©The Pakistan Development Review
50:4 Part II (Winter 2011) pp. 555–573

Schooling is Associated not only with Long-run Wages, but also with Wage Risks and Disability Risks: The Pakistani Experience

ASMA HYDER and JERE R. BEHRMAN

1. INTRODUCTION

Many studies document significantly positive associations between schooling attainment and wages in developing countries [see the reviews in Psacharopoulos (1985, 1994); Psacharopoulos and Patrinos (2004)]. Based in part on these associations, there has been widespread advocacy for increasing schooling in developing countries to increase productivity and income and, if targeted towards poorer households, reduce poverty and inequality.

But when individuals enter occupations subsequent to completing their schooling, they not only face an expected work-life path of wages, but also other occupational characteristics, including wage risks and disability risks, for which there may be compensating wages differentials. This has been recognized in some of the recent (as well as older) literature on schooling and labour markets in developed economies. Christiansen, *et al.* (2006), for example, estimated the risk-return trade-off for different schooling attainment and types of schooling based on the Danish Labour Force Survey and identified "efficient" and "inefficient" (inferior based only on risks and returns) schooling combinations. Tuor and Backes-Gellner (2010) used the Swiss Labour Force Survey to estimate risk and returns for different types of schooling paths—all leading to a tertiary degree—by distinguishing among a purely academic path, a purely vocational path and a mixed path with loops through both systems, with entrepreneurs separated from employees in order to examine whether for the same schooling the labour market outcomes differ between these two groups. Their empirical results suggest that mixed schooling paths are well-rewarded in the Swiss labour market and for entrepreneurs high returns are associated with high income variance. Diaz-Serrano and Hartog (2006) used the 1995 Spanish Encuesta de Estructura Salarial (Salary Structure Survey) of 1995 to estimate the earnings variance and skewness and found compensating wage differentials for schooling as a risky investment. There are studies which have employed cross sectional data for finding risk as the dispersion of earnings [for instance McGoldrick

Asma Hyder <baloch.asma@gmail.com> is Assistant Professor, Karachi School for Business and Leadership, Pakistan. Jere R. Behrman <jbehrman@econ.upenn.edu> is William R. Kenan, Jr. Professor of Economics and Sociology and a Research Associate of the Population Studies Centre at the University of Pennsylvania, Philadelphia, USA.

(1995); McGoldrick and Robst (1996)]. Low, Meghir, and Pistaferri (2008) specify a structural life-cycle model of consumption, labour supply and job mobility in an economy with search frictions that allows them to distinguish among different sources of risks (shocks to productivity, job destruction, processes of job arrival when employed and unemployed and match level heterogeneity) and to estimate their effects and the impact of alternative governmental policies to mitigate risks.

However there is very little evidence in the literature on the associations between schooling attainment and these risks characteristics of occupational choices in developing country contexts, where labour markets may operate much differently than in more developed economies due to, for example, different degrees of mobility and labour market segmentation. The present paper contributes to the literature on developing country labour markets by estimating the associations between schooling and wage risks and between schooling and disability risks in addition to those between schooling and expected wages. These estimates are conditional on the maintained assumption that individuals enter broad occupational categories in specific geographical locations subsequent to their schooling and there is relatively little subsequent mobility. Data on workers in the most recently available six rounds of the Pakistan Labour Force Survey with 77,685 observations are used for the empirical analysis. The occupational and regional categories used are broad so that, in the context of Pakistan, the assumption of limited mobility seems warranted.

The rest of the paper is organized as follows. Section 2 describes the key data from the Labour Force Surveys used in this study. Section 3 discusses how wage risks and disability risks are defined. Section 4 presents the results. Section 5 concludes.

2. DATA

We use pooled data from the six most recent available cross-sectional nation-wide Labour Force Surveys of Pakistan for the years 2001-02, 2003-04, 2005-06, 2006-07, 2007-08 and 2008-09. The Labour Force Survey of Pakistan is conducted by the Federal Bureau of Statistics (FBS), Islamabad. The FBS[1] collects data throughout the country from all rural/urban localities in four provinces of Pakistan based on the 1998 Population Census, excluding the Federally Administered Tribal Areas (FATA) and the military restricted areas. The population of these excluded areas constitutes about 2 percent of the total population.

The analysis includes 77,685 observations on individuals of working-age (10-65 years)[2] involved in any economic activity in these six surveys for whom we have data on the critical variables for the analysis. The variables for each worker include wages, hours worked, work disability, occupation, residence (in urban or rural area and in one of the four provinces), schooling attainment, gender and age. Table 1 gives summary statistics

[1]The FBS uses a stratified two-stage random sample design for data collection. Each area is divided into urban and rural domains. The enumeration blocks for urban domains and village/mouzas/dehs for rural domains are considered as Primary Sampling Units (PSU). The listed households of sample PSUs are taken as Secondary Sampling Units (SSUs). A specified number of households (i.e., 12 from each urban sample PSU, 16 from each rural sample PSU) are selected with equal probability using a systematic sampling technique with a random start.

[2]The Labour Force Survey of Pakistan collects data on economic activity for those above 10 years of age. Only 1.4 percent of the observations in the data that we use for our analysis below is in the 10-14 age range. Our estimates do not change substantially if these individuals are excluded.

Table 1

Summary Statistics

Variables	Categories	Means/ (S.D)
Age (Years)		33.8
		(11.6)
Ln Monthly Wages		8.26
		(.78)
Ln Hourly Wage Rates		2.95
		(.85)
Hours Worked Per Week		49.4
		(12.2)
Disability Risks		1.3
		(11.9)
Male		89.6%
Rural		40.3%
Province	Punjab	44.3%
	Sindh	28.2%
	Khyber Pakhtunkhwa	14.7%
	Balochistan	12.8%
Schooling	Illiterate	22.0%
	Primary (7 grades)	15.7%
	Middle (9 grades)	11.3%
	Matric (11 grades)	19.5%
	Intermediate (13 grades)	11.3%
	Graduation (15-16 grades)	13.4%
	Above Graduation (more than 16 grades)	6.8%
Occupations	Managers	6.4%
	Professionals	6.4%
	Technicians and Associate Professionals	19.1%
	Clerical Support workers	7.2%
	Service and Sales Workers	15.4%
	Skilled, Agricultural, Forestry and Fishery Workers	1.5%
	Craft and Related Trade Workers	14.5%
	Plant and Machine Operators, Assemblers	9.7%
	Elementary Occupations	19.5%
Total Number of Observations=		77685

for these data. The mean age is 33.8 years. The sample is predominantly male (89.6 percent), reflecting the very limited female labour force participation rate in Pakistan. Durrant (2000) discuss that mostly females in Pakistan are not economically active and even if they are active their work is largely unpaid and hidden. Ahmed and Azim (2010) also conclude that probabilities of women in Pakistan to be economically active become low special after marriage and traditional culture is the main reason for low economic activity at women's part. Occupation is defined according to the International Standard Classification of Occupations

(ISCO) at the level of nine categories. The highest proportions of workers are in elementary/unskilled occupations (19.5 percent), technicians and associate professionals (19.1 percent), service and sales workers (15.4 percent) and craft and related trade occupations (14.5 percent). There are seven schooling categories, with 22 percent illiterate having less than primary education and 11.3-19.5 percent in the five categories ranging from completed primary education (seven years) to graduation (15-16 years) and a smaller proportion (6.8 percent) having attained the post-graduate level.[3]

3. MEASUREMENT OF WAGES RISKS AND DISABILITY RISKS

We assume that subsequent to schooling, working individuals enter into one of 144 labour market groups defined by occupation, gender, urban/rural, province and gender (144 = 9 occupational categories * 2 gender categories * 2 urban/rural categories * 4 provinces). We use these groups to define the wage risks and the disability risks that the individuals face upon entering into one of these groups subsequent to schooling. That is, we assume that the residuals in relations that we estimate below are, from the point of view of individuals, short-term random shocks, not persistent longer-run factors. To the extent that there are long-run persistent factors known by individuals, our procedures may result in overestimates of the actual risks, but with the time series of cross sections that we have we are not able to explore such a possibility.

Wage Risks: To estimate the wage risks we use the standard deviation of the residuals in a wages[4] (or earnings) equation for each of the 144 groups defined above. To do so, we first estimate *ln* wages relations with right-side variables for nine occupational dichotomous variables, one gender dichotomous variable, one urban/rural dichotomous variable, three provincial dichotomous variables, age, age-square[5] and

[3]According to the Pakistan Education Statistics Pakistan follows three tier education systems which include Elementary Education (8 years), Secondary Education (4 years) and Higher Education (4 years). There are two scenarios in case of higher education either go for two year graduation degree (BA/BSc) then later on two year masters degree (MA/MSc) or four year professional degree in Engineering, Computer sciences, Business Administration etc. In case of degree in Medical science there are 5 years. In case of PHD there are five more years of study after 4 years of higher education. According to the National Education Policy enrolment of students is the lowest in elementary level of education in Pakistan as compared to other reference countries including India, Bangladesh, Thailand, South Korea, Malaysia and Iran. Pakistan spends relatively less in education in terms of GDP (2.3 percent) as compared to the countries like Iran (4.7 percent), Malaysia (6.2), Thailand (4.2 percent), South Korea (4.6 percent), India (3.8 percent), and Bangladesh (2.5 percent). It further tells that on the Education Development Index, which combines all educational access measures Pakistan lies at the bottom with Bangladesh and is considerably below in comparison to Sri Lanka. A similar picture is presented by the gross enrolment ratios that combine all education sectors, and by the adult literacy rate measures. The overall Human Development Index (HDI) for Pakistan stands at 0.55, which is marginally better than for Bangladesh and Nepal but poorer than other countries in the region. Although Pakistan's HDI has improved over the years but the rate of progress in other countries has been higher. Bangladesh, starting at a lower base has caught up, while other countries have further improved upon their relative advantage. These developments do not augur well for Pakistan's competitive position in the international economy. As the Global Competitiveness Index (GCI) shows, Pakistan's performance is weak, on the health and education related elements of competitiveness, when compared with its major competitors like India, China, Bangladesh, Sri Lanka and Malaysia.

[4]Wages used in the paper are real wages. The nominal wages provided in the Labour Force Surveys are deflated by the consumer price index provided by the Ministry of Finance, Government of Pakistan (Economic Survey of Pakistan 2009-10, Chapter 10).

[5]Age-sqaure is used as a proxy for experience; this proxy has been widely used in literature. [For example: Serrano, *et al.* (2003); Danny and Harmon (2007), Harmon, *et al.* (2001)].

interactions of all the other variables with age and age-squared to allow life-cycle wages patterns to vary with occupation, gender, urban/rural and province: [6]

$$Ln\ (Wages) = \alpha + \beta_i X_i + \mu_i,\ \ \mu \sim (0, \sigma^2), \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

where X is a vector with the right-side variables described above. We then calculate the standard deviations of the residuals from the estimated *ln* wages relation for each of the 144 groups defined above and refer to these standard deviations as the "wages risks." [7]

Because wages are the product of average hourly wage rates and hours worked, we also follow a similar procedure for wage rates and hours worked by estimating:

$$Ln(Wage\ Rate) = a + b_i X_i + u_i,\ \ u \sim (0, \sigma^2) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

$$Ln(Hours\ Worked) = \xi + \lambda_i X_i + v_i,\ \ v \sim (0, \sigma^2) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

We then define "wage rate risks" and "hours worked risks" parallel to "wages risks", defined above.

Table 2 presents OLS estimates of relations (1)-(3). The graphical presentation of life-time earnings profiles based on gender, provinces, urban/rural and occupations are presented in Figures 1–4. The estimated coefficients of occupational, regional, gender, provincial categories, age and age square confirm an inverted u-shaped life-time earning profile, as has usually been reported in the previous literature. The gender earning gap favoring males is evident from this regression analysis, with this gap increasing over the life cycle. Among the occupational categories, 'Managers, senior officials and legislators' remain the highest earnings category over the life cycle. The earnings of 'Professionals' increase sharply initially with age but there is steep decline as well for older ages. 'Clerks' is one occupational category whose mean earnings remain almost stable throughout the working life.

The first three columns of Table 3 present summaries of our estimated wages risks, wage rate risks, and hours worked risks by occupation, gender, urban/rural and province. The means for wages risks and wage rate risks are fairly stable for those with low levels of schooling but increase for those with the highest two or three schooling levels. In the case of gender, wages risks are very high for females as compared to their male counterparts, with both wage rates risks and hours worked risks higher. The higher wages risks for females may reflect that a large proportion of working women are in the informal sector without any legally-binding agreements between employers and employees.

[6]The extended form of this equation is:

$\ln(\text{Wage } s_i) = \alpha + \beta_{1j}\text{age} + \beta_{2j}\text{agesq} + \beta_{3j}\text{gender} + \beta_{4j}\text{gender} * \text{age} + \beta_{5j}\text{gender} * \text{agesq} + \beta_{1j}\text{region} + \beta_{7j}\text{region} * \text{age} + \beta_{8j}\text{region} * \text{agesq} + \beta_{9ij}\text{age} \sum^4_{j=1}\text{province} + \beta_{1Dij} \sum^4_{j=1}\text{province} * \text{age} + \beta_{11ij} \sum^4_{j=1}\text{province} * \text{age sq} + \beta_{12ij} \sum^9_{j=1}\text{occupation} + \beta_{13ij} \sum^9_{j=1}\text{occupation} * \text{age} + \beta_{13ij} \sum^9_{j=1} \text{occupation} * \text{agesq} + \mu_j$

[7]Wages risks $= \sqrt{\frac{1}{n-1}\sum_{i=1}^{n_j}(\mu_{ij} - \bar{\mu}_{ij})^2}$, where i refers to the ith individual in the jth group and n is number of observations in each group.

Table 2

Regression Results for ln Monthly Wages, ln Hourly Wage Rate and ln Hours Worked per Week

Variables	*ln* Monthly Wages		*ln* Hourly Wage Rate		ln Hours Worked per Week	
	Coefficient Estimate	Standard Error	Coefficient Estimate	Standard Error	Coefficient Estimate	Standard Error
Age	0.14***	0.005	0.15***	0.006	–0.01***	0.002
Age^2	–0.001***	0.00007	–0.001***	0.00007	0.0001***	0.00002
Occupation						
Professionals	–0.34*	0.14	0.05	0.16	–0.39***	0.05
Technicians	–0.06	0.11	0.09	0.12	–0.15***	0.04
Clerks	1.42***	0.14	1.58***	0.15	–0.15**	0.05
Services	0.177	0.11	0.20	0.12	–0.02	0.04
Skilled_Agri	0.45*	0.19	0.55**	0.20	–0.10	0.07
Craft	0.66***	0.11	0.87***	0.12	–0.21***	0.04
Plant and Machine	1.54***	0.13	1.81***	0.13	–0.25***	0.04
Elementary/Unskilled	0.77***	0.11	0.83***	0.11	–0.06	0.04
Occupations*Age						
Professionals*Age	0.02*	0.008	0.003	0.008	0.01***	0.003
Technicians*Age	–0.02**	0.006	–0.01*	0.007	–0.0005	0.002
Clerks*Age	–0.09***	0.008	–0.09***	0.008	0.003	0.003
Services *Age	–0.03***	0.006	–0.04***	0.006	0.005**	0.002
Skilled_Agri*Age	–0.05***	0.010	–0.06***	0.01	0.005	0.003
Craft*age	–0.06***	0.006	–0.07***	0.006	0.011***	0.002
Plant & Machine*Age	–0.11***	0.007	–0.13***	0.007	0.02***	0.002
Elementary*Age	–0.07***	0.006	–0.08***	0.006	0.003	0.002
Occupation*Age^2						
Professionals*Age^2	–0.0003**	0.0001	–0.0001	0.0001	–0.0001***	0.00003
Technicians*Age^2	0.0001*	0.0001	0.0001	0.00009	0.00003	0.00003
Clerks*Age^2	0.0009***	0.0001	0.001***	0.0001	–0.00001	0.00003
Services*Age^2	0.0002*	0.0001	0.0002*	0.00008	–0.00003	0.00003
Skilled_Agri*Age^2	0.0005***	0.0001	0.0005***	0.0001	–0.00005	0.00005
Craft*Age^2	0.0006***	0.0001	0.0007***	0.00008	–0.0001***	0.00003
Plant and Machine*Age^2	0.001***	0.0001	0.001***	0.00009	–0.0002***	0.00003
Elementary*Age^2	0.0007***	0.0001	0.0007***	0.00008	–3.65E-06	0.00002
Region						
Rural	0.006	0.04	0.007	0.04	0.0008	0.01
Rural*Age	–0.006*	0.002	–0.006*	0.002	–0.0002	0.0008
Rural*Age^2	0.00004	0.00003	0.00004	0.00003	3.64E-06	0.00001
Gender						
Female	–0.752***	0.06	–0.50***	0.07	–0.2***	0.02
Female*Age	0.022***	0.004	0.02***	0.004	0.005***	0.001
Female*Age^2	–0.0003***	0.00005	–0.0002***	0.00006	–0.00007***	0.00002
Province						
Sindh	0.045	0.045	0.02	0.05	0.02	0.02
KPK	–0.032	0.062	–0.09	0.06	0.06*	0.02
Balochistan	0.41***	0.069	0.4***	0.07	–0.03	0.02
Province*Age						
Sindh*Age	0.0026	0.0028	0.004	0.003	–0.001	0.001
KPK*Age	0.0011	0.0035	0.007*	0.004	–0.006***	0.001
Balochistan*Age	–0.011*	0.004	–0.01*	0.005	–0.001	0.001
Province*Age^2						
Sindh*Age^2	–0.00002	0.00003	–0.00004	0.00004	0.00002*	0.00001
KPK*Age^2	0.00001	0.00005	–0.00008	0.00005	0.00009***	0.00001
Balochistan*Age^2	0.0001**	0.00005	0.0001	0.00006	0.00002	0.00002
Constant	5.87***	0.11	0.26***	0.11	4.16***	0.03
F(41, 77643)	1142.92		1215.54		491.51	
Prob > F	0.0000		0.0000		0.0000	
R-squared	.3764		.3909		.2061	
Adj R-squared	.3760		.3907		.2056	
N	77685		77685		77685	

Notes: *t significant at p<.05.
**t significant at p<.01.
***t significant at p<.001.

Fig. 1. Male- Female Life-Time Wage Earnings Profiles

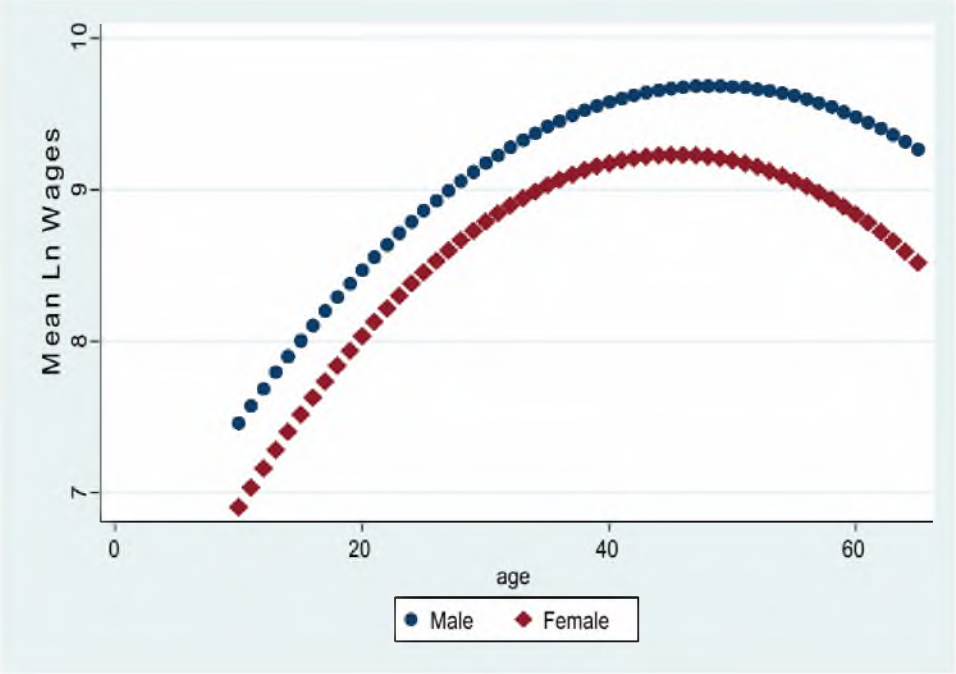


Fig. 2. Urban-Rural Life Time Wage Earnings Profiles

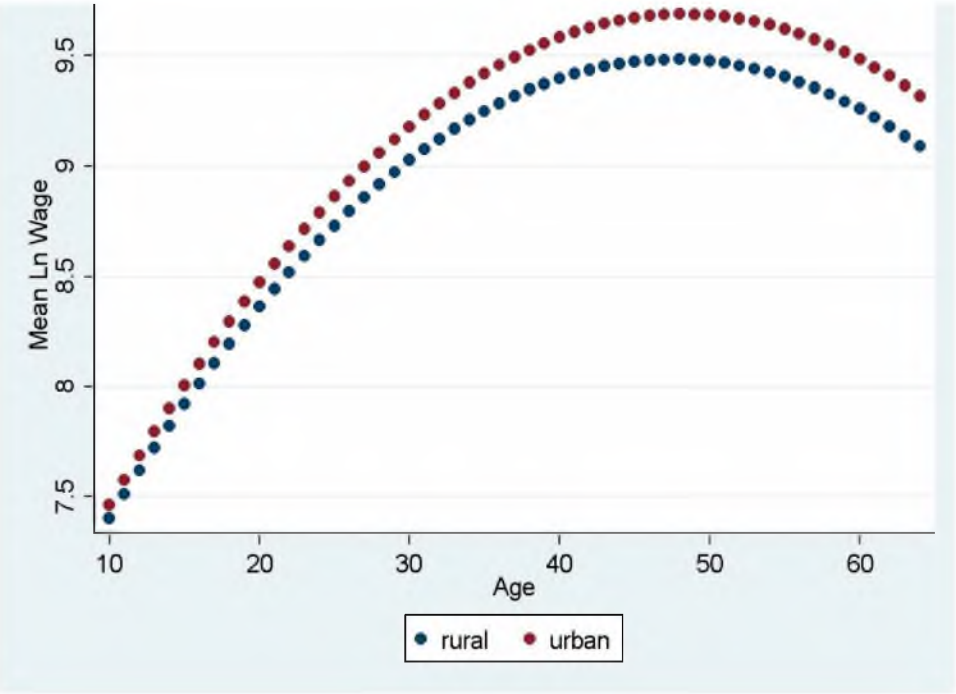


Fig. 3. Life Time Wage Earnings Profiles in Different Provinces

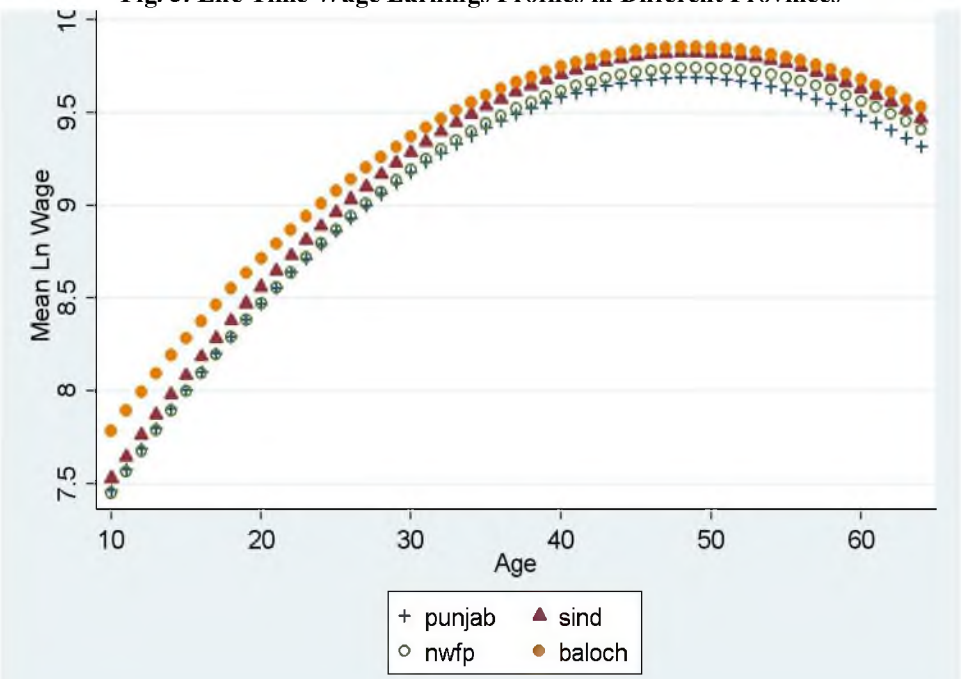


Fig. 4. Life-Time Wage Earnings Profiles in Different Occupations

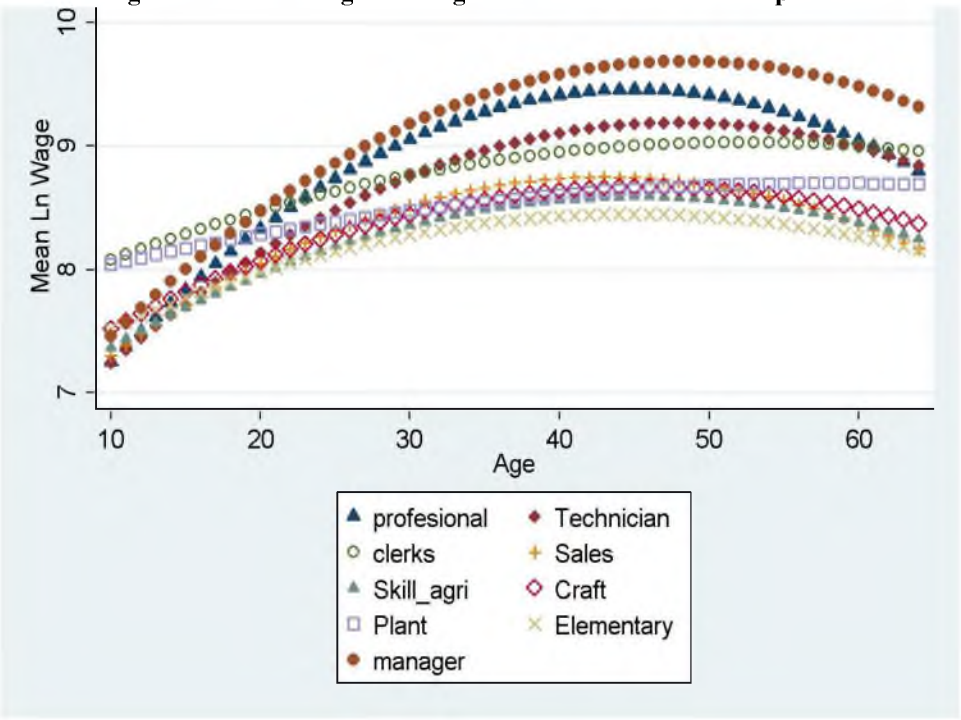


Table 3

Summary Statistics for Wages Risks, Wage Rate Risks, Hours Worked Risks and Disability Risks

Variable	Wages Risks	Wage Rate Risks	Hours Worked Risks	Disability Risks[8]
Gender				
Male	.57	.63	.22	1.4
	(.09)	(.09)	(.04)	(12.3)
Female	.77	.76	.27	.45
	(.10)	(.08)	(.05)	(7.05)
Region				
Rural	.58	.65	.23	1.7
	(.09)	(.08)	(.04)	(14.8)
Urban	.60	.65	.22	1.02
	(.12)	(.11)	(.04)	(9.3)
Province				
Punjab	.63	.67	.24	1.6
	(.11)	(.09)	(.04)	(12.0)
Sindh	.59	.64	.21	1.17
	(.11)	(.11)	(.04)	(11.0)
KPK	.58	.64	.26	.96
	(.11)	(.10)	(.04)	(9.29)
Balochistan	.52	.57	.20	0.93
	(.08)	(.08)	(.04)	(15.4)
Schooling				
Illiterate	.57	.62	.24	1.78
	(.10)	(.08)	(.05)	(12.4)
Primary (5 grades)	.57	.62	.23	2.12
	(.09)	(.08)	(.04)	(18.7)
Middle (8 grades)	.56	.61	.22	1.56
	(.08)	(.07)	(.04)	(11.0)
Matric (10 grades)	.58	.63	.22	.97
	(.10)	(.09)	(.04)	(8.96)
Intermediate (12 grades)	.59	.64	.22	0.83
	(.11)	(.11)	(.04)	(10.4)
Graduation (14-16 grades)	.67	.71	.23	0.63
	(.13)	(.13)	(.04)	(7.64)
Above Graduation (more than 16 grades)	.71	.75	.23	0.45
	(.13)	(.13)	(.05)	(6.49)
Occupations				
Managers	.79	.84	.19	0.69
	(.04)	(.05)	(.02)	(7.4)
Professionals	.82	.87	.26	0.55
	(.06)	(.06)	(.04)	(7.44)
Technicians and Associate Professionals	.61	.67	.25	0.63
	(.10)	(.08)	(.03	(7.95)
Clerical Support Workers	.51	.55	.17	0.86
	(.05)	(.05)	(.03)	(11.29)
Service and Sales Workers	.56	.62	.22	.80
	(.05)	(.04)	(.02)	(8.27)
Skilled, Agricultural, Forestry and Fishery Workers	.52	.62	.23	2.55
	(.09)	(.07)	(.04)	(14.7)
Craft and Related Trade Workers	.58	.61	.19	2.44
	(.08)	(.06)	(.04)	(13.84)
Plant and Machine Operators, Assemblers	.50	.56	.23	2.48
	(.03)	(.03)	(.02)	(20.13)
Elementary Occupations	.56	.63	.26	1.41
	(.08)	(.06)	(.03)	(12.68)
Number of Observations=77685				

[8]The labour market diability risk rate is calculated as: number of injuries faced by every individual during one year/Total number of hours worked by every worker during one year*200,000; where 200,000 = base for 100 full-time equivalent workers (40 hours per week, 50 weeks per year).

Disability Risks: Work accidents are widespread. According to the International Labour Organisation (ILO, 2010),[9] there are 340 million occupational accidents and 160 million victims of work-related illnesses annually, overall in the world. Moreover in the Middle East and Asia ILO region that includes Pakistan (but excludes China and India), work-related accident fatality rates are four-fold more than those observed in industrialized countries.

For our empirical work we define "disability risks" to be the incidence of injuries or illness at the work-place for the same 144 groups defined above.[10] The fourth column of Table 3 presents summaries of the estimated disability risks by occupation, schooling, gender, urban/rural and province. The disability risks tend to have patterns opposite to the wage risks for schooling, occupations and gender. Occupational disability rates are highest in 'Skilled, Agricultural, Forestry and Fishery Workers', 'Craft and Related Trade Workers' and 'Plant/Machine Operators and Assemblers.'

Correlations Among Risks Measures: The more correlated are the risks measures, of course, the less is gained by including multiple risks measures in our analysis. On the other hand, the more correlated are the risks the harder it would be to identify the associations of schooling with any one particular type of risks rather than other highly-correlated types. Table 4 gives the correlations among our measures. Note that the wages risks measure and the wage rate risks measure are highly correlated, but—though both are significantly correlated with the hours worked risks—for neither of the two are the correlations with hours worked risks all that high. On the other hand disability risks are negatively and significantly correlated with both the wages risks and wage rate risks, though the absolute magnitudes of these correlations are small and the correlation with hours worked risks is insignificant.

Table 4

Correlations among Wages Risks and Disability Risks

Type of Risk	Wages Risks	Wage Rate Risks	Hours Worked Risks	Disability Risks
Wages Risks	1	–	–	–
Wage Rate Risks	0.96*	1	–	–
	(0.00)			
Hours Worked Risks	0.32*	0.38*	1	–
	(0.00)	(0.00)		
Disability Risks	–.025*	–.025*	–.008	1
	(.00)	(0.00)	(.014)	

Note: *Significant at .01 level.

4. RESULTS

The primary results of interest for this study are estimates of associations between schooling attainment and wages, wage risks and disability risks. Therefore we estimate relations of the form of

[9]International Labour Organisation (2010), World Statistics: The Enormous Burden of Poor Working Condition. http://www.ilo.org/public/english/region/eurpro/moscow/areas/safety/statistic.htm Accessed on April, 8th 2011.

[10]Hersch (1998) used the same measure of disability risks for different industries.

$$Y_i = \alpha + \beta_i Z_i + \mu_i, \qquad \mu \sim (0, \sigma^2) \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad (4)$$

Where Y_i is a seven-element vector of labour market outcomes (mean wages, mean wage rates, mean hours worked, wages risks, wage rate risks, hours worked risks, and disability risks) for each individual based on his/her being in one of the 144 labour market categories as a function of the vector Z, which includes three dichotomous variables for provinces (with Punjab the omitted category), a dichotomous variable for female, a dichotomous variable for rural and seven dichotomous variables for different schooling levels.

The first three variables in Y_i —mean wages, mean wage rates, and mean hours worked—have been included because these are the work life-cycle equivalents of the variables that are the outcomes of usual emphasis in studies on associations between schooling and labour market outcomes. In addition we include various risks variables that have been defined and described above.

Table 5 presents estimates for the first three variables in Y_i. *Ln* mean wages are lower in Punjab than in the other three provinces, particularly than in Balochistan. This reflects that *ln* mean wage rates are higher in the three other provinces than in Punjab, indeed enough higher in Balochistan and in the Khyber Pakhtunkhwa to more than offset the significantly lower *ln* mean hours worked in these two provinces. The mean *ln* wages are 0.17 *ln* points lower in rural than in urban areas, primarily reflecting that the significantly lower *ln* wage rates are reinforced slightly by lower *ln* hours worked. The mean *ln* wages are 0.52 *ln* points lower for females than for males, reflecting a combination of 0.32 *ln* points lower *ln* wage rates and 0.20 lower *ln* points hours worked.[11] The coefficient estimates for the schooling levels indicate significant positive

Table 5

Regressions for Mean ln Wages, Mean ln Wage Rates and Mean ln Hours Worked

	Mean *ln* Wages		Mean *ln* Wage Rate		Mean *ln* Hours Worked	
	Coefficient Estimate	Standard Error	Coefficient Estimate	Standard Error	Coefficient Estimate	Standard Error
Province						
Sindh	0.12***	0.002	0.12***	0.002	0.006***	0.0007
KPK	0.06***	0.003	0.10***	0.003	–0.03***	0.0009
Balochistan	0.27***	0.003	0.34***	0.003	–0.06***	0.0009
Region						
Rural	–0.17***	0.002	–0.15***	0.002	–0.01***	0.0006
Gender						
Female	–0.52***	0.004	–0.32***	0.004	–0.20***	0.001
Schooling						
Primary	0.06***	0.003	0.07***	0.002	–0.005***	0.0009
Middle	0.10***	0.003	0.11***	0.004	–0.01***	0.001
Matriculation	0.25***	0.003	0.31***	0.003	–0.06***	0.0009
Intermediate	0.39***	0.003	0.51***	0.004	–0.11***	0.001
Degree	0.60***	0.004	0.74***	0.004	–0.13***	0.001
Above Degree	0.72***	0.005	0.87***	0.005	–0.14***	0.001
Constant	8.06***	0.002	2.65***	0.002	3.96***	0.0007
F(11, 77673)	7566.36		8579.84		8350.88	
Prob > F	0.0000		0.0000		0.0000	
Adj R-squared	0.56		0.53		0.54	
N	77685		77685		77685	

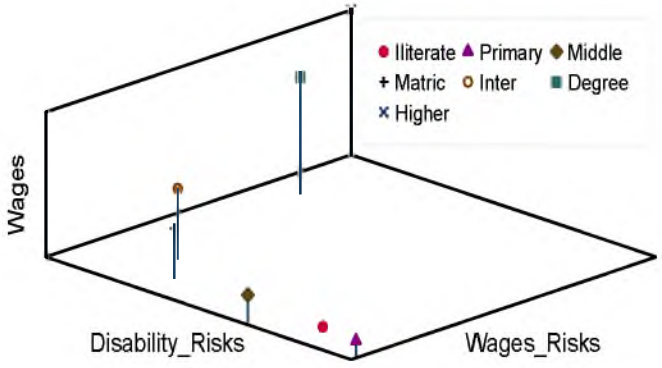
[11]Khan and Irfan (1985), Shabbir (1993, 1994) and Nasir (1999) present similar findings.

associations between schooling and ln wages and more strongly with ln wage rates. The latter more than offset the increasing significantly negative association between schooling levels and mean ln hours worked, perhaps because those with higher full incomes use part of their incomes to purchase more leisure. The patterns in the coefficient estimates for schooling attainment, thus, are consistent with the usual emphasis on positive associations of schooling with wages and wage rates, with the latter more than offsetting possibly negative associations with hours worked.

Table 6 presents the estimates for the last four components of Y_i, those related to wages risks (including the two components of wage rate risks and hours worked risks) and disability risks. For almost all of the alternative risks variables, risks are significantly greater in the Punjab than in the other three provinces, and least of all in Balochistan.[12] The single exception to this statement is that the hours worked risks are greatest in the Khyber Pakhtunkhwa. The risks are significantly less in rural than in urban areas for wages, but are significantly greater in rural areas than in urban areas for wage rates, hours worked and disabilities. Thus in terms of geography, both with reference to provinces and rural/urban areas, there is a tendency ceteris paribus for lower wages to be associated with greater risks—the opposite of what one might expect if wages included compensating differentials for risks. Females experience significantly higher wages risks than males by about 0.16 ln points, reflecting primarily higher wage rate risks but also significantly higher hours worked risks. But females experience significantly lower disability risks.

Of central interest for this paper are the associations between schooling and wages risks and disability risks, the estimated values of which are plotted in Figure 5. As compared with no schooling, having primary school does not significantly change the risk experience except for significantly slightly less hours worked risks. Having middle schooling, however, significantly reduces both wages risks (and both of its components)

Fig. 5. Schooling Levels and Associated Mean *ln* Wages, Mean *ln* Wage Risks and Mean Disability Risks (Males and Females)



[12]Punjab is the largest province of Pakistan, both in terms of population and economic activity, with a large proportion of the workforce engaged in agriculture-based employment. During the period under study there were considerable fluctuations in agricultural production (*Economic Survey of Pakistan 2006-07*), consistent with relatively high risks in this province. Siddiqui and Siddiqui (1998) and Ashraf and Ashraf (1993) present related results for earning equations.

Table 6

Estimates of Associations of Schooling with Wages Risks and Disability Risks

	Wages Risks		Wage Rate Risks		Hours Worked Risks		Disability Risks	
	Coefficient Estimate	Standard Error	Coefficient Estimate	Standard Error	Coefficient Estimate	Standard Error	Coefficient Estimate	Standard Error
Province								
Sindh	–0.03***	0.0007	–0.03***	0.0007	–0.02***	0.0003	–0.31***	0.10
KPK	–0.04***	0.0009	–0.04***	0.0009	0.02***	0.0004	–0.57***	0.13
Balochistan	–0.09***	0.0009	–0.09***	0.001	–0.04***	0.0004	–0.73***	0.14
Region								
Rural	–0.0001*	0.0006	0.01***	0.0006	0.01***	0.0002	0.53***	0.09
Gender								
Female	0.16***	0.001	0.10***	0.0009	0.04***	0.0004	–0.81***	0.14
Schooling								
Primary	–0.0001	0.0008	–0.0007	0.0007	–0.009***	0.0004	0.27*	0.14
Middle	–0.003***	0.0009	–0.003***	0.001	–0.01***	0.0005	–0.28*	0.16
Matriculation	0.006***	0.0008	0.007***	0.001	–0.01***	0.0004	–0.77***	0.13
Intermediate	0.02***	0.001	0.02***	0.001	–0.01***	0.0005	–0.83***	0.16
Degree	0.09***	0.001	0.09***	0.001	–0.01***	0.0004	–0.96***	0.15
Above Degree	0.12***	0.001	0.12***	0.001	–0.01***	0.0006	–1.08***	0.19
Constant	0.58***	0.0007	0.64***	0.0007	0.24***	0.0003	1.88***	0.11
F(11, 77673)	5506.27		4190.13		3102.92		25.13	
Prob > F	0.0000		0.0000		0.0000		0.0000	
R–squared	0.4262		0.3330		0.3053		0.0035	
Adj.R-Squared	0.4261		0.3330		0.3053		0.0035	
N	77685		77685		77685		77685	

Table 7

Estimates of Association of Schooling with Mean ln Wage, Mean ln Wage Rate, Mean ln Hrs Worked, Mean ln Wage Risks), Mean ln Wage Rate Risks, Mean ln Hours Worked Risks, Mean Disability Risks [Note: Standard Errors in Parenthesis]

	Mean *ln* Wages	Mean *ln* Wage Rate	Mean *ln* Hrs Worked	Mean *ln* Wages Risks	Mean *ln* Wage Rate Risks	Mean *ln* Hours Worked Risks	Mean Disability Risks
Province							
Sindh	0.14***	0.09**	0.06**	–0.04	–0.05**	–0.03*	–0.20
	(0.05)	(0.05)	(0.02)	(0.03)	(0.03)	(0.02)	(0.32)
KPK	0.04	0.04	0.0001	–0.07**	–0.07***	0.01	–0.38
	(0.05)	(0.05)	(0.02)	(0.03)	(0.03)	(0.01)	(0.30)
Balochistan	0.32***	0.33***	–0.01	–0.13***	–0.12***	–0.06***	–0.39
	(0.05)	(0.05)	(0.02)	(0.03)	(0.03)	(0.02)	(0.32)
Region							
Rural	–0.10***	–0.08**	–0.02	0.07**	0.07***	0.02	0.69*
	(0.04)	(0.04)	(0.02)	(0.02)	(0.02)	(0.01)	(0.25)
Gender							
Female	–0.46***	–0.40***	–0.08***	0.12***	0.05*	0.01	–0.49
	(0.05)	(0.05)	(0.02)	(0.03)	(0.03)	(0.02)	(0.31)
Schooling							
Primary	–0.21	–0.16	–0.05	–0.35	–0.11	–0.28**	–2.78
	(0.43)	(0.38)	(0.19)	(0.27)	(0.24)	(0.13)	(2.65)
Middle	1.6**	0.89	0.72**	–0.24	–0.32	–0.17	6.35*
	(0.61)	(0.55)	(0.26)	(0.37)	(0.34)	(0.18)	(3.69)
Matric	0.22	0.18	0.04	0.13	0.14	–0.12	–2.36
	(0.30)	(0.27)	(0.13)	(0.18)	(0.16)	(0.09)	(1.79)
Intermediate	0.65*	0.92***	–0.28*	–0.83***	–0.72***	–0.23**	–1.63
	(0.37)	(0.32)	(0.15)	(0.22)	(0.20)	(0.11)	(2.18)
Graduate	1.08***	1.14***	–0.07	0.39**	0.48***	–0.06	–0.76
	(0.27)	(0.23)	(0.11)	(0.16)	(0.14)	(0.08)	(1.58)
Above Degree	2.21***	2.36***	–0.15	–0.08	–0.03	–0.19***	–0.76
	(0.21)	(0.18)	(0.09)	(0.12)	(0.11)	(0.06)	(1.22)
Constant	7.17***	1.98***	3.84***	0.89***	0.83***	0.37***	1.81**
	(0.09)	(0.08)	(0.05)	(0.06)	0.05	(90.03)	(0.72)
N	106	106	106	106	106	106	106
F(11, 94)	69.30	103.65	15.55	11.29	9.60	6.34	3.84
Prob>F	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R-Square	0.89	0.92	.645	0.56	0.52	0.43	0.31
Adj. R-Square	0.87	0.91	.603	0.51	0.47	0.36	0.23

Table 6

and disability risks. Having still higher levels of schooling increasingly reduces disability risks, but increases wages risks (and even more wage rate risks that offsets slight declines in hours worked risks). Therefore the increased average wages and wage rates with more schooling noted in Table 5 may in part be due to compensating differentials for increased wages risks and wage rate risks—but there certainly is not evidence of compensating differentials for disability risks, which are negatively associated with schooling.

Figures 6 and 7 show how the mean return and risks estimates vary for male and female workers. Female workers are more exposed than male workers to disability risks and wage risks at the three lower levels of schooling and still have relatively low mean wages.

Fig. 6: Schooling Levels and Associated Mean *ln* Wages, Mean *ln* Wage Risks and Mean Disability Risks (Males Only)

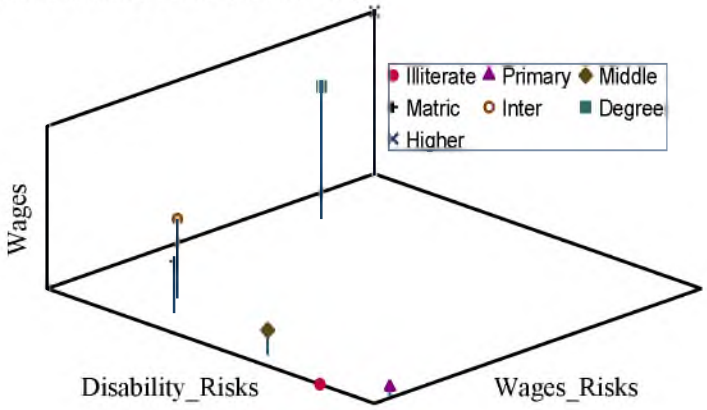


Fig. 7. Schooling Levels and Associated Mean *ln* Wages, Mean *ln* Wage Risks and Mean Disability Risks (Females Only)

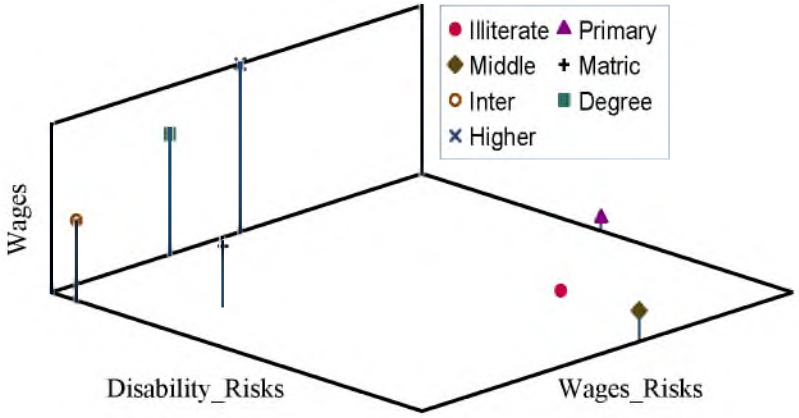


Table 7 presents alternative estimates in which the observations are the mean values for the subset of 106 of the 144 labour market categories for which there are sufficient numbers of observations (minimum number of observations in each category is

Table 7

at least 15), rather than the individuals, for the same specifications as in Tables 5 and 6. The estimates in Table 7 generally are consistent with the results in Tables 5 and 6 (i.e., positive associations of schooling with wages risks but negative association of schooling with disability risks), though with some minor differences and a tendency towards less precision.

5. CONCLUSION

Schooling is widely associated with wages in developing country labour markets. However other characteristics of these markets also may be importantly associated with schooling. Subject to the caveats about our assumptions above, we have examined what are the associations between schooling attainment and "wages risks" and "disability risks" in Pakistani labour markets. Our estimates suggest that more schooling is not only significantly positively associated with higher work life-cycle mean wages and wage rates, but also with higher wages risks and lower disability risks. These patterns also differ significantly by gender, moreover, with women with low schooling facing higher wages risks and lower disability risks than men with low schooling. Considering the wage level-schooling association alone, therefore, may be misleading regarding the associations of schooling with labour market outcomes and gender differentials in those associations.

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