant pay-offs in the labor market.

³ Earnings information is available only for the first three categories: wage employment, self-employment, and agricultural employment. Although earnings are available at the individual level for the wage-employed, only household-level earnings are available 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).

⁴ 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 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. Underlying regressions are available in Kingdon and Söderbom (2007a).

⁵ These estimates are based on the fourth round of the Ghana Living Standards Measurement Survey 1998/99 (GLSS4). The sample is restricted to individuals aged 16-70 and not enrolled in school. Graphs are based on multinomial logits with wage-employment as the base category. Figure 4 shows the estimated association for men and women evaluated at the sample mean values of the explanatory variables in the model. See Kingdon and Söderbom (2007b) for underlying regressions.

⁶ The sampling for the RECOUP survey was intended to yield a representative sample at the province level, and we assume that it is representative and therefore comparable with the sample from the PIHS dataset.

⁷ These graphs comparing occupational outcomes using the PIHS and RECOUP datasets are based on identical specifications of parsimoniously specified multinomial logits (out of the labor force is the base category). The explanatory variables are years of education, education squared, age, age squared, number of children in the household under the age of 12, number of adults in the household over the age of 65, and a dummy variable depicting whether the individual is married or not. All regressions are estimated separately for men and women. Underlying regressions are available from the authors.

⁸ In 2007, 21.8 percent of women had more than eight years of education.

⁹ The figures estimated only on the Punjab and NWFP sample of the PIHS (1999).

¹⁰ 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.

¹¹ Aslam and Kingdon (2006) show that girls receive significantly lower educational expenditures within the household than boys in Pakistan. Aslam (2007b) finds that girls also face poorer quality schooling than boys in Pakistan, as they are very significantly less likely to be sent to private schools than their brothers, combined with the fact that private schools are more effective than public schools in imparting cognitive skills to students. Her findings on the relative effectiveness of private and public schools are supported by other studies on Pakistan (Alderman et al. 2001; Andrabi et al. 2002; Arif and Saqib 2003).