

MICROECONOMETRIC ANALYSIS OF EARNINGS ORIENTED EDUCATIONAL SYSTEM OF LAHORE (PAKISTAN)

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Abstract. This study explores the factors that affect earnings and estimates returns to education (RTedu) for the workforce of educational institutions in Lahore (Pakistan). Primary data were collected by the researcher himself from a sample of 8327 respondents in 2011. Education, experience, training, computer use, gender, marital status, institution sector from where the respondent has completed Secondary School Certificate, nature of job, family background, and family status are found to be contributing to the earnings of the workforce of various categories of the educational institutions. RTedu for the workforce of schools, colleges and universities increases, on average, by 12.4, 15.8, and 12.5 percent, respectively for every one year increase in schooling. RTedu has been found higher for the workforce of various categories of private sector as compared to the workforce of various categories of public sector educational institutions. Human capital theory is found to be valid. The concavity in experience-earning profile is observed. This study recommends some solid measures that address, reduce and minimize the ever widening relative earning differentials.

Keywords: Returns to education, Microeconometric analysis, Earnings oriented educational system, Earning differentials, Human capital theory

JEL classification: I21, I24, I25, J01, J21, O15, P36, P46

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I. INTRODUCTION

The importance of education as a basis of income differentials is well recognized in both theoretical and empirical literature. Education, experience, trainings and skills are the main levers for acquiring and accumulating human capital. Some nations are richer and prosperous than others. Education proved itself to be the main cause of these variations across nations. Besides education, there are other factors, for example, working experience, training acquired, computer skills, publications, gender, marital status, sector from where the respondent has acquired his/her Secondary School Certificate (SSCsector), nature of job, family background, and family status that determine individual's earnings. Identification of factors that determine workforce earnings can help in designing and formulating policies, not only to boost up the social and economic status of the workforce but also to minimize the overall inequalities between regions and gender regarding income distribution.

The positive linkage between formal education and earnings is well established in empirical literature in Pakistan (Abbas and Foreman-Peck, 2007; Afzal, 2011; Ahmed and Sirageldin, 1994; Asadullah, 2005, 2009; Ashraf and Ashraf, 1993a; 1993b; Ashraf, 2011; Aslam, 2007; Arif and Iqbal, 2008; Aslam, Bari and Kingdon, 2008; Awan *et al.*, 2008; Guisinger, Henderson and Scully, 1984; Hamdani, 1977; Haque, 1977; Hyder, 2007; Khan and Irfan, 1985; Kurosaki and Khan, 2006; Nasir, 1998; Nasir and Nazli, 2000; Nasir, 2002; Nasir, 1999; Nazli, 2004; Pasha and Wasti, 1989; Qureshi and Arif, 2001; Riboud, Savchenko and Tan, 2006; Siddiqui and Siddiqui, 1998; Shabbir, 1991; 1994; Shabbir and Khan, 1991; Shah, 2007) and in abroad (Ashenfelter, Harmon and Oosterbeck, 1999; Carnoy, 1997; Cohn and Addison, 1998; Griffin and Edwards, 1993; Griffin and Ganderton, 1996; Kurosaki and Khan, 2006; Light, 1998; Mincer, 1974; Mace, 1992; Psacharopoulos and Layard, 1979; Psacharopoulos, 1985; Preston, 1997). The above-mentioned studies related to Pakistan have investigated the rate of RTEdu and earning differentials and found enhancing role of education in determining the earnings of the individuals. Education and earnings of the workforce are found to be directly correlated in Pakistan (Afzal, 2011).

There are a variety of factors that play a decisive role in determining the earnings of both teaching and non-teaching workforce of educational institutions of Pakistan. Differential labour market RTEdu for teaching (both male and female) and non-teaching (both male and female) workforce in private as well as public sector educational institutions is one of the potential explanations for large gender and occupation earning differentials in

Pakistan. The present study empirically tested this argument by first examining the role of different determinants on the workforce earnings profiles and then estimates the rate of RTEdu for the workforce of institutions of general education, located in Lahore district of Punjab province of Pakistan.

The present study has the following objectives:

1. To explore the connection between individual's earnings and major determinants of earnings and to evaluate the rate of RTEdu, when education of the workforce is measured by 'years of schooling completed'.
2. To explore the nature of education-earnings relationship for both teaching and non-teaching workforce of both private and public sector educational institutions.
3. To test the validity of the Psacharopoulos (1994) finding for the workforce of educational institutions such that the private sector workforce has a higher rate of RTEdu than that of the public sector.

The present study was planned to test the following questions:

1. Is there any linkage between individual's earnings and major determinants of earnings for the workforce of educational institutions?
2. Is the nature of education-earning relationship for both teaching and non-teaching workforce same for each category (public versus private) of educational institutions?
3. Is the marginal rate of RTEdu for the workforce of private sector educational institutions higher than that of their counterparts in public sector educational institutions?

This research is of great value for individuals as to decide whether to pursue further education or to join the labour market. Individuals will prefer to continue further formal education, if they expect that the present value of the marginal benefit of schooling is greater than the present value of the marginal cost of schooling. Public decision makers want to know how to allocate scarce resources between education sector and other sectors of the economy and among various categories of educational institutions (school, college, university). The results of this study also serve as a guideline to education policy makers in Pakistan, particularly relating to efficient allocation of scarce resources among various levels of educational institutions, and how funding and access to various levels of educational

institutions affects equity. This study has its own significance in empirical literature, because it is based on purposive primary data collected by the researcher himself on the workforce of institutions of general education.

II. REVIEW OF RELATED LITERATURE

The linkage between education and its wage benefit is well known in market economies. Human capital theory that is mainly based on education has supplied the basis for the investigation of effect of education on earnings since the late 1950s.

Ashenfelter, Harmon and Oosterbeek (1999); Carnoy (1997); Cohn and Addison (1998); Griffin and Edwards (1993); Griffin and Ganderton (1996); Griliches (1977); Light (1998); Mace (1992); Mincer (1974); Psacharopoulos (1985); Psacharopoulos and Layard (1979); Preston (1997) and Afzal (2011) used "Earning Function" to set up a linkage between earnings and education and evaluated the rates of RTEdu. The results of all these studies supported the positive association between education and earnings. Harmon, Oosterbeek and Walker (2000) found that the European countries like UK had 7-9 percent returns to a year of schooling which was higher than the Nordic countries. They have also explained that if the simple OLS method is applied then the RTEdu at school level becomes more stable. More educated workers received higher earnings as compared to less educated (Mincer, 1974; Takii, 2003). The returns to an additional year of schooling are relatively higher than an additional year of job-specific experience. Higher level of education leads to more earnings as the employment experience lengthens (Kirby and Riley, 2004).

A few attempts by Hamdani (1977), Haque (1977), and Guisinger, Henderson and Scully (1984) using data from 1975 Socio-Economic Survey of Rawalpindi (Pakistan); Khan and Irfan (1985) using the Population Labour Force and Migration Survey (PLMS); Pasha and Wasti (1989); Shabbir (1991; 1994) and Shabbir and Khan (1991) by using data from PLMS, 1979; Ashraf and Ashraf (1993*a*; 1993*b*) using data from 1975 Socio-Economic Survey of Rawalpindi (Pakistan) and data for industrial groups from Household Income and Expenditure Surveys (HIES), 1979 and 1985-86; Ahmed and Sirageldin (1994); Nasir (1998); Siddiqui and Siddiqui (1998); Nasir (1999); Nasir and Nazli (2000) using data from the PIHS, 1995-96; Nasir (2002) using data from the PIHS, 1995-96; Nazli (2004) using data from the Pakistan Socio-Economic Survey (PSES) 1998-99; Asadullah (2005, 2009); Riboud, Savchenko and Tan (2006); Aslam (2007) using the PIHS, 2002; Aslam, Bari and Kingdon (2008); Hyder (2007) using

data from the Pakistan Labour Force Survey (PLFS), 2001-02; Abbas and Foreman-Peck (2007) using data from the Pakistan Social and Living Standards Measurement Survey (PSLSMS), 2004-05; Shah (2007); Ashraf (2011) using 2001-02 PIHS data have been made to investigate RTEdu and earning differentials by using secondary source data such as PSLSMS, PLFS and PIHS in Pakistan labour market.

All of the above-mentioned studies on Pakistan about PRTEdu were mostly out dated and often constrained by data, number of variables included and methods of estimation. Comparison between the results of the above studies on Pakistan was little bit difficult. However, two consistent findings from these studied emerged: (i) rate of RTEdu in Pakistan was lower than that of other developing countries and (ii) rate of Private Financial Returns (PFR) increases with the level of education. There is hardly any study, except Afzal (2011), based on primary data that estimates the RTEdu, the determinants of individual's personal earnings and earning differentials of the general educational institutions workforce of Pakistan education labour market. The present empirical study differs from previous studies conducted in Pakistan on the basis of nature of data (primary data personally collected by the researcher), sample size (8327 observations), geographical study area (Lahore: the second most populous district of Pakistan), occupation of the workforce (teaching and non-teaching workforce), and the sectors (both private and public) of educational institutions.

III. METHOD AND PROCEDURE

This study applied Mincerian style Human Capital Earnings Function Approach (Basic as well as Augmented) to estimate RTEdu and to determine the factors that affect the earnings of the workforce working at educational institutions. Data were collected by the researcher himself from the workforce of the educational institutions by using the questionnaire in 2011. The questionnaire used for data collection was got validated through opinion of experts in the field of economics and education and then pre-tested in the field to make it understandable for every respondent. Questionnaire was improved based on the response rate of the respondents and results of the pre-test. The data obtained through survey was analyzed by using OLS econometric method.

MODEL SPECIFICATION

To identify the determinants of earnings and to estimate the rate of RTEdu, this study considered the following models:

The Mincer Basic Human Capital Earnings Function

According to Mincer (1974) ‘Human Capital Earnings Function Model’, the natural log of individuals earnings in a given time period can be decomposed into an additive function of a linear education term and a quadratic experience term as given below:

$$\ln Y_i = \beta_0 + \beta_1 Edu_i + \beta_2 Experi_i + \beta_3 Experi_i^2 + \varepsilon_i \quad (\text{Basic Model})$$

Mincerian Type Earnings Function

The ‘Mincerian Type Earnings Function’ or ‘Augmented Version of Earnings Function’ is specified in the form of regression model as:

$$\ln Y_i = \beta_0 + \beta_1 Edu_i + \beta_2 Experi_i + \beta_3 Experi_i^2 + \sum_{i=1}^k \beta_i X_i + \varepsilon_i \quad (\text{Model 1})$$

The *specific form* of the model 1, when education is measured by ‘years of schooling completed’, is as under:

$$\begin{aligned} \ln Y_i = & \beta_0 + \beta_1 Edu_i + \beta_2 Experi_i + \beta_3 Experi_i^2 + \beta_4 Train_i + \beta_5 Compu_i \\ & + \beta_6 Pub_i + \beta_7 Gend_i + \beta_8 Mstatus_i + \beta_9 SSC\ sector_i \\ & + \beta_{10} Jnature_i + \beta_{11} Fback_i + \beta_{12} Fstatus_i + \varepsilon_i \end{aligned} \quad (\text{Model 1.1})$$

Where

\ln = Natural logarithm

$\ln Y_i$ = Natural logarithm of Y_i and ‘ Y_i ’ stands for the net earnings per hour of workforce of school, college and university in the fiscal year 2011. Net hourly earnings includes net salary from the main job and from other jobs, plus income from occasional jobs (e.g., payment from research project, script marking etc.) other than running a private business or income from farming a family agricultural land, plus income from entrepreneurialship. Workforce earning is measured per hour basis instead of monthly basis as it is an international practice.

Edu_i = Education of the i^{th} workforce. Edu_i includes individual’s education in ‘years of schooling completed’. Education is the main explanatory variable in the earnings equation. The estimated coefficient β_1 associated with Edu_i measures the marginal rate of PFR (i.e., the percentage change in earnings due to Edu_i) to an additional year of schooling. In this study, it is expected that $\beta_1 > 0$.

- $Experi_i$ = Total number of years of actual work experience of the i^{th} respondent.
- $Experi_i^2$ = Square of actual work experience of the i^{th} respondent. A positive value of the coefficient of the variable 'experience' and negative value of the coefficient of 'experience square term' reflect the concavity of the experience-earnings profile. The concavity in experience-earning profile would reflect that additional years of experience will lead to high earnings, but at decreasing rate.
- $Train_i$ = Formal training acquired (dichotomous variable = '1' if workforce has got training, '0' otherwise.) by the i^{th} respondent. The impact of post schooling/in service training on earnings is found substantially positive in many developing countries including Pakistan (Jimenez and Kugler, 1987; Gaag and Vijverberg, 1989; Nasir, 1999).
- $Compu_i$ = Computer literacy/skills that was proxied by use of computer and Internet at home and at work ('1' for using computer and internet and '0' for not using computer and internet at work place and at home) of the i^{th} respondent. This study differs from other studies because of the use of 'computer index' rather than simply using 'dummy variable representing computer and internet uses as have been done by Afzal (2011). Since schooling, training and use of computer and Internet are major type of investment, so this study expected the positive linkage between earnings and use of computer and Internet.
- Pub_i = Number of research articles published in journals of national and international repute by the i^{th} respondent. The relationship between earnings and research publications is expected to be positive if publications were derived from the funded research, whereas the relationship between earnings and research publication was negative if the publication were derived from non-funded research as the workforce cannot perform earning activities while involving in research.
- Gen_d_i = Gender ('1' for male workforce and '0' for female) of the i^{th} respondent. The relationship between earnings and gender was subjected to empirical outcome.
- $Mstatus_i$ = Marital status ('1' for married and '0' for unmarried) of the i^{th} respondent. The sign of the relationship between earnings and

marital status was subjected to empirical outcome.

$SSCsector_i$ = Institution sector from where the i^{th} respondent has completed his/her Secondary School Certificate ('1' for government institution and '0' for private institution). The relationship between earnings and SSC was ex ante unclear.

Following Heckman and Hotz (1986), Afzal (2011) and others, this study attempts to control for individual ability, which is known to bias the estimates of the RTEdu, by using the educational attainment of the individual's parents (father and/or mother) as proxies. Parents' education through family connections and nepotism, etc. may either have a direct effect on the earnings of workforce in the labour market or indirect effect through its effect on schooling quality. Such types of arguments make a case to include parents' education as to control variables in "Earnings Functions" rather than use them as an instrument for workforce education.

$Fback_i$ = Family background measured by the i^{th} workforce father education in years of schooling of the i^{th} respondent. Armitage and Sabot (1987) for Kenya and Tanzania, Liu *et al.* (2000) for Taiwan, Neuman (1991) for Israel and Patrinos (1995) for Greece, San-Segundo and Valiente (2003) for Spain and Afzal (2011) for Pakistan have used father's education as a measure of family background in their studies. Afzal (2011) found a direct relationship between earnings of the workforce and their father education in case of Pakistan.

$Fstatus_i$ = Family status of the i^{th} respondent and was measured by workforce car ownership ('1' for having car ownership and '0' for not having car ownership): Workforce car ownership was one of the most important indicators of family status. Owning at least one car is considered as one of the most important indicators of family status in many developing countries, especially in Pakistan. Car(s) and home ownership is deemed as a high family status in Pakistan (Afzal, 2011). So, this study expects the positive linkage between earnings and family status.

β_i = Regression coefficient measuring returns to the i^{th} respective explanatory variable.

ε = Random error term

The problem of endogeneity of education results from (a) unobserved determinants of education such as innate ability or motivation that also affects earnings and (b) unobserved errors in measurement of education, or both. The unobservable are common in developing countries like Pakistan. This study has included some more control variables such as family background and status in the main regression to avoid the problem of endogeneity.

IV. EMPIRICAL RESULTS AND THEIR ANALYSIS

Tables 1, 2, 3(a) and 3(b) present OLS estimated results of semilogarithmic earnings equations for the workforce of all categories of educational institutions, when education of each type of workforce is measured by 'number of years of schooling completed'.

Table 1 provides OLS estimates of 'Basic Earnings Equations' (also known as 'Basic Model') as well as of 'Augmented Earnings Equations' (also known as 'Augmented Model') for the workforce of schools, colleges and universities. Table 2 presents the OLS estimated results of the semilogarithmic earnings equations (both Basic and Augmented) for the *workforce of entire public and entire private sector educational institutions*. Tables 3(a) and 3(b) present the OLS estimated results of the semilogarithmic earnings equations (both Basic and Augmented) for the *workforce of public and private sector schools, for the workforce of public and private sector colleges, and for the workforce of public and private sector universities*.

The results presented in Table 1 reveal that the factors that positively contribute to the earnings of schools workforce are 'years of schooling completed', actual working experience, training acquired, computer use, gender, marital status, SSCsector, nature of job, family background, and family status variables.

The results presented in Table 1 reveal that the factors that positively and significantly contribute to the earnings of *colleges' and universities workforce* are 'years of schooling completed', actual working experience, training acquired, computer use, marital status, family background, and family status variables. Gender variable contributed negatively and significantly to the earnings of both *colleges'* and *universities workforce*, while the SSCsector and family background variables contributed positively but insignificantly to the *universities workforce*.

The results in Table 1 show that the goodness of fit of 'Augmented Model' estimates has been found more satisfactory. The Adj. R^2 increases

remarkably compared to that found in the case of 'Basic Model'. The F-statistic consistently rejects the null hypothesis that all the explanatory variables additional to those in the Basic Model are jointly equal to zero.

TABLE 1

OLS Regression Results of Basic and Augmented Models
Dependent variable: In earnings, where the education of the workforce of various levels of educational institutions is measured by 'years of education completed'

	Workforce of various levels of educational institutions			Workforce of all/entire educational institutions
	Schools	Colleges	Universities	
Basic Model				
Constant	1.093 (0.000)	1.159 (0.000)	1.467 (0.000)	0.878 (0.000)
Edu (in years)	0.151 (0.000)	0.182 (0.000)	0.177 (0.000)	0.180 (0.000)
Experi (in years)	0.072 (0.000)	0.068 (0.000)	0.025 (0.000)	0.072 (0.000)
(Experi2/100)* (in years)	-0.087 (0.000)	-0.100 (0.000)	-0.003 (0.814)	-0.092 (0.000)
Augmented Model				
Constant	1.168 (0.000)	1.339 (0.000)	2.152 (0.000)	0.970 (0.000)
Edu (in years)	0.124 (0.000)	0.158 (0.000)	0.125 (0.000)	0.151 (0.000)
Experi (in years)	0.045 (0.000)	0.042 (0.000)	0.029 (0.000)	0.046 (0.000)
(Experi2/100)* (in years)	-0.034 (0.000)	-0.047 (0.000)	-0.011 (0.327)	-0.043 (0.000)
Train (Yes = 1)	0.053 (0.001)	0.038 (0.100)	0.182 (0.000)	0.010 (0.414)
Comp.uses	0.073 (0.000)	0.0004 (0.973)	0.072 (0.000)	0.075 (0.000)
Gend (Male = 1)	0.232 (0.000)	-0.037 (0.135)	-0.156 (0.000)	0.192 (0.000)
Mstatus (Married = 1)	0.185 (0.000)	0.107 (0.000)	0.058 (0.048)	0.154 (0.000)

	Workforce of various levels of educational institutions			Workforce of all/ entire educational institutions
	Schools	Colleges	Universities	
SSCsector (Govt = 1)	0.053 (0.001)	0.000 (0.989)	0.010 (0.719)	0.066 (0.000)
Jnature (Permanent = 1)	0.160 (0.000)	0.219 (0.000)	-0.090 (0.004)	0.136 (0.000)
Fedu (in years)	0.010 (0.000)	0.005 (0.042)	0.002 (0.257)	0.009 (0.000)
Rcar (Ownership = 1)	0.197 (0.000)	0.226 (0.000)	0.366 (0.000)	0.315 (0.000)
Obs	4394	2000	1933	8327
Adj. R^2 (Basic model)	0.465	0.598	0.618	0.547
Adj. R^2 (Augmented model)	0.537	0.636	0.676	0.608
F Statistic (Basic model)	1274.21 (0.000)	991.64 (0.000)	1044.56 (0.000)	3348.30 (0.000)
F Statistic (Augmented model)	464.917 (0.000)	318.47 (0.000)	366.95 (0.000)	1173.00 (0.000)

Values in parentheses are p-values.

*Experience square term is divided by 100 to get its coefficient value other than zero.

The results of 'Basic Model' presented in Table 1 also show that the rate of RTEdu has been found to be the highest for *college level workforce*. This finding is quite consistent to Afzal (2011) findings in case of the workforce of educational institutions of general nature. The coefficient for education variable of 'Augmented Model' shrinks remarkably as compared to those obtained in Basic Model, confirming that the variables added to this specification do affect RTEdu. The highest shrink (29.4 percent) has been found in case of *universities workforce*. This means that factors other than education and experience that affect the individual's earnings are more important for *universities workforce*. This highest (18.2 percent and 15.8 percent in case of 'Basic Model' and 'Augmented Model', respectively) rate of RTEdu for *colleges workforce* as compared to *schools workforce* (15.1 percent and 12.4 percent in case of 'Basic Model' and 'Augmented Model', respectively) and *universities workforce* (17.7 percent and 12.5 percent in case of 'Basic Model' and 'Augmented Model', respectively) may be the

result of doing extra work by *colleges workforce* as private tutors, especially in private sector colleges for additional income as well as performing double duties for extra payment. This may also be the result of flexible duty timing at *colleges* as compared to those at *schools* and *universities*. The duty timings for the *schools workforce* are more than those for *colleges and universities workforce*. The *teaching workforce at universities* keeps themselves busy in their academic research, where as the *non-teaching workforce at universities* keeps themselves busy in their office affairs. *Universities teaching workforce* spends more time on publications, as certain number of published articles has become part and parcel of their promotions or for higher scale of salary.

The results in Table 1 also imply that the rate of RTedu does not diminish as the workforce level of educational institutions rises. This is evident from the results presented in Table 1, *i.e.* 15.1 percent for *schools workforce*, 18.2 percent for *colleges' workforce* and 17.7 percent for *universities workforce*. This finding is not consistent with the findings of Psacharopoulos (1994).

TABLE 2

OLS Regression Results of Basic and Augmented Models
Dependent variable: In earnings, where education of each sector (aggregated)
of the workforce is measured by 'year of education completed'

	Workforce of educational institutions by sector (aggregated)					
	Public Sector			Private Sector		
	Teaching Workforce	Non-teaching Workforce	Entire Workforce	Teaching Workforce	Non-teaching Workforce	Entire Workforce
	Basic Model					
Constant	0.940 (0.000)	2.238 (0.000)	1.385 (0.000)	0.235 (0.000)	1.156 (0.000)	0.529 (0.000)
Edu (in years)	0.196 (0.000)	0.096 (0.000)	0.167 (0.000)	0.212 (0.000)	0.180 (0.000)	0.193 (0.000)
Experi (in years)	0.058 (0.000)	0.035 (0.000)	0.052 (0.000)	0.049 (0.000)	0.038 (0.000)	0.063 (0.000)
(Experi2/100)* (in years)	-0.068 (0.000)	-0.025 (0.009)	-0.056 (0.000)	0.017 (0.536)	-0.071 (0.001)	-0.074 (0.001)
	Augmented Model					
Constant	1.351 (0.000)	2.298 (0.000)	1.626 (0.000)	0.815 (0.000)	1.657 (0.000)	0.843 (0.000)
Edu (in years)	0.151 (0.000)	0.076 (0.000)	0.135 (0.000)	0.155 (0.000)	0.116 (0.000)	0.153 (0.000)

	Workforce of educational institutions by sector (aggregated)					
	Public Sector			Private Sector		
	Teaching Workforce	Non-teaching Workforce	Entire Workforce	Teaching Workforce	Non-teaching Workforce	Entire Workforce
Experi (in years)	0.047 (0.000)	0.028 (0.000)	0.038 (0.000)	0.024 (0.000)	0.030 (0.000)	0.035 (0.000)
(Experi ² /100)* (in years)	-0.046 (0.000)	-0.009 (0.344)	-0.027 (0.000)	0.055 (0.035)	-0.055 (0.006)	-0.026 (0.216)
Train (Yes = 1)	-0.082 (0.000)	0.081 (0.004)	0.012 (0.420)	0.005 (0.806)	0.105 (0.083)	0.012 (0.540)
Comp.uses	0.086 (0.000)	0.067 (0.000)	0.057 (0.000)	0.103 (0.000)	0.113 (0.000)	0.101 (0.000)
Gend (Male = 1)	0.135 (0.000)	0.012 (0.686)	0.012 (0.456)	0.366 (0.000)	0.143 (0.007)	0.350 (0.000)
Mstatus (Married = 1)	0.089 (0.001)	0.082 (0.001)	0.101 (0.000)	0.151 (0.000)	0.103 (0.053)	0.149 (0.000)
SSCsector (Govt = 1)	-0.018 (0.427)	0.053 (0.036)	0.017 (0.343)	0.012 (0.541)	-0.047 (0.367)	0.005 (0.782)
Jnature (Permanent =1)	0.122 (0.000)	0.096 (0.001)	0.073 (0.000)	0.141 (0.000)	0.105 (0.041)	0.145 (0.000)
Fedu (in years)	0.012 (0.000)	0.003 (0.080)	0.007 (0.000)	0.009 (0.000)	0.007 (0.163)	0.009 (0.000)
Rcar (Ownership = 1)	0.260 (0.000)	0.244 (0.000)	0.342 (0.000)	0.196 (0.000)	0.488 (0.000)	0.251 (0.000)
Obs.	3015	1875	4890	2942	495	3437
Adj. R ² (Basic model)	0.496	0.458	0.587	0.452	0.558	0.425
Adj. R ² (Augmented model)	0.558	0.491	0.630	0.538	0.528	0.529
F Statistic (Basic model)	989.30 (0.000)	527.15 (0.000)	2312.73 (0.000)	809.475 (0.000)	138.87 (0.000)	848.166 (0.000)
F Statistic (Augmented model)	347.14 (0.000)	165.06 (0.000)	758.04 (0.000)	312.201 (0.000)	57.69 (0.000)	352.080 (0.000)

Values in parentheses are p-values.

*Experience square term is divided by 100 to get its coefficient value other than zero.

Table 2 reveals that the factors that significantly and positively contribute to the earnings of the *workforce of both entire public sector and entire private sector educational institutions* are 'years of schooling completed', actual working experience, computer use, marital status, nature of job, family background, and family status variables.

The 'Basic Model' as well as 'Augmented Model' results presented in Table 2 reveals that the rate of RTEdu has been found to be the higher for *the workforce of entire, teaching and non-teaching private sector educational institutions* as compared to their counterparts in *public sector educational institutions*. This study recommends more financial benefits in the form of more allowances or increments against improving educational qualifications to the *workforce of public sector educational institutions*.

The coefficient for schooling variable of 'Augmented Model' shrinks remarkably as compared to those obtained in 'Basic Model', confirming that the variables added to this specification do affect RTEdu. The highest shrink (35.6 percent) has been found for *non-teaching workforce of private sector educational institutions*. This means that factors other than education and experience that affect the individual's earnings are more important for the *non-teaching workforce of private sector educational institutions*. The rate of RTEdu for the *workforce of entire public sector educational institutions* increases, on average by 16.6 percent (Basic Model) and 13.5 percent (Augmented Model), while the rate of RTEdu for the *workforce of entire private sector educational institutions* increases, on average, by 21.2 (Basic Model) and 15.5 percent (Augmented Model) for every one year increase in schooling. The RTEdu for the *teaching as well as non-teaching workforce of public sector educational institutions* has been found to be less as compared to their counterparts in *private sector*.

TABLE 3(a)

OLS Regression Results of Basic and Augmented Models

Dependent variable: Ln earnings, where education of public sector (disaggregated) of the workforce is measured by year of education completed

	Teaching Workforce			Non-teaching Workforce		
	School	College	Uni	School	College	Uni
	Basic Model					
Constant	1.447 (0.000)	3.086 (0.000)	3.201 (0.000)	2.269 (0.000)	2.281 (0.000)	2.239 (0.000)
Edu (in years)	0.143 (0.000)	0.065 (0.004)	0.100 (0.000)	0.089 (0.000)	0.098 (0.000)	0.096 (0.000)
Experi (in years)	0.063 (0.000)	0.075 (0.000)	0.036 (0.000)	0.037 (0.001)	0.035 (0.000)	0.035 (0.000)
(Experi2/100)* (in years)	-0.072 (0.000)	-0.091 (0.000)	-0.050 (0.000)	-0.045 (0.231)	-0.034 (0.056)	-0.021 (0.083)

	Teaching Workforce			Non-teaching Workforce		
	School	College	Uni	School	College	Uni
Augmented Model						
Constant	1.511 (0.000)	3.137 (0.000)	3.232 (0.000)	2.184 (0.000)	2.419 (0.000)	2.313 (0.000)
Edu (in years)	0.119 (0.000)	0.047 (0.003)	0.095 (0.000)	0.073 (0.000)	0.074 (0.000)	0.075 (0.000)
Experi (in years)	0.047 (0.000)	0.050 (0.000)	0.031 (0.000)	0.022 (0.057)	0.030 (0.000)	0.028 (0.000)
(Experi2/100)* (in years)	-0.040 (0.004)	-0.046 (0.000)	-0.044 (0.000)	-0.014 (0.702)	-0.025 (0.180)	-0.004 (0.722)
Train (Yes = 1)	-0.032 (0.274)	0.036 (0.146)	0.032 (0.000)	-0.014 (0.895)	0.046 (0.452)	0.102 (0.003)
Comp.uses	0.073 (0.000)	0.012 (0.395)	0.025 (0.000)	0.106 (0.042)	0.076 (0.007)	0.068 (0.000)
Pub.Articles		0.050 (0.010)	0.002 (0.000)			
Gend (Male = 1)	0.140 (0.000)	0.012 (0.653)	0.049 (0.000)	0.103 (0.137)	-0.066 (0.230)	0.026 (0.537)
Mstatus (Married = 1)	0.166 (0.000)	0.115 (0.001)	-0.012 (0.000)	0.214 (0.004)	0.000 (0.993)	0.078 (0.011)
SSCsector (Govt = 1)	0.007 (0.848)	-0.019 (0.490)	-0.016 (0.000)	0.026 (0.767)	0.086 (0.160)	0.050 (0.093)
Inature (Permanent=1)	0.172 (0.000)	0.195 (0.000)	-0.021 (0.000)	0.165 (0.040)	0.157 (0.008)	0.065 (0.101)
Fedu (in years)	0.010 (0.000)	0.002 (0.450)	-0.005 (0.000)	0.005 (0.376)	0.003 (0.503)	0.003 (0.134)
Rcar (Ownership = 1)	0.194 (0.000)	0.126 (0.000)	0.148 (0.000)	0.106 (0.527)	0.359 (0.000)	0.203 (0.000)
Obs.	1320	1238	457	207	405	1263
Adj. R^2 (Basic model)	0.433	0.554	0.431	0.387	0.464	0.442
Adj. R^2 (Augmented model)	0.488	0.583	0.463	0.421	0.508	0.474
F Statistic (Basic model)	336.26 (0.000)	512.41 (0.000)	116.25 (0.000)	44.37 (0.000)	117.34 (0.000)	334.02 (0.000)
F Statistic (Augmented model)	115.252 (0.000)	145.24 (0.000)	31.86 (0.000)	14.62 (0.000)	38.96 (0.000)	104.30 (0.000)

Values in parentheses are p-values.

*Experience square term is divided by 100 to get its coefficient value other than zero.

Out of the teaching and non-teaching workforce of public as well as private sector educational institutions, the lowest (9.6 percent in 'Basic Model' and 7.6 percent in 'Augmented Model') RTEdu has been found for non-teaching workforce of public sector educational institutions. While revising educational policies, the non-teaching workforce of public sector educational institutions must be given some financial incentives as they improve their qualifications. The higher marginal rate of RTEdu for the workforce of private sector educational institutions as compared to public sector educational institutions workforce is quiet consistent with the finding of Psacharopoulos (1994).

Table 3(a) indicates that **out of the workforce of entire public sector educational institutions**, the rate of RTEdu for the teaching workforce of public sector schools has been found to be the highest (14.3 percent) whereas, it is found to be 6.5 and 10.0 percent for the teaching workforce of public sector colleges and public sector universities, respectively. Table 3(b) indicates that **out of the workforce of entire private sector educational institutions**, the rate of RTEdu for the teaching workforce of private sector universities has been found to be the highest (23.0 percent), whereas the same has been found to be the lowest (17.4 percent) for the teaching workforce of private sector schools. This also means that the teaching workforce of private sector universities has been found to earn 13 (13 = 23 – 10) percent more than that of their counterparts in public sector universities. The results in Tables 3(a) and 3(b) indicate that **out of the teaching workforce of public as well as private sector educational institutions**, the **teaching** workforce of private sector universities has been found to earn highest returns (23.0 percent in Basic Model), whereas the same has been found to be the lowest (6.5 percent in Basic Model) for the teaching workforce of private sector colleges. Financial as well as non-financial incentives may further be introduced to keep at power and retain experienced teaching workforce at public sector colleges and universities.

The results in Table 3(a) also indicate that **out of the workforce of entire public sector educational institutions**, the rate of RTEdu for the non-teaching workforce of public sector colleges have been found to be the highest (9.8 percent) whereas, it is found to be 8.9 and 9.6 percent for the non-teaching workforce of public sector schools and public sector universities, respectively. The results given in Table 3(b) yield that **out of the workforce of entire private sector educational institutions**, the rate of RTEdu for the non-teaching workforce of private sector universities has been found to be the highest (19.0 percent), whereas the same has been found to be the lowest (12.9 percent) for non-teaching workforce of private sector

colleges. According to the Augmented Model results in Tables 3(a) and 3(b), the non-teaching workforce of public sector universities has been found to earn less than that of their counterparts in private sector universities.

TABLE 3(b)

OLS Regression Results of Basic and Augmented Models
Dependent variable: In earnings, where education of private sector
(disaggregated) of the workforce is measured by year of education completed

	Teaching Workforce			Non-teaching Workforce		
	School	College	Uni	School	College	Uni
Basic Model						
Constant	0.743 (0.000)	1.066 (0.061)	0.907 (0.265)	1.210 (0.000)	1.868 (0.000)	1.357 (0.000)
Edu (in years)	0.174 (0.000)	0.186 (0.000)	0.230 (0.000)	0.161 (0.000)	0.129 (0.000)	0.190 (0.000)
Experi (in years)	0.049 (0.000)	0.062 (0.000)	-0.039 (0.341)	0.051 (0.000)	0.029 (0.176)	0.018 (0.180)
(Experi2/100)* (in years)	0.012 (0.691)	-0.101 (0.003)	0.328 (0.046)	-0.105 (0.000)	-0.048 (0.329)	-0.033 (0.403)
Augmented Model						
Constant	1.181 (0.000)	1.363 (0.015)	0.405 (0.651)	1.579 (0.000)	1.856 (0.000)	2.176 (0.000)
Edu (in years)	0.126 (0.000)	0.144 (0.000)	0.229 (0.000)	0.108 (0.000)	0.102 (0.001)	0.113 (0.000)
Experi (in years)	0.029 (0.000)	0.033 (0.009)	-0.045 (0.311)	0.034 (0.000)	0.010 (0.702)	0.029 (0.055)
(Experi2/100)* (in years)	0.025 (0.385)	-0.029 (0.407)	0.397 (0.021)	-0.071 (0.005)	-0.015 (0.789)	-0.059 (0.163)
Train (Yes = 1)	0.028 (0.181)	-0.066 (0.335)	0.160 (0.260)	0.194 (0.013)	0.184 (0.306)	0.072 (0.501)
Comp.uses	0.090 (0.000)	0.079 (0.047)	0.186 (0.093)	0.089 (0.020)	-0.019 (0.858)	0.143 (0.016)
Pub.Articles		0.065 (0.346)	-0.010 (0.328)			
Gend (Male = 1)	0.331 (0.000)	0.122 (0.083)	0.287 (0.056)	0.301 (0.000)	-0.114 (0.573)	-0.129 (0.173)
Mstatus (Married = 1)	0.167 (0.000)	0.112 (0.169)	-0.071 (0.677)	0.070 (0.284)	0.318 (0.093)	0.094 (0.323)
SSCsector (Govt = 1)	0.016 (0.424)	-0.101 (0.158)	-0.248 (0.069)	-0.047 (0.466)	0.156 (0.405)	-0.039 (0.643)

	Teaching Workforce			Non-teaching Workforce		
	School	College	Uni	School	College	Uni
Jnature (Permanent = 1)	0.124 (0.000)	0.394 (0.000)	0.212 (0.171)	0.125 (0.043)	0.121 (0.450)	-0.019 (0.843)
Fedu (in years)	0.010 (0.000)	0.000 (0.941)	0.023 (0.148)	-0.002 (0.771)	0.010 (0.521)	0.011 (0.276)
Rcar (Ownership = 1)	0.178 (0.000)	0.173 (0.029)	-0.127 (0.427)	0.555 (0.000)	0.619 (0.042)	0.258 (0.007)
Obs.	2591	279	72	276	78	141
Adj. R^2 (Basic model)	0.392	0.255	0.499	0.375	0.276	0.496
Adj. R^2 (Augmented model)	0.480	0.353	0.581	0.527	0.328	0.568
F Statistic (Basic model)	557.20 (0.000)	32.76 (0.000)	24.54 (0.000)	55.95 (0.000)	10.77 (0.000)	46.84 (0.000)
F Statistic (Augmented model)	218.33 (0.000)	13.65 (0.000)	9.19 (0.000)	28.86 (0.000)	4.41 (0.000)	17.76 (0.000)

Values in parentheses are p-values.

*Experience square term is divided by 100 to get its coefficient value other than zero.

The non-teaching workforce of public sector universities has been found to earn 7.5 to 9.6 percent, while the non-teaching workforce of private sector universities has been found to earn 11.3 to 19 percent. Financial as well as non-financial incentives may further be introduced to keep at power and retain experienced non-teaching workforce at public sector colleges and universities.

In conclusion, financial as well as non-financial incentives may further be introduced to keep at power and retain experienced teaching and non-teaching workforce at public sector colleges and universities.

The increase in the rate of RTEdu has been found to be the highest (23.0 percent) for every additional year of schooling in case of *teaching workforce of private sector universities* out of the workforce of various categories of private and public sector educational institution's workforce. The increase in the rate of RTEdu has been found to be the lowest (6.5 percent in 'Basic Model' and 4.7 in 'Augmented Model') for every additional year of schooling in case of *teaching workforce of public sector colleges* out of various categories of private and public sector educational institution's workforce.

In conclusion it is evident from the results given in Table 3(a) and 3(b) that the rate of RTEdu has been found higher for each and every category of *teaching and non-teaching workforce of private sector educational institutions* (see Table 3(b)) as compared to each and every category of *teaching and non-teaching workforce of public sector educational institutions* (see Table 3(a)).

The results given in Tables 1, 2, 3(a) and 3(b) indicate that the estimated coefficient associated with work experience is positive and statistically significant in all models, whereas the coefficient associated with the square of experience variable is negative, exhibits parabolic linkage between earnings and actual working experience for *each category of models*, except for the *teaching workforce of private sector universities*, implying diminishing PFR to work experience after a specific working experience. This also implies that the experience-earning profile is not concave for the *teaching workforce of private sector universities*. The concavity (*i.e.*, earnings increases with the increasing actual working experience but at a decreasing rate) of experience-earning profile is clearly observed from the negative and significant coefficient of actual working experience squared term. Table 4 provides a better quantitative picture of the concavity of experience-earning profile.

The coefficient of work experience variable for *each category of educational institutions workforce*, except for the *teaching workforce of private sector universities* indicates rise in earnings at decreasing rate for every one additional year of actual working experience. The second last row in Table 4 presents the rate of PFR to work experience for *the workforce of all categories of educational institutions* calculated on average value of experience of each category of educational institutions. The rate of PFR to work experience for the *workforce of schools, colleges and universities* has been found 7.2 percent, 6.8 percent and 2.5 percent, respectively. This finding implies that the rate of PFR to work experience diminishes as the workforce levels of educational institutions rises.

The rate of PFR to work experience has been found higher for the workforce of *entire public sector* than that of *the workforce entire private sector educational institutions*. This also means that actual working experience matters more for the *workforce of public sector* as compared to the *workforce of private sector educational institutions*. Work experience is more important in determining the earnings of the *workforce of public sector* than that of their counterparts in *private sector educational institutions*.

TABLE 4
Rate of Private Financial Returns to Experience
and Concavity of Experience-Earnings Profile

Work experience (years)	All/entire workforce	Workforce of public sector	Workforce of private sector	Workforce of schools	Workforce of colleges	Workforce of universities
1	0.045	0.037	0.034	0.044	0.041	0.029
5	0.042	0.035	0.032	0.042	0.037	0.028
10	0.037	0.033	0.030	0.038	0.033	0.027
15	0.033	0.030	0.027	0.035	0.028	0.026
20	0.029	0.027	0.025	0.031	0.023	0.025
25	0.025	0.025	0.022	0.028	0.019	0.024
30	0.020	0.022	0.019	0.025	0.014	0.022
35	0.016	0.019	0.017	0.021	0.009	0.021
40	0.012	0.016	0.014	0.018	0.004	0.020
45	0.007	0.014	0.012	0.014	0.000	0.019
At respective category average years of experience	0.037	0.031	0.032	0.039	0.029	0.026
The experience that adds positively to the earnings of the workforce, beyond which it contributes negatively.	55	70	67	67	46	Not found because the estimated coefficient of Experience ² is insignificant

The point where work experience stops adding positively to the earnings of workforce is defined by $\partial \ln Y / \partial \text{Experi} = 0$, and $\partial^2 \ln Y / \partial^2 \text{Experi} < 0$, and is calculated from the 'Augmented Earnings Equation' and is given in last row of Table 4. The experience level that stops adding positively to the earnings of the *workforce of schools, and colleges* is 67 years, and 46 years, respectively, beyond which this contributes negatively to earnings. The experience level that stops adding positively to the earnings of the *workforce of entire public sector educational institutions* is the 70 years of experience, while 67 years of experience stops adding positively to the earnings of the *workforce of entire private sector educational institutions*, beyond which it contributes negatively to earnings.

The results given in Table 1 further indicate that the effect of trainings on the earnings of the workforce of schools, colleges and universities has been found to be positive and significant. The highest effect (18.2 percent) of the training on the earnings of universities respondents has been observed.

The results in Tables 1, 2, 3(a) and 3(b) further indicate that the computer use variable has been found to be contributing positively and significantly to the returns for the *workforce of all categories of educational institutions, except for the teaching workforce of public sector colleges and non-teaching workforce of private sector colleges*. The rate of returns to computer use has been found to be the lowest for the *workforce of colleges* (consistent with the findings of Afzal, 2011). The computer use being an important indicator of individual's as well as institutional productivity and skills must be increased for the workforce of *all levels of educational institutions, especially for the workforce of each of entire, teaching and non-teaching public sector educational institutions and particularly to the teaching workforce of public sector colleges, and non-teaching workforce of private sector colleges*.

Tables 3(a) and 3(b) further shows that the publications impact on the earnings of the *teaching workforce of public sector colleges and public sector of universities* has been estimated and found to be positive and significant, while the impact of publications on the earnings of *teaching workforce of private sector colleges and teaching workforce of private sector universities* has been found to be insignificant.

All the above discussion reveals that the higher returns coupled with education, actual working experience, training and computer use variables provide a clear support to human capital theory in case of the workforce of educational institutions in Lahore (Pakistan). In other words, the highly significance of estimated coefficients associated with education, actual working experience, training and computer use variables indicate the applicability of Human Capital Model for the workforce of educational institutions in Pakistan.

V. CONCLUSIONS AND RECOMMENDATIONS

CONCLUSION

The present research work has been carried out to identify the major determinants of earnings and to estimate the RTEdu for the workforce working in general education institutions of Lahore District of Punjab Pakistan. The primary data on the sample of 8327 respondents has been

collected by the researcher himself by using the survey method through questionnaire.

The factors such as 'years of schooling completed', actual working experience, training acquired, computer use, gender, marital status, sector from where the respondent has completed his/her secondary school certificate (SSCsector), nature of job, family background, and family status variables contributed positively and significantly to the earnings of *school workforce*. The factors that positively and significantly contributed to the earnings of *college and university workforce* are years of schooling completed, actual working experience, training acquired, computer use, marital status, family background, and family status variables. Gender variable contributed negatively and significantly to the earnings of both *college* and *university workforce*, while SSCsector and family background variables contributed positively but insignificantly to the university workforce. The factors that positively and significantly contributed to the earnings of the *workforce of both entire public sector and entire private sector educational institutions* are 'years of schooling completed', actual working experience, computer use, marital status, nature of job, family background, and family status variables.

The marginal rate of RTEdu by using OLS method for the *workforce of schools, colleges and universities* increases, on the average, by 12.4, 15.8 and 12.5 percent, respectively for every additional year of schooling. The marginal rate of RTEdu for *the workforce of various categories of private sector educational institutions* has been found to be higher than that of the *workforce of various categories of public sector educational institutions*. The lowest RTEdu has been found for *non-teaching workforce of public sector educational institutions*. Higher returns coupled with education, actual work experience, training and computer use provide a clear support to Human Capital Theory in case of the workforce of educational institutions in Lahore (Pakistan). The concavity in experience-earning profile has also been observed in this study.

RECOMMENDATIONS

Keeping in view the findings, this study recommends:

- (a) The major determinants of the earnings found in this study must be considered while formulating any development policy that intends to raise the earnings status of the workforce of educational institutions in Pakistan.

- (b) To promote education and enhance teaching workforce productivity at private sector educational institutions, the earnings of teaching workforce of private sector educational institutions must be raised at least equal to the earnings level of teaching workforce of public sector educational institutions. The causes of low earnings for the teaching workforce of private sector educational institutions must be explored further by undertaking an independent study.
- (c) Financial as well as non-financial incentives may further be introduced to keep at power and retain experienced teaching and non-teaching workforce at public sector colleges and universities of Pakistan.
- (d) The high relative occupation earning differentials in favour of teaching workforce of public sector educational institutions needs special attention of the government and other education policy makers in Pakistan. Some measures like award of special pay scales/ grades for non-teaching workforce, especially the non-teaching workforce of public sector educational institutions and particular to non-teaching workforce of public sector universities must be introduced to minimize this mountaineering relative occupation earning differentials in education market of Pakistan.
- (e) The mean earnings of the workforce working at public and private sector educational institutions are found to be highly differential. It is, therefore, recommended that the development policy makers must design a uniform salary structure to minimize the shuffling of the workforce between private and public sector educational institutions.

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