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SOCIAL POLICY AND DEVELOPMENT CENTRE

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**Abstract:** This paper uses Pakistan Social and Living Standard Measurement Survey (PSLM) 2004-2005 to examine labour market earnings. The earning function controls for educational qualifications in addition to years of schooling and other conventional correlates. The estimated returns to additional years of schooling are slightly lower than previous estimates for Pakistan. The findings of the study are consistent with the notion that previous estimates of returns to years of schooling might have soaked the sheepskin effects for credentials. The reported returns to credentials for female are higher than male for whole range of educational attainments. Particularly engineering and medicine education increases female earnings substantially. Overall, the computer and engineering education payoffs are highest. The wage penalty after controlling for education and other influences declines significantly for female workers.

**Key words:** credentials, earning function, human capital, sheepskin, wage gap,

**JEL Classification:** J31 J38

# PAY OFFS TO SCHOOLING AND RETURNS TO CREDENTIALS

## 1. Introduction

The positive relationship between years of schooling and labour market earnings is well established in the field of labour economics. Economists consider investment in education as an important factor contributing to "human capital" beside skills training and health care. The argument of building human capital through schooling and training is increasingly employed by the poverty reduction policy makers in developing world (WDR 2006). This study contributes to enhance previous knowledge of positive correlation between educational experience and labour market outcomes in Pakistan by reducing statistical biases. Here an effort is made to reduce the bias in estimated coefficient of schooling by incorporating control variables for location, occupational/industry classification and "sheepskin" effects of credentials. The term "sheepskin" comes from the idea that if an individual holds a specific diploma/degree then he/she will observe a substantial change in the labour market earning compared to the workers without that diploma/degree, keeping all other factors constant.

The renewed interest in exercise of estimating returns in education for Pakistan is motivated by various factors. First, the human capital and productivity nexus is assertively propagated in poverty reduction policy documents. For instance, recently proposed Poverty Reduction Strategy Paper (PRSP-II) by Government of Pakistan calls for more investment in human capital for sustained economic growth and poverty alleviation (GOP 2007a). The estimation of impact of schooling and credentials on earning profile can guide policy makers to focus on the areas where premium to

education are substantial. Second, secondary and post secondary enrollment increased substantially during last decade, leading to the concern about relative cost and benefit of schooling for those who were not going to school in past (Mark Bary 2004, Card 2001).

This study has some fundamental contentions. First, much of the empirical work on returns to schooling is motivated by the work of Mincer (1974). According to his model, the individual earnings can be expressed as a function of years of completed schooling and experience in the labour market. The variations of the model may also include language, marital status, and other demographic variables. This specification ignores the role of diploma or credential in determination of wages. Not accounting for credentials in the basic Mincer model implies little difference between earning of two persons with same years of schooling but possessing different diplomas (i.e. an engineering degree or a medicine degree). The alternative model that has been used in different studies[1] and which recognizes the impact of credentials on labour market earnings omits the years of schooling from wage equation that means, "pure credentials" model assumes that different credentials observe substantial sheepskin effects and no impact of years of schooling on labour market outcomes.

The basic model and credential model both partially explain the theory of human capital. The earning potential of a person may come from the knowledge gained in each year of schooling and the experience which comes from only graduation or attaining a specific credential. Earlier studies in Pakistan estimated the Mincer model and credential specific earning model separately. The use of years of schooling as measure of human capital, in

[1] See Nasir and Nazli (2000), Jamal et.al (2003)

earning equation, without incorporating degree, diploma, and certificate effect may invoke bias in schooling coefficient (Ferrer and Riddle, 2001). That mean the education return coefficients in earning function soaks the impact of credentials. Of course, there are also other sources of econometric bias in earning-education relationship including idiosyncratic element like personal ability, and parental upbringing (Card, 1999). This study addresses the issue of bias in wage equation by including control variables for educational attainments and occupation-industry fixed effects.

The paper starts by discussing a descriptive picture of wage earning and educational attainment in the next section. The third section explains the econometric model and describes the data set used for estimation of the model. Main results are presented in the forth section, while policy implications come at the end with concluding remarks.

## 2. Educational Attainment and Wage Structure

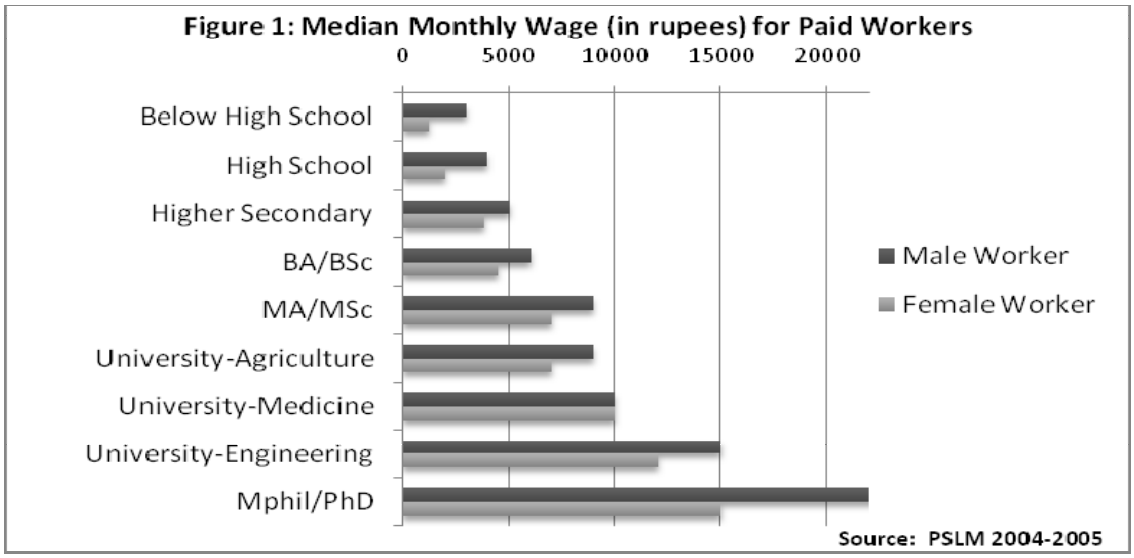
The workers educational attainment structure and labour market earnings are discussed here (Table1 and Table2). Overall share of higher educated workers increased for paid employees during last five years, while the high school drop-out share of paid workers declined substantially. That shows the growth of post secondary enrollment in public and private sector has contributed to increased number of educated workers in the labour market of Pakistan. The share of post high school qualified workers is substantially higher for female workers than male workers, which is consistent with the fact that female post secondary enrollment rate increased faster than male post secondary enrollment during last 10 years ( GOP 2007b).

| TABLE 1<br>COMPOSITION OF PAID MALE WORKERS, BY CREDENTIALS % | | | |
|---|---|---|---|
| **CREDENTIAL** | **1998-99** | **2001-02** | **2004-05** |
| Below High School | 67 | 56 | 51 |
| High School | 20 | 21 | 23 |
| Higher Secondary | 5 | 9 | 7 |
| BA/BSc | 5 | 8 | 12 |
| University-Engineering | 0 | 1 | 1 |
| University-Medicine | 0 | 0 | 1 |
| University-Agriculture | 0 | 0 | 0 |
| MA/MSc | 1 | 4 | 5 |
| MPhil/PhD | 0 | 0 | 0 |

Source: Analysis based on PIHS 1998-99, PIHS 2001-2002, and PSLM 2004-2005

| TABLE 2<br>COMPOSITION OF PAID FEMALE WORKERS, BY CREDENTIALS % | | | |
|---|---|---|---|
| **CREDENTIAL** | **1998-99** | **2001-02** | **2004-05** |
| Below High School | 42 | 44 | 30 |
| High School | 29 | 19 | 23 |
| Higher Secondary | 6 | 13 | 13 |
| BA/BSc | 9 | 14 | 20 |
| University-Engineering | 0 | 0 | 1 |
| University-Medicine | 0 | 2 | 2 |
| University-Agriculture | 4 | 0 | 0 |
| MA/MSc | 4 | 8 | 11 |
| MPhil/PhD | 5 | 0 | 0 |

Source: Analysis based on PIHS 1998-99, PIHS 2001-2002, and PSLM 2004-2005



Further, the share of high school workers in paid female labour force declined one third during last 5 years while during the same period the share of graduate female workers increased more than two times. That may be due to the delayed decision by females to enter job market, where females prefer now to complete at least a higher secondary or graduate (i.e.BA/BSc) degree before starting paid employment.

Figure-1 depicts the positive correlation between credentials and wage earnings for male and female workers. The paid employee with a university degree in agriculture, medicine and engineering or master level qualification in other disciplines earn substantially higher than high school drop-outs. The gender wage gap is consistent across credentials with female penalty of varying extent. However the premium for higher qualified female workers within female work force is larger than higher qualified male premium within male work force. For instance, the female paid employee holding engineering degree earns 6 times higher than female worker with below high school education, while male engineer earns less than 4 times than below matric male worker. The information based on the raw wage differentials produced here is further validated by taking wage differential after controlling for other factors beyond education in the next section.

## 3. The Model and Data

According to Mincer (1974), in the conventional wage equation the logarithm of earnings can be expressed as a linear function of years of completed schooling and quadratic expression of labour market experience. Most studies in Pakistan used the core specification with addition of demographic, location and other controls to estimate

returns to schooling (Nasir and Nazli, 2000). The basic Mince-Adapted models omit the diploma or certificate effect from the earning equation that leads to the concern that coefficient of years of schooling may be soaking the impact of omitted sheepskins variables[2]. For estimation of the marginal impact of credentials on earnings, Nasir and Nazli (2000) used different splines of education to construct earning function; the similar approach has also been used by some other studies (Jamal et al. 2003). The pure credential model emphasize the significance of diploma attainment on individual earning, while ignoring the importance the impact of years of schooling on earnings. The credential earning function says that substantial increase in labour earnings will be observed with degree or diploma completion, that mean large sheepskins effects for earnings (Ferrer and Riddle, 2001). Therefore, in this study the basic Mincer model has been adapted by including vector of credential dummies[3], and a set of indicator variables for location and occupational-industrial classification. The model used here is adapted from Ferrer and Riddle (2001).The econometric model for the estimation of returns of education and sheepskins is presented below.

$$ln\ Y = \alpha + \beta 1\ DEMOG + \beta 2\ \mathrm{CRED} + \beta 3\ LOCAT + \beta 3\ OCC + \varepsilon \qquad (1)$$

where

*ln Y* is the log of monthly wages/salaries in rupees

[2] Jamal et al.2003 used a variable for professional/technical education, but variety of education sheepskins were missing in their model

[3] The sheepskin dummies are constructed by cumulative approach. For instance, the indicator of matric is 1 if the individual have completed matric (i.e. high secondary or O level) class, including those who attained higher than matric degrees.

*DEMOG* is a vector of variables controlling for experience (years in the labour market in quadratic form)[4], years of education, and dummy variables indicating female gender, and marital status married;

*CRED* is a vector of indicator variables for credentials and diplomas attained by individual;

*LOCAT* is a series of dummy variables for area of residence that account for the effect of geographical differences in labour markets;

*OCC* is a set of dummy variables controlling for industry and occupation mix, that assumes a value of 1 for a specific combination of industry and occupation classification[5];

The sample for estimation of schooling coefficient and sheepskins has been extracted from first round of Pakistan Social and Living Standard Measurement Survey (PSLM). The first round of PSLM was conducted in 2004 and 2005, the survey provide labour market and educational attainment data for individuals along with other socioeconomic indicators. The sample includes only individuals between age 15 and 65 years who are paid employees and have valid industry and occupation classification codes. In order to discard outliers, sample also excludes very low (below Rs100/month) wages and salaries. The sample size for current study (i.e. 32182 persons) is substantially larger than sample used in previous studies, which allows estimating separate gender and location disaggregated equations.

[4] "Years in the labour market" is calculated using the standard Mincerian experience (age minus 5 minus years of education).

[5] The Pakistan Social and Living Standard Measurement Survey (PSLM) describe an individual's economic activity by 9 occupational classes and 9 industrial groups. A combination of occupation and industrial code identifies each individual's class of economic activity.

## 4. Empirical Findings

The econometric model presented in equation 1 is estimated by using ordinary least square method. The estimated coefficient of wage equation turns to be statistically significant with conventional signs for schooling and experience coefficient. The estimate shows that one additional year of education fetches 5 percent increase in monthly wage/salary of paid employees (Table 3, Table 4). There is little variation in schooling effect across provinces, except NWFP where an extra year of schooling increases monthly wage by 3 percent[6]. The estimate of marginal impact of one additional year of schooling is lower than estimated previously in Pakistan (Appendix Table A), particularly in two recent studies, Jamal et al. (2003) and Nasir and Nazli (2000) reported 6 percent and 7 percent returns to additional year spent in school respectively. The high value of returns estimated in past may be caused by the case that schooling coefficient soaks the impact of missing credential in the wage equation; therefore addition of educational diploma dummies in earning function might have helped to lower the previous bias. However, when compared with estimates from PIHS 2001-02 data, after including credential dummies in wage equation, the years of schooling coefficient does show an increase from 4 percent to 5 percent.

**TABLE 3**
**RETURNS TO HUMAN CAPITAL%**

| | PAKISTAN | FEMALE | MALE |
|---|---|---|---|
| Years of Schooling | 4.8 | 7.0 | 4.0 |
| Experience | 5.0 | 6.0 | 5.1 |
| Male Wage Premium | 47.4 | - | - |

Computed from OLS wage equation based on PSLM 2004-05
Estimates control for educational level and other influences on wage
Source: Authors analysis of PSLM 2004-2005

[6] The relatively low return to schooling in NWFP is surprising and demand further research.

| TABLE 4<br>REGIONAL PICTURE OF RETURNS TO HUMAN CAPITAL% | | | | |
|---|---|---|---|---|
| | **PUNJAB** | **SINDH** | **NWFP** | **BALOCHISTAN** |
| Years of Schooling | 5.0 | 5.0 | 2.9 | 5.2 |
| Experience | 4.8 | 5.1 | 4.7 | 4.2 |
| Male Wage Premium | 59.8 | 27.6 | 17.3 | 12.1 |

Computed from OLS wage equation based on PSLM 2004-05
Estimates control for educational level and other influences on wage
Source: Authors analysis of PSLM 2004-2005

The penalty for female wage earners is substantial and statistically significant after controlling for demographic, occupational and geographic controls. Overall male worker earn nearly 50 percent higher than female worker. The gender wage gap prevails across provinces, except insignificant gap for Balochistan where the male earns just about 10 percent higher than female other things equal. Highest premium of 60 percent for male is estimated for Punjab (Table 4) interestingly the uncontrolled male premium for Punjab is also about 60 percent. The female penalty for monthly wage and salary show a decline when compared to estimates of previous studies. For instance, Jamal et al (2003) estimated male monthly wage premium of 128 percent over female. It appears that non inclusion of educational attainment controls in earning function over estimated the gender wage gap in past, other wise the gender gap has not much changed at least since 2001.

The previous exercises of estimating sheepskins for various credentials have employed earning function without including years of schooling variable in the list of control variables. In this study, the completed schooling years entered in earning function as addition control that will help to lower the bias in sheepskin estimates. The dummy variable for estimation of sheepskin coefficients has been constructed using incremental approach that gives room for estimating relative and total sheepskin effects.

The relative estimate shows that the high school certificate holder earn 8 percent higher monthly wage than high school drop outs (Table 5). The person with higher secondary school certificate earns 10 percent more than Matric qualified persons. At university level engineering degree have a premium over medicine and agriculture degree, an engineer earns 53 percent higher than higher secondary school graduate followed by medicine and agriculture graduate who earn 43 and 33 percent higher than higher secondary qualified respectively. Similarly, when compared to bachelor degree a University Master degree holder gets a premium of 25 percent over a simple gradate (i.e. BA/B.Sc).

**TABLE 5**
**RETURNS TO CREDENTIALS IN PAKISTAN %**

| | OVERALL | MALES | FEMALES |
|---|---|---|---|
| High School | 8.4 | 8.6 | 23.1 |
| Higher Secondary School | 9.9 | 9.2 | 13.8 |
| Bachelor's BA/B.Sc.[a] | 10.3 | 9.5 | 12.5 |
| University-Engineering[a] | 52.7 | 51.2 | 87.8 |
| University-Medicine[a] | 42.8 | 33.9 | 64.4 |
| University-Agriculture[a] | 33.4 | 30.4 | 66.1 |
| University-Master[b] | 24.7 | 19.8 | 39.4 |
| PhD/M. Phil[c] | 72.8 | 62.5 | 95.1 |

Computed from OLS wage equation based on PSLM 2004-05
Estimates control for educational level and other influences on wage a:compared to Higher Secondary school; b: compared to BA/BSc.;c: compared to Master degree
Source: Authors analysis of PSLM 2004-2005

The gender disaggregated estimated earning function reveals that female have larger returns to credentials as compared to male[7]. Matric qualified female earn 23 percent higher monthly income when compared to high school drop out female. The wage gap between matric qualified and early drop out is more than double for female when compared to male. In this fashion, sheepskins for female are about two times than male

[7] It is worth noting that these estimates are obtained using separate regressions for male and female samples. Therefore, returns to incremental (higher) credentials are comparable keeping gender constant. For instance, returns to female higher secondary school are compared with female high school.

for agriculture, medicine, and master degrees[8]. This finding have significant implications for role of human capital in female earnings, human capital substantially improve labour market income of female paid employees. Particularly, investment in female education in fields such as engineering, medicine and agriculture substantially increase labour market earnings.

The analysis above presented marginal effect of educational attainment, as the credential dummies entered in earning function incrementally. Therefore, one can calculate the total sheepskin effect by adding individual coefficients. That shows higher secondary school certificate holder earns 10 percent more than secondary school qualified, while individuals with higher secondary school certificate earn 18 percent (i.e. 8%+10%) higher than high school drop outs. Thus total effect gives an estimate of wage gap between a credential holder and a person with no credentials (i.e. high school drop out).

The premium of engineering, medicine and agriculture degree at university level over high school drop outs is higher than premium of master degree at university level in other subjects, this gap is again larger for female. Female with medicine or engineering degree earn more than 100 percent higher than female who drop out before matric while female doing master in other subjects earn 75 percent higher monthly wages. The corresponding wage gaps for male are much less. The sheepskin effect for M. Phil/PhD degree is also higher for female (i.e. 170 percent female and 100 percent for male).

[8] Results are not reported here.

## 5. Concluding Remarks

The technological progress and emerging knowledge based economy in last 20 years has increased the demand of skilled and educated people. The growing sectors include information technology, telecommunication and financial sector. Globalization and international demand for products and services that use highly educated workers have also impacted the emerging economies such as Pakistan. These factors have pushed the wage earning of skilled and well educated labour. Estimate indicates that in Pakistan the rate of return on addition year of schooling in the form of higher earning is 5%.

This paper have estimated returns to education using latest available data, here educational credentials/qualification variables (i.e. sheepskin) are added to the earning function to reduce the bias in returns to schooling coefficient. The result is a comparatively reduced size of impact of additional year of schooling on labour market earnings. The empirical analysis depicts that increased demand for educated female workers may have led to higher schooling returns and sheepskin effect compared to male. Simple high school or higher secondary school graduates earning have become stagnant since 2001. The premium for IT experts and engineers increased while premium for medicine graduates declined, that may be an impact of oversaturated doctors market.

However this correction in returns bias need some caveat. The lake of availability of separate completed years of schooling variable in the survey data constraints independent variation in years of schooling from credentials. That problem can only be fixed by asking the question for completed years of schooling in future household surveys. The individual ability bias that is more able person pursues more schooling and get better wage in labour market still weakens the robustness of the education return estimate.

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| APPENDIX TABLE-A<br>ESTIMATES OF THE RETURNS TO SCHOOLING % | | | |
|---|---|---|---|
| | **Tayyeb & Aliya 1991** | **Nasir and Nazli 2000** | **Jamal et.al. 2003** |
| OLS estimates | 9 | 7 | 6 |
| Data Set | PLM 1979 | PIHS 1995-96 | PIHS 2001-02 |
| N | 1568 | 4828 | 12638 |

| APPENDIX TABLE-B<br>REGRESSION RESULTS, THE OLS ESTIMATES | | | | | | |
|---|---|---|---|---|---|---|
| | **OVERALL** | | **MALE** | | **FEMALE** | |
| **Log wage** | **Coefficient** | **Std. Error** | **Coefficient** | **Std. Error** | **Coefficient** | **Std. Error** |
| Years of Schooling | 0.05 | 0.00 | 0.04 | 0.00 | 0.07 | 0.02 |
| Experience | 0.05 | 0.00 | 0.05 | 0.00 | 0.06 | 0.01 |
| Experience Square | -0.07 | 0.00 | -0.07 | 0.00 | -0.09 | 0.01 |
| Male | 0.47 | 0.02 | | | | |
| Married | 0.11 | 0.01 | 0.11 | 0.01 | 0.16 | 0.04 |
| Matric | 0.08 | 0.01 | 0.09 | 0.01 | 0.23 | 0.09 |
| Intermediate | 0.10 | 0.02 | 0.09 | 0.02 | 0.14* | 0.06 |
| Engineering | 0.53 | 0.06 | 0.51 | 0.06 | 0.88 | 0.17 |
| Medicine | 0.43 | 0.05 | 0.34 | 0.05 | 0.64 | 0.12 |
| Agriculture | 0.33 | 0.08 | 0.30 | 0.09 | 0.66 | 0.15 |
| BA/BSc | 0.10 | 0.02 | 0.10 | 0.02 | 0.13* | 0.06 |
| Master | 0.25 | 0.02 | 0.20 | 0.02 | 0.39 | 0.06 |
| MPhil/PhD | 0.73 | 0.14 | 0.62 | 0.15 | 0.95 | 0.28 |
| Constant | 6.76 | 0.03 | 7.27 | 0.03 | 6.30 | 0.14 |
| N | 32182 | | 29288 | | 2894 | |
| Adjusted R-Square | 0.47 | | 0.46 | | 0.54 | |

Indicator variable for location of residence, and occupational-industry classification fixed effect were included in all regressions.

The collinearity test used for identifying collinear variables

* indicate that the coefficient is not statistically significant at the 1 % level. All other coefficients are significant at the 1 % level.

Source: Authors analysis of PSLM 2004-2005