

STYLIZED FACTS VS EVIDENCE; THE REPERCUSSIONS OF HUMAN CAPITAL MISMATCH ON INCOME INEQUALITY IN PAKISTAN

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Abstract

This paper examines the impact of human capital mismatch on earnings inequality in Pakistan and compares the evidence to test its conformity to the widely observed stylized facts.

Human capital mismatch in the labor market is represented by job specific earnings differences between over, under and adequately educated persons. Three main methods are generally used to measure the mismatch including workers' self-assessment, job analysis and realized method. Present study uses the realized method to measure the over, under and adequate education levels from the given set of data thus being more representative of the in-focus job market.

Using Duncan and Hofmann variation of the Mincerian earnings function and a transformed dataset from Household Integrated Income and Consumption Survey, the paper confirms existence of earnings disparities due to human capital mismatch in Pakistan. Empirical results mostly conform to the stylized facts about pattern of mismatch and earning differences.

Key Words: Human Capital, Overeducation, Undereducation, Job-Education Mismatch

2. INTRODUCTION

Human Capital is the most important ingredient and component of the labor market. It is comprised of the set of skills that an individual acquires through education and training. The experience further polishes the skills adding to individual's human capital (Becker, 1964). Acquired education is main building block of human capital and a good indicator of individual's productivity which is major determinant of its compensation or reward. So it further implies that keeping other factors constant, earning of the equally qualified persons should be uniform. But in real world, other factors like structure and dynamics of labor market also impact rewards. This results in job-education mismatch and earnings inequalities among people with same level and field of qualification. (Berg, 1970 and Freeman, 1976).

The issue of job education mismatch got attention of economists in early 1970s reason being that education boom in this period resulted in substantial reduction in returns to education, job-education mismatch and earning inequalities that continued to grow steadily through 1980s and 1990s (Ordine, et al., 2017). Berg (1970) was the first to highlight the issue of mismatch and Freeman, (1975) coined the term "Overeducation" and his seminal work proved to be a catalyst for further research on the issue. Before all that, Mincer (1958) devised "Mincerian Earnings Function" presenting earnings as a function of education and experience

and this function is one of the most widely used models in empirical economics. Duncan and Hoffman (1981) presented their variation of Mincerian Earnings Function, decomposing education into over, under, and required education relative to respective job. Their wage equation helped lay foundation of a new subfield namely Economics of Over-education.

Researchers in this field try to capture the dynamics of human capital mismatch and resulting earning inequalities among equally educated individuals. Structure and dynamics of labor market, education system, technology, growth, personal abilities, educational quantity and quality, job characteristics etc., are modelled and tested to comprehend the phenomenon. (Allen and De Weert, 2007 ;Sala , 2011)

Human capital or job-education mismatch is classified into two distinct classes i.e., horizontal and vertical mismatch. Horizontal mismatch is characterized by a difference between field of qualification and field of employment for example, an engineering graduate working as an accountant. On the other hand, vertical mismatch occurs when there is a difference between the level of qualification and that of the job. A person having a high level degree like an engineering graduate working on a cash-register, and a person having lower qualification working on a higher level job are two opposite cases of vertical mismatch. Former is known as over-education and later as under-education (Allen & van der Velden, 2001).

An important question arises, why is there job-education mismatch in the labor market? Different labor market theories are put forward to understand this phenomenon and the consequent earnings inequalities.

Human Capital Theory (Becker, 1964) suggests that availability of human capital and emerging technologies direct firms' adoption of optimal production processes. Transition and adjustment to technological change create mismatch in short run that would be overcome and any mismatch in long run is merely result of personal inabilities. Job Competition Model (Thurow, 1975) terms job characteristics and not the individual characteristics as determinant of productivity and only job required qualification would pay and any surplus education would have no returns. A job queue remains static while individual queue expands due to people getting more and more education to acquire competitive edge in the labor market thus creating a mismatch. Job Assignment Model (Satinger, 1993) includes both individual and job characteristics as the determinant of productivity and earnings. So changes in both job and individual characteristics result in mismatch. Sicherman and Galor (1990) suggest that in early career people accept low level jobs to gain much sought after experience and move up in the ladder to later get a matching job. Most of the present studies confirm this explanation of the education-job mismatch.

Human capital mismatch has negative consequences on individual, enterprise and national levels. At individual level it result in sub-optimal marginal productivity and earnings, lower job satisfaction and higher job switching rate (Robst, 2007). A higher job switching increases screening, training and recruiting costs for the firms. At national level resources wasted on education that could not be materialized into productivity create a dead weight loss (Ordine, et al., 2011). It even has consequences for adequately educated individuals, as over-education potentially raises minimum thresholds of required education in the labor market (Robst, 2007; Wolbers, 2003).

The problem of job-education mismatch has gained attention of scholars globally but in Pakistan the issue got attention relatively recently as the exponential growth of educational institutions, producing huge number of graduates every year coupled with fewer jobs due to economic crisis has worsened the mismatch (Hassan et al., 2013). Huge diversity in education quality implies huge disparity in access to better jobs and earnings for graduates of same level graduating from institutions of different reputation (Farooq, 2011). According to the Pakistan Bureau of Statistics (2021) over 209 public and private sector higher education

institutes are producing around 500,000 university graduates each year that is huge as compared to the lower absorption capacity due to economic downturn.

Despite the severity and seriousness of the issue there is a very lower number of studies that are mostly descriptive to understand Pakistan specific dynamics of the problem and suggest appropriate policy measures. An appropriate approach would be to test the conformity of stylized facts as observed by Duncan and Hoffman (1981); Hartog (1986); Rumberger (1987); Hartog and Oosterbeek (1988); Schirman, (1991); and Slonimczyk, (2013). These facts serve as rules of thumb to comprehend various dimensions of the problem and are presented as under:

- Educational mismatches contribute to income inequality.
- Overeducated individuals earn less than their equally qualified peers in jobs that match their qualifications.
- Overeducated individuals earn more than coworkers with lower but matched qualifications.
- Undereducated individuals earn more than those with similar qualifications but working in matching jobs.
- Undereducated individuals earn less than those with higher, but suitably matched qualifications working at the same job level.

Present study analyzes the impact of vertical job-education mismatch on income disparities in Pakistan and tests the conformity of the results of empirical analysis to the above mentioned stylized facts. To this end it develops an empirical model, estimates an earnings equation and conducts a comprehensive analysis, examining combined, gender-based and province-wise perspectives.

Hopefully, understanding the dynamics of job-education mismatch and its role in creating earnings disparities would contribute on many levels. For researchers, the study can serve as a catalyst for further research and for policy makers it would help in better policy and decision making to minimizing mismatch and its consequences.

2. Methodology

2.1. Measurement of educational mismatch

Existing literature employs various subjective and objective methods to measure job-education mismatch. Worker's self-assessment method is subjective in nature that measures the mismatch based on worker's own perception of required education that differs from his/her attained education. On the other hand, job analysis and realized match methods are objective in nature. Job analysis method measures the difference between education level determined by professional job analysts for each job category and that possessed by individual worker. While realized match methods calculates required education from mean or mode of education level for each job category in given dataset and considers mismatch as one standard deviation above or below mean education (Summers,1971). Present study uses realized match method while using mean education as a determinant of adequate or required education level for each job category.

2.2 Model Specification

This study uses Duncan and Hofmann (1981) modification of human capital earnings function originally presented by Mincer (1974). This modification is also known as ORU specification as it decomposes education into required, over and under-education as below:

$$\ln W_i = X_i \cdot \phi_i + \beta_r E^r + \beta_s E^s + \beta_d E^d + \epsilon_i \quad \dots \dots \dots (1)$$

Here, E^r , E^s , E^d are 'required, over (surplus), and under (deficit) education levels, while $\ln W_i$ is log of earnings, and X_i is vector of control variables including experience, experience

squared, marital status and gender. This equation decomposes attained education and compares it with education level that is required by worker's present job as follows:

$$E^a = E^r + E^s - E^d \quad (\text{Attained education} = \text{required education} + \text{surplus education} - \text{deficit education})$$

Such a decomposition logically follows that:

For overeducated worker if $E^a > E^r$ then $E^s = E^a - E^r$ gives years of surplus education

For undereducated workers if $E^r > E^a$ then $E^d = E^r - E^a$ gives years of deficit education

This paper estimates three variations of the equation (1) and acquires OLS estimates with robust standard errors. The variations include total, province-wise and gender-wise regressions respectively

2.3 Theoretical Interpretation of Coefficients

A theoretical insight of coefficients of ORU specification is provided by Sicherman (1991), postulating that coefficients in equation (1) contain important information. This information can be extracted by careful theoretical interpretation of the respective coefficients in the following way:

- β_s = Returns to additional year of schooling exceeding what is required by job (for an overeducated worker) relative to coworkers that are on the same job but their education matches job requirement.
- $\beta_s - \beta_r$ = Returns to additional year of schooling exceeding what is required by job (for an overeducated worker) relative to workers with equal schooling but working on matching jobs elsewhere.
- β_d = Wage loss or penalty due to a year of under-schooling (for an undereducated worker) relative to coworkers that are on the same job but their education matches job requirement.
- $\beta_r + \beta_d$ = Wage difference between an (undereducated) worker working on the job that requires an additional year of schooling and of those who have the same level of schooling but work on matching job elsewhere.

Moreover, estimated coefficients β_r , β_d and β_s can be used to test standard human capital and job competition theories as well. First, if restriction $\beta_r = \beta_s = -\beta_d$ empirically holds then the model completely aligns with standard human capital theory, rewarding education equally purely without any discrimination of over or under education. Second, if $\beta_s = \beta_d = 0$ holds, it implies that surplus or deficit education and no consequential rewards are purely based on job requirements thus conforming to job competition theory.

2.4 Data Sample and Source

The study is based on relevant data from Household Integrated Income and Consumption Survey (HIICS) conducted in 2015-16 by Pakistan Bureau of Statistics (PBS) after merging Family Budget Survey (FBS) and Household Integrated Economic Survey (HIES) (HIES, 2016). The survey covered 24,238 households from all urban and rural areas of four provinces of Pakistan and provides information on household income, savings, consumption patterns, consumption expenditure and liabilities. Only data on variables relevant to present study from Section 1 and Section 2 of the survey is retrieved and transformed to conduct

required empirical analysis. Farmer provides information about household and employment while later provides information about education. The reason for using survey data for years 2015-16 is the presence of relative economic stability so as to avoid the impact of lateral economic crisis on dynamics of human capital mismatch and earnings disparities. Later years up to present time are marred with multifaceted economic crisis including very low growth rates in manufacturing, agriculture and services sectors, swerve stagflation, political and fiscal instability unmanageable debt and foreign exchange crisis etc.

3. RESULTS AND DISCUSSION

3.1 Empirical Results

Using the ORU model as given in equation (1), empirical analysis are conducted at three different levels i.e., OLS regression for entire data set, province-wise level and gender-wise level. Obtained results and relative discussion is presented as under:

3.1.1 Overall Regression

Table 2a Overall Regression
Dependent Variable: Natural Logarithm of earnings

Variables	Coefficients
Required Education	0.170 ^{***} (82.54)
Overeducation	0.143 ^{***} (40.73)
Undereducation	-0.0902 ^{***} (-28.04)
Experience	0.0636 ^{***} (37.71)
Experience Sq	-0.000870 ^{***} (-27.71)
Gender	1.073 ^{***} (47.24)
Marital Status	0.105 ^{***} (7.93)
KPK	0.00893 (0.75)
Sindh	-0.0759 ^{***} (-7.52)
Baluchistan	0.0602 ^{***} (4.35)
Constant	6.106 ^{***} (173.68)
<i>N</i>	24142

t statistics in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
- mean_edu + OVedu = 0 : $F(1, 24131) = 52.40$, Prob > F = 0.0000

The results in Table 2a for overall regression confirm the hypothesis of difference in rewards between an additional year of required, under and over education. F-test reaffirms overall significance of regression coefficients. The rewards of an additional year of required education is 17% which is more than that of additional year of overeducation that stands at 15%. It can also be seen that a year of undereducation bears the penalty of 9%. One more

year of experience is rewarded at 6.5 % and a significant experience squared confirms diminishing returns to education. The results not only confirm the stylized facts but also reveal striking gender disparity, as is obvious in the results as depicted by 192% higher wage for males compared to females.¹ Such discrimination may be attributed to explicit and implicit male biases, occupational segregation as women are often concentrated to lower-paying/informal jobs, the limited opportunities due to restricted access of women to education, skill development and professional growth and other unmeasured factors like job type, hours worked and regional disparities.

3.1.2 Province-Wise Regression

Table 2b Province-wise Regression

Dependent Variable: Natural Logarithm of earnings

Variables	(Punjab)	(Sindh)	(KPK)	(Baluchistan)
Required Education	0.172 ^{***} (49.30)	0.187 ^{***} (52.23)	0.141 ^{***} (33.32)	0.146 ^{***} (25.15)
Overeducation	0.150 ^{***} (24.28)	0.142 ^{***} (23.98)	0.143 ^{***} (18.04)	0.124 ^{***} (15.45)
Undereducation	-0.0903 ^{***} (-18.97)	-0.114 ^{***} (-19.28)	-0.0642 ^{***} (-8.37)	-0.0672 ^{***} (-7.52)
Experience	0.0641 ^{***} (22.52)	0.0566 ^{***} (20.87)	0.0746 ^{***} (19.34)	0.0563 ^{***} (12.91)
Expsq	-0.000886 ^{***} (-17.33)	-0.000720 ^{***} (-14.52)	-0.00112 ^{***} (-14.56)	-0.000669 ^{***} (-7.60)
Gender	1.256 ^{***} (39.69)	1.177 ^{***} (27.34)	0.469 ^{***} (9.57)	0.491 ^{***} (6.07)
Marital Status	0.135 ^{***} (6.31)	0.0493 [*] (2.18)	0.140 ^{***} (4.71)	0.0935 ^{**} (2.74)
Constant	5.903 ^{***} (109.80)	5.892 ^{***} (94.77)	6.825 ^{***} (90.60)	6.986 ^{***} (56.51)
<i>N</i>	10649	6421	4723	2349

t statistics in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2b presents results of OLS regressions for all the four provinces of Pakistan. The results reconfirm the earnings disparities arising out of over and undereducation except for KPK that shows no significance difference. An additional year of required education rewards increment earnings to 17%, 19%, 14% and 15% in Punjab, Sindh, KPK and Baluchistan respectively. For overeducation increments are 15%, 14%, 14% and 12% while a year of undereducation bears a penalty of while 9%, 11%, 6%, 7% in same provincial order.

¹ The dependent variable is log of wages so gender coefficient would be interpreted as: $(e^{1.07}-1) \times 100 \approx (2.92-1) \times 100 = 192\%$

The results show more severe gender discrimination in Punjab and Sindh as results for male depicted by 251%, and 224% higher wage respectively for males compared to females. A relatively milder discrimination is depicted by 60% and 63% higher wages for males in KPK and Baluchistan respectively. These results on their surface defy common perception but the possible explanation lies in more relatively structured economic systems in Punjab and Sindh, where men dominate higher-paying jobs. Occupational segregation in competitive sectors and heavy urbanization reinforcing male dominated labor markets intensify discrimination. KPK and Baluchistan although culturally more patriarchal have relatively milder discrimination due to informal, subsistence-based economies and limited industrialization.

3.1.3 Gender-Wise Regression

Finally empirical analysis are conducted based on male and female divisions of the data. The results for these two regressions are presented in table 2c.

Table 2c Gender-wise Regression
Dependent Variable Natural Logarithm of earnings

	(Male)	(Female)
Required Education	0.147 ^{***} (76.53)	0.278 ^{***} (38.50)
Overeducation	0.132 ^{***} (39.44)	0.292 ^{***} (13.51)
Undereducation	-0.0755 ^{***} (-24.41)	-0.186 ^{***} (-11.07)
Experience	0.0584 ^{***} (36.36)	0.0907 ^{***} (13.12)
Experience Sq	-0.000815 ^{***} (-26.81)	-0.000977 ^{***} (-6.40)
Marital Status	0.170 ^{***} (14.18)	-0.155 ^{**} (-3.11)
KPK	-0.0438 ^{***} (-3.76)	0.399 ^{***} (7.29)
Sindh	-0.0856 ^{***} (-9.02)	0.0281 (0.60)
Baluchistan	0.0124 (0.95)	0.535 ^{***} (7.55)
Constant	7.432 ^{***} (315.76)	4.497 ^{***} (41.92)
<i>N</i>	21732	2410

t statistics in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2c presents gender sorted regressions with some very interesting results. The results for male workers reinforce conformities as in table 2a and 2b as additional year of required education give 16% rise to wages while as against 14% for overeducation and a 9% penalty for undereducation. However a year of overeducation is offering higher return at 29% than 27% of required education for females sorted regression. Increased education participation and a male dominated labor market with very lower female participation entice employers to take advantage of the situation. In an attempt to tap on signaling value of education offering higher productivity they offer slightly higher returns to attract overeducated female workers even if the job doesn't fully utilize the worker's qualifications.

4. Conclusions

Human capital is made up primarily of education, skills and experience which determines marginal productivity and consequent rewards (earnings) in pure theoretical settings. However in reality, heterogeneity may arise out of personal abilities and quality of schooling, altering the signal mechanisms that operate as per given patterns in different job markets. For a host of reasons and as in other developed and emerging economies, job-education mismatch, termed more appropriately as human capital mismatch is widely prevalent in Pakistan. A prolonged boom in education and a recession in economy has worsened the situation, specially the incidence of overeducation. The level of job is the direct determinant of earnings and present study has confirmed that a higher incidence of mismatch between level of education and level of job is causing worrisome earnings disparities in Pakistan. A more comprehensive and well-organized view of human capital mismatch on earnings, widely known as Schirman's Stylized facts are also confirmed by this study. Gender discrimination in labor market is widely observed phenomenon, especially in more patriarchal societies like Pakistan. But present study brings to surface an interesting fact, observing that levels of gender based wage disparities are higher in more developed, economically advanced and culturally relatively liberal areas of Pakistan than in backward areas. This interesting fact requires more research and present study has presented some seminal arguments in section (3). Hopefully this study would provide valuable insights into the issue of human capital mismatch and its impact on earnings disparities both to the researchers and policy makers.

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