

# Econometric Measurement of Earning Differentials for the Workforce Working in Technical Educational Institutes of Lahore

Mary Kashif, Mehwish Raheel

Department of Economics  
Lahore College for Women University  
35 FC College Ferozepur Road Lahore, Pakistan  
E-mail: marytariq07@yahoo.com  
August 2017

**Abstract:** Despite of the large number of studies related to earning differentials there are very few studies that attempts to estimate earning differentials for the workforce working in technical education institutions especially in Case of Lahore. Therefore, this study is designed to examine the factors that affect the earnings of the worker working in the technical educational institutions of Lahore District of Punjab province of Pakistan. Mincerian Human Capital Earning Function Approach was used to estimate the earning differentials of the workforce working in technical educational institutes of Lahore. Primary data was collected for the sample of 1168 respondents in 2015 directly from the field in order to conduct the current study. Empirical analysis indicates that education, experience, training acquired, computer usage, institution from where respondent had completed their secondary school certificate (SSC), gender, family status and family background were found to be contributing factors towards the earnings of the workforce of various categories of the technical educational institutions in Lahore. Results also recommend that implementation of such policies and development programs that reduces or minimizes the earning differentials among the staff which arise on the basis of occupation (teaching and non-teaching).

## Introduction

According to the Classical Economists, wage is the price of labor that is usually determined by the demand and supply of labor. When labor offers their services in the market, the price they charge is influenced by several factors on the demand side. It depends on the demand and supply of labor. In addition, wages are shaped by the worker's skillset, employers need, as well as the location where job is being offered. Classical Economists call this a theory of wages determination. These wages paid to the worker varies greatly called wage differentials. Earning differential is basically a term used in the labor market to examine the relationship between wage rate and other undesirable attributes of the particular job. Earning differentials has become the one of the important subject of interest of researchers in recent years across the world as it has been realized that earning differentials not only challenges social justice goals but can also have adverse economic consequences.

For every country, development of the labor force sector has been the top priority. But the policies that had been developed so far, earing differentials and unemployment remained the major issues in the economy of many developing countries like Pakistan. According to the

Global Wage Report 2015-16, inequality trend in the labor market is mainly due the change in wages distribution and paid employments in many countries. Technical education plays an important role in building human capital and hence in the development of a country. It raises the efficiency and the productivity of the individual which eventually produce a skilled manpower and ultimately can lead economy towards a sustainable economic development. There is a great variation in earnings paid to the workers. These differentials are majorly due to the difference in the worker effort in performing the job and ability to work. Earning differentials also exists across occupation, because of demand and supply of workers for a particular job.

At the time of independence in 1947, Pakistan had a very weak Training and Vocational Education (TVE) base; this was supported by Akram and Khan (2007), Munir (2002) and Shah (2003). During 1950-2002 hundreds of vocational education (middle, secondary and higher level), polytechnic institutes, colleges and universities had been established both in private and public sector. This fact is worry some that still in Pakistan, technical education is considered as post-secondary courses and practical training intended to produce technicians, who works as supervisory staff (middle level), however vocational education considered as lower level training and education for making skilled and semi-skilled workers in different professions.

Federal Ministry of education is responsible under education department for making education policy. In this regard, many different trainings policies in the country were discussed. Under the Education Policy 1972-80 at middle level in school, vocational and training workshops were opened where students were taught vocational training, child care, weaving, black-smithy, electricity, book-binding, food preservation, wood work, home management and agriculture in accordance to the local requirement. In terms of promotion, 1981-1991 was the worst time period of vocational training in Pakistan. From 1981-1991 nothing special was added to the existing vocational and training educational schools and colleges rather to avoid the student movement in contradiction of dictatorial government many polytechnic institution and colleges were closed. Vocational and technical training need was felt in Education Policy of 1992-2002 after analyzing it thoroughly. But semi-literate dropouts training remained a major problem.

The Education Policy 1992-2002 led to the establishment of a network one each in all four provinces of Pakistan 'the teacher training institutes' which link them to the national teacher training college at federal level. A new National Education Policy 1998-2010 was formed, however Education Policy 1992-2002 was still under implementation just to satisfy the market oriented education system. According to National Educational Policy 1998-2010 sustainable socioeconomic development is not possible only with the capital investment unless there is proper supply of trained scientific and technical human resource. According to this policy, for general education there had been larger increase in the facilities in the country but for promotions of TVE facilities and opportunities provided were not enough. Technical Education Project 1996-2003 was another noticeable scheme initiated by the Federal Ministry of education with support of Asian Development Bank (Javied & Haider, 2009).

Pakistan is the sixth largest country with the population of 20 billion in 2017 as per current census. Pakistan's population is expected to be double in 2045 if it continues to grow at the rate of one point eight percent (Nasir and Nazli, 2000). This indicates the need of generating the ways

to employ the coming flood of people. Measurement of the earning differentials will help to recommend the suitable policies in this regard.

Determinants of individuals earning differentials have been one of the topics that took too much attention in economic literature in the early studies starting from 1960's. All these early studies used Human Capital Approach in which the basic determinant of personal earnings was the investment to human capital. But researchers such as Behrman and Taubman (1976) and Morgenstern (1973) added some variables like father's education, gender, occupation and employment status to extend to basic human capital model as the models developed in early 60's were criticized for not taking an account of socio-economic factors. After that some other researcher like Psacharopoulos (1977a); Kasnakoğlu (1978); Tachibanaki (1980) and Varlier (1982) went further and developed simultaneous equation systems to explore the link between education, occupation and earnings. There are a lot of studies that had been done in order to estimate the earning differentials in both developed and developing countries around the world, including Pakistan.

In Pakistan, available literature is lacking in finding out the earning differentials of the workforce of technical educational institutes especially working in Lahore. So this study intends to measure the earning differentials of the workers working in technical educational institutes of Lahore by developing family background and family status indices. So far there has been hardly any study on measurement of earning differentials using indices of Family Background and Family Status as determinants of individual's earnings.

As there are some delimitations that lies with every research since it is very difficult to study all the aspects of a certain problem. So this research is delimited to only one sector of education i.e. technical educational institutions because it has been observed that colleges and universities in Pakistan are used to place an emphasis on certification and theory problems. But now this perception is changing and focus of all the technical institutes is more on skill and training acquisition. These institutions are providing sufficient amount of supply of efficient and effective instructor, training material and enhanced learning environment.

## **Review of Empirical Literature**

**Technical Education:** Technical education has to be extremely important to the other sectors of the society due to its nature. For socio-economic development there is a need of technical and skilled workforce (Inamullah, Naseeruddin, Hussain & Shah; 2009). Inamullah et. al. (2009) concluded in their study with reference to Pakistan that teachers of technical educational institutes were only expert of academic teaching but they are not good at modern teaching techniques. They also added that no budget is allocated for the training of teachers of technical educational institutions of NWFP province of Pakistan. This was supported by Shah (2004) in his study of problems and prospects of technical education in Pakistan and also Shah, Rahman, Ajmal, and Hamidullah (2011) in their study of situation analysis of technical education and vocational training of Pakistan.

Many international studies such as Retallick and Miller (2010), Reynaldo and Martinez (2007), Yocke, Maldonado, Saddler (2007), also supported technical education as an important indicator

for nation's development. They also concluded that there are very few Latino who get enrolled in the post-secondary technical education program particularly in the occupations that are considered to be high skill and high earnings. The authors believe that the quality of the future Labor market of United States highly depends on the education and job skill on this group.

**Education and Experience:** Education is one of the main sources of human capital accumulation which have positive and direct effect on individual's life time earnings. Chew (1990) found education the most important factor that effect earnings in software and marketing occupation of supply sector as well as software occupation of IT user sector.

Alam (2008) tried to present the picture of technical and vocational education for Bangladesh. This study also suggested that Bangladesh needs to propose in-service training programs for different subjects at different level which can help the employees to manage the changes in technical and vocational education. The study concluded that a well-planned technical and vocational education can help Bangladesh to raise their economic growth.

Faridi, Hussain and Bashir (2010) presented a study of public sector universities of Pakistan showing education impact on student's earnings. Data was collected from the two upper and lower Punjab public sector universities. The work had been divided into two parts. In the first part, statistical and descriptive analysis and in the second part econometric analysis had been discussed. Results for the first half showed that there was a positive relation between higher education and monthly earnings. For second part OLS had been used to analyze educational level impact on earnings of students. Results showed that there was a significant and positive contribution of experience and years of schooling completed on student's monthly earnings. They concluded that earnings of the students increase with the increase in level of education. On the other hand Patrinos (1995) said that women get more benefits than men because of occupational experience.

**Training and Computer use:** Training is another important indicator of earnings. Booth (1993) observed a positive impact of training on their productivity and wages for the British graduates. According to his conclusion training have considerably more effect of male earnings than the female, as the male acquire more training than the female workers. Furthermore Torp (1994) conducted a study in Norway and evaluated that training reduces the unemployment by increase in workers productivity. Javied and Hyder (2009) investigated the role of training in wage determination by using OLS technique. For this purpose cross-sectional data from Pakistan Labor Force Survey 2005-06 had been used. Their results showed that training have insignificant impact on earnings because of the poor quality of training.

Many studies at international level such as Black and Lynch (2001), Dearden, Reed and Reenen (2006), Dieckhoff (2007), Gabriella (2005), Sanchez, Barba and Valle (2003) and studies at national level such as Ghafoor, Khan and Aslam (2011), Ameerq and Hanif (2013), Kemal (2005), Khilji, Kakar and Subhan (2012), Mustafa, Abbas and Saeed (2005), Nawaz, Hassan, Hassan, Shaukat and Asadullah (2014), Zained and Hyder (2009) found positive relationship between training acquired and the earnings of the individual. On the other hand, Bartel (1994) did not find any impact of formal training on the workers productivity in terms of earnings.

**Computer usage:** Computer use is considered to be an important indicator of individual's earnings as well as institutional productivity. Few studies such as Afzal (2011; 2104), Borghans and Ter Weel (2004), Krueger (1993), Lehr and Lichtenberg (1999) found positive effect of computer use on earnings and few like Kemerer and Sosa (1991) found positive but insignificant impact of computer use on individual's earnings. Krueger (1993) found that because of the computer use, there was 10 to 18 percent increase in the earnings of the individual. Green (1998) concluded that computer use is highly valued at the work place. He also found that individuals with the 'moderate level of complexity' earn 13 percent more than the individuals who don't use computer at all.

**Family Status and Family Background:** The family status found to be another contributing factor that had positive impact on individual's earnings (Afzal, 2011; 2014). Shah (1986) concludes that family's socio-economic status has negatively associated with the women labour force participation in Pakistan.

Another factor that can affect the earnings of the individual is family background. Many studies observed the positive relationship between family background and individuals earnings. Patrinos (1995) examined a positive and significant impact of family background on the earnings in different countries. Furthermore, Altonji and Dunn (1995) said that family background can be measured by the parent's education. The author concluded that individual does with more educated parents earn more as compared to the individual's with less educated parents.

**Marital status and gender discrimination:** Marital status is considered as an important independent variable that affects the earnings of an individual. Becker (1981; 1985); Green (2003), Greenhalgh (1980) and Kenny (1983) claimed that married individuals earned more than the unmarried individuals as they are more productive. Becker (1981); Keely (1977) and Nakosteen and Zimmer (1982) also claimed that married people earn more because of the characteristics like motivation and punctuality which are greatly valued by the employer. According to Boheim et al. (2007) men received a marriage premium, however it is opposite in case of married women. Married women received fewer earnings than the unmarried women. Like many other countries, studies related to Pakistan also found out that marital status has positive and significant impact on earnings (Afzal, 2014; Javied & Hyder, 2009 and Yasin et al., 2010).

Gender discrimination is another factor that has significant impact on earnings. Gastwirth (1975) tried to study how industries can be ranked and to observe the trend over time. For this purpose USA government data had been used. It had been found that there were very few areas where women dominate the market. For the continuous work as compared to men, women don't receive same economic returns which proved discrimination exists. This was supported by a study on gender earning differentials conducted by Patrinos (1995) for the workforce in engineering profession. In Greece large portion of women population manages to make up to engineering workforce. The evidence showed that women earn less than men because of the discrimination in the labor market. To analyze gender earning differentials in occupation of engineering, survey of 1987 of employed engineers had been used. Results showed that difference in earnings was because of discrimination, not because of productivity, education and experience.

Awan and Hussian (2007) also examined that male worker were receiving high income as compared to the female workers. Another study by Chew (1990) attempted to analyze the gender earning differentials in Singapore for the workforce of Information Technology (IT) occupation. The author examined gender earning differentials for two differentials IT profession of IT sector. One was software and marketing profession for both supply and user sector. Study revealed that discrimination was not always a reason behind earning differentials but there were other factors too like experience, education, age etc.

Nasir (2000) in his research tried to examine the earning differentials among private and public sectors of Pakistan. For the purpose of comparison, the private sector further divided into informal and formal sectors as it develops extended form for Human Capital Model to analyze major determinants of income. The author found that individuals working in public sector earn more in comparison to the individuals working in formal as well as informal private sectors. These higher earnings were not because of the wage structure of public sector but their own superior personal human capital endowment.

All of the studies mentioned-above were mostly out dated and constrained by data, number of variables included and estimation methods. The present study differs from previous study in terms of the nature of the data i.e. primary, sample size (1168 observations), geographical area of the study (Lahore) and the sector (Technical educational institutes). Furthermore there is hardly study found that measures the earning differentials by constructing different indexes for family background and family status as an independent variables.

## Data Source and Methodology

**Target Population:** Keeping in mind the objective of the study, the targeted population of this study was the workforce working in technical educational institutes of Lahore. In order to avoid the confusion that result because of the variation among the different sector this study focuses only on technical educational institutions and specifically those institutions which were affiliated with Punjab Technical Board of Pakistan.

**Sampling:** In the current study, the sample is taken from the individuals working in technical educational institutes of Lahore and especially those institutes were selected which were affiliated with the Punjab Technical Board of Pakistan. The reason for selecting the sample instead of population was money, time constraint and other human resource constraints. Getting data from the whole population of individuals working in technical educational institutions and also analyzing and interpreting the huge amount of data was difficult within the limited financial resources and the time constraints associated with the research.

**Questionnaire Design:** Questionnaire has been used as research instrument for the data collection. A questionnaire had two main types of responses. First, open-ended questions and second was close-ended questions. In open-ended questions, respondents could answer the questions in their own words. However in close-ended questions, there were dichotomous, multiple-choice and scaled based questions. The questionnaire was designed keeping in mind the objectives of the study. As a survey instrument, a questionnaire was designed for the study to investigate the individual's earnings and the major factors that determines the earnings for both

teaching and non-teaching workforce of each of private and public technical educational institutions. The structured questionnaire consists of three main sections as given below:

- I. Personal Information
- II. Qualifications, Experience, Computer Skills and Trainings Acquired
- III. Respondent's Household Information

First section contained the personal information of the respondent which includes respondents name, organization name, town or area in which organization falls, nature of job and monthly income. Second sections included the information about the education qualifications, job category (Teaching or Non-teaching), type of the institution (private or public), total working experience starting from the first job to last, use of computer at work and foreign language proficiency. Third part comprised the respondent's household information such as gender of the household, income of the household, respondents gender, language use at home for communication, parents education and occupation, marital status of respondent, total years of spouse education received, employment sector of respondent's spouse, monthly income of spouse, residence (Owned, rented, Govt. accommodation or other), size of the house, ownership of agriculture land and annual income for agriculture land, can ownership by respondent, car ownership by the family member of respondent, total number of mobile phones, respondents SSC from private or public sector school.

### **Section I: Personal information**

This section included the basic information about the worker working in technical educational institutes of Lahore. For example the name of respondent (optional), name of the institute, town or location of the institute. And the variables used in this section were gender, nature of job and monthly income of the respondent from all sources like income from the main job, other job and also income from the occasional jobs. Income from the occasional jobs is the one you get from entrepreneurship, farming a family agriculture land or from a private business. Gender is an important factor that can affect the individual's earnings. Chew (1990) found that gender preference is the variable that found to be effective in IT managerial supply sector. Supporting Chew (1990), Afzal (2011; 2014) also said that gender is an important factor that contributes in individual's life time earnings.

### **Section II: Qualifications, Experience, Computer Skills and Trainings Acquired**

The second section investigated the professional qualifications or skill set of the respondent based on his education (in terms of years of education completed), SSC (secondary school certificate), the category of the respondent in the institutes (teaching or non-teaching), type of the institution they are working in, their total work experience starting from the first job to the present one, use of computer at work, respondents foreign language proficiency and formal training. Professional qualifications is very important in determination of individuals life time earning. Education and experience are direct link to the individual's earnings. Individuals with the higher education and experience earn more as compared to the other people with low education and experience (Faridi et al, 2010). Furthermore training also has an impact on individual's earnings. Training has positive but insignificant impact on earnings because of the quality of

trainings (Javied & Hyder, 2009). So the study is also expecting a positive link between training and earnings for the workforce working in technical educational institutes.

### Section III: Respondent's Household Information

This section tried to find the importance of respondent's family background and family status in determining their earnings. This section represents the different indicators of family background and family status indicators with reference to Pakistan which were further used in the development of indexes of family background and family status. Indicators of family background include parent's education, parent's occupation and the language that has been used at home for the sake of communication. Family status indicator included income of the head of the household, employment sector and salary of spouse, residence of respondent, area and the size of the house, income from the agriculture land, ownership of car and numbers of cars own by other family members and number of mobile phones in a household. Azal (2011, 2014) used family background and family status as an indicator in order to determine individual earnings in Pakistan. It had been found that family background and status have a positive and significant impact on individual earnings. So current study is also expecting and positive impact of both Family Background and Family Status indices on the earnings of technical educational institute's workforce.

**Scale of Instrument:**In social science research, question on a Likert scale are widely used. Maximum questions used in the questionnaire were kept close ended using nominal and ordinal scale except from the occupation of the parents. For some questions Likert scale of different points had been used. While open-ended questions like occupation of respondents mother and father were measured by the ISCO-8 (International Standard Classification of Occupation) scores of major groups of occupation. ISCO-8 divide occupations in 10 major groups give below:

**Table 1**  
**International Standard Classification of Occupation**

<i>Codes</i>	<i>Occupations</i>
1	Manager
2	Professionals
3	Technicians and Associate Professionals
4	Clerical Support Workers
5	Services and Sales Worker
6	Skilled Agricultural, Forestry and Fishery Workers
7	Craft and Related Trades Workers
8	Plant and Machine Operators and Assembler
9	Elementary Occupations
10	Armed Force Occupation

**Sampling Dynamics:**The sample size was equally distributed among the nine towns of Lahore and Lahore Cantt targeting technical institutions affiliated with Punjab Technical Board. Keeping in view the objective of the study, both private and public institutes were targeted for the data collection. Furthermore for the second objective, data was collected from categories of staff teaching and non-teaching both from targeted technical educational institution. There were 74

technical institutes affiliated with the Punjab Technical Board. Fifteen hundred questionnaires were distributed in technical institutes and colleges which were affiliated with Punjab Technical Board of Pakistan.

Hence, there were two constraints that were faced at the time of data collection that was time and non-availability of the respondents. So after studying literature it had been observed that to achieve the objectives of the study from the whole list of institutes affiliated with Punjab Technical Board can be focused more on the institutes that are providing technical education than the other institutes.

**Pre-Testing and Reliability test:** To check the reliability and validity of the questionnaire, a pre-test was conducted. For pre-testing, 60 questionnaires were distributed equally in both public and private institutes of technical education. These 60 questionnaires were not including in the actual sample size. Thirty questionnaires had been filled from each institute (public and private institutes). Questionnaires got filled from both teaching and non-teaching staff of those institutes as researcher wanted the equal participation of both categories. Thus, 15 questionnaires had been filled up from the teaching and 15 from the non-teaching staff of each public and private educational institute. During this, respondents were encouraged to ask questions and comment on any question, if they have problem in understanding the question or the statement was unclear. Responses showed few weak points in the questionnaire so some modifications were made before finalizing the questionnaire.

Cronbach's Alpha test established by Lee Cronbach's in 1951 was used to test the reliability of the questionnaire. Results of Cronbach's alpha test are given below:

**Table 2**  
**Reliability Statistics**

<i>Cronbach's Alpha test</i>	<i>No of Items</i>
0.756	54

Since value of Cronbach's Alpha test was 0.756 which is more than acceptable for the reliability. Which means now data can be collected from the respondents.

**Data Collection Source:** The source of data collection that had been used in the study is primary source. Data has been collected by the researcher's themselves from the technical educational institutes of Lahore. Since, Primary data is considered more accurate, reliable and authentic than secondary data since it has not been published previously, thus it has not been altered or changed by people. Researchers used primary data sources to get first-hand information for the variables of interest to achieve the objectives of study.

**Consent:** Permission was taken from the educational institutions, where the study was being performed before collecting or conducting the survey. Permission letter had been submitted to the Head/Principal of the educational institutes with the brief description of the study and ensuring the administration and the respondents that their response to the questionnaire will be kept strictly confidential and will not be disclosed or used for purpose other than the research.

**Data collection:**After getting permission, data was collected from workforce of technical educational institution affiliated with the Punjab technical board. Data was collected through various means such as direct visits to the institutions, where questionnaires were randomly distributed among the teaching and non-teaching staff, interviews were conducted and also via emails from the technical educational institutes of Lahore.

**Response Rate of the Study:**For attaining the objectives of the study a sample of 1168 observations has been collected. Total 1500 questionnaires were distributed in the technical educational institutes because 253 questionnaires were not returned by the respondents. So in order to complete the sample size extra questionnaires got printed. But after data cleaning only 1168 questionnaire were left that could be used for the final estimation. As around 79 questionnaires were not seriously filled or usable. For the distribution and collection of data from relevant respondents simple random sampling technique have been used in the sample institutions.

**Table 3**  
**Details of respondents of technical institutions by sectors and categories**

	Teaching Respondents	Non-Teaching Respondents	Total Respondents
Respondents from Public Sector Institutes	473 (40%)	143 (13%)	616 (53%)
Respondents from Private Sector Institutes	398 (34%)	154 (14%)	552 (47%)
Total Respondents			1168

**Data Analysis:**As a first step towards the analysis data collected through questionnaire were organized and sorted. And for all analysis Statistical Package for Social Sciences (SPSS) version 21.00 was used.

**Diagnostic Method:**After sorting data on earning differentials for the workforce working in technical educational institutes of Lahore, analytical techniques such as frequencies, averages, dispersion and percentages were used as the study is quantitative in nature.

**Descriptive Analysis:**In order to interpret data, descriptive statistics were applied. Data were represented or described by the frequencies, averages and percentages. According to Fisher and Marshall (2009) that's the graphical techniques and the numerical procedures are used in order to describe the characteristics of the sample data set. In current study, descriptive analysis was used to explain the characteristics of the data set e.g. demographics, professional qualification and the household information.

**Methodology:**

**Regression Model:**In order to estimate the earning differentials for the workforce working in technical educational institutes the current study used Mincer Basic as well as Augmented

Human Capital Earning Function Approach as was used by studies by Afzal et. al. (2010), Afzal (2014), Daneshvary (1993), Fernandez (2009) and Siddiqui and et. al. (1998).

**Model Specification:** To identify and estimate the earning differentials for the workforce of technical educational institutions, the following models were considered:

**Mincer Basic Human Capital Earning Function:** According to Basic Human Capital Model, natural log of individuals earnings in a given time period was explained or determined by the education and experience squares (Mincer, 1974) as give below:

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

**Augmented Earning Function:** Augmented Earning Function was specified in the form of regression model as follow:

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

Another form of Model 1, when education is being measured by ‘years of schooling completed’ is given below:

$$\ln Y_i = \beta_0 + \beta_1 Edu_i + \beta_2 Experi_i + \beta_3 Experi_i^2 + \beta_4 Comp_i + \beta_8 Train_i + \beta_6 SSC_i + \beta_7 Gend_i + \beta_5 Flang_i + \beta_9 FBI_i + \beta_{10} FSI_i + \mu_i \quad \text{(Model 2)}$$

Where as,

$\ln Y_i$  = Natural log of net per month earnings of the workforce of technical educational institutes of Lahore in fiscal year 2016. Net monthly earnings include net salary from the main job plus from other and occasional jobs. Income from occasional job includes income from research projects or script marking income from entrepreneurship etc.

$Edu_i$  = Education of the  $i^{th}$  respondent.  $Edu_i$  is measured in term of ‘years of schooling completed’. It is the main predictor variable in an earning function.  $\beta_1$  is the estimated coefficient associated with  $Edu_i$  which measures the marginal rate of percentage change due to an additional year of schooling which is expected to be positive in the current study, which also measures private financial returns to education of  $i^{th}$  respondent.

$Experi_i$  = Total number of years of work experience (from the first job till the current job) of the  $i^{th}$  respondent.  $\beta_2$  is the estimated coefficient associated with  $Experi_i$  which measures the marginal rate of percentage change due to an additional year of experience. In the present study it is expected to be positive in the current study.

- $Experi_i^2$  = Squares of total number of years of work experience of the  $i^{th}$  respondent. A positive and negative value of the coefficients of variables  $Experi_i$  and  $Experi_i^2$ , respectively shows the concavity of experience-earning profile. By concavity of experience-earning profile it mean an additional year of experience will lead to high earnings but at decreasing rate.
- $Comp_i$  = Computer literacy, measured by the use of computer/internet at work (it is a dichotomous variable, '1' for using computer and internet at work and '0' otherwise) by the  $i^{th}$  respondent.
- $Train_i$  = Foreign/local training acquired which was helpful for the job, (it is a dichotomous variable, '1' for Yes, if the respondent has received training and '0' for No, if the respondent has not receive any local/foreign training) by the  $i^{th}$  respondent. In case of many developing countries including Pakistan it had been found that training have a direct or positive impact on earnings (Afzal, 2014; Gaag & Vijverberg, 1989; Jimenez & Kugler, 1987; Naisr, 1990).
- $SSCsector_i$  = Sector of institution from where  $i^{th}$  respondent has completed Secondary School Certificate ('1' for SSC from government institution and '0' for SSC from private institution).
- $Gend_i$  = Gender of the  $i^{th}$  respondent ('1' for the male respondent and '0' for the female respondent). The impact of gender on earnings subjected to the empirical results/outcome.
- $Flangu_i$  = Foreign Language Proficiency of the  $i^{th}$  respondent ('1' for Yes and '0' for No). The impact of Foreign Language proficiency on earnings is expected to be positive in the current study.
- $FBI_i$  = Family Background Index was developed by parent's education and parent's occupation of the  $i^{th}$  respondent and the language use at home for communication. This study differs from the other studies because of the use of 'family background index' rather than simply measuring it by father's education in terms of years of schooling completed of the  $i^{th}$  respondent. Many researcher have used fathers education as a measure of family background like Afzal (2011; 2014) for Pakistan, Armitage and Sabot (1987) for Kenya and Tanzania, Neuman (1991) for Israel, Liu *et al.* (200) for Greece, San-Segundo and Valiente (2003) for Spain. Research conducted by Afzal (2011; 2014) found positive relationship between family background and earnings in case of workforce working educational institutions of general nature. So, this study also expected the direct link between earnings and family background.

$FSI_i$  = Family Status Index was constructed by different indicators. In Pakistan, FS (Family Status) of an individual is known by his/her residence, area and the size of the house, income from the agriculture land, income of the head of the household, spouse education, employment sector of spouse, income of spouse, ownership of car, number of cars owned by the other family members, number of mobile phones in a household of the  $i^{th}$  respondent. Another factor that makes this study different from the other studies because of the use of another index i.e. 'Family Status Index' rather than simply measuring it by ownership of car by the  $i^{th}$  respondent. Afzal (2011, 2014) used car ownership as a measure of family status in case of Pakistan and found the positive link between family status and the individual's earnings. The current study is also expecting the direct relationship among family status and earnings.

$\mu_i$  = Random Error Term

**Method for Constructing Family Background and Family Status indices:** Over the year's numbers of indices have been constructed including living conditions index to measure inequalities in health, housing etc. by Social and Cultural Planning Office of Netherlands (Boelhouwer & Stoop, 1999), Duncan's index in order to classify occupation by income and education (Oakes & Rossi, 2003) and many more indexes. But while constructing indexes, the most important problem faced by the researcher is finding a suitable aggregation strategy in order to combine the multidimensional indicators into a composite index.

For current study PCA found to be a most suited method to construct a Family Background and Family Status index.

**Principal Component Analysis (PCA):** PCA was given by Pearson (1901). PCA is a useful technique for converting or transforming large number of variables into a smaller and more consistent/logical uncorrelated set of factors.

PCA is an approximation to PFA (Principal Factor Analysis) if the components are rotated. Difference between both techniques is that PCA assume that in a variable all variability should be used in the analysis, however in PFA variability that is common with the other variables are used. In most of the cases results of both techniques are more or less the same. Though PCA is more suitable for the data reduction and PFA is suitable for detecting structure.

PCA was first used develop a single index by combining socio-economic indicators (Boelhouwer & Stoop, 1999). Since late 1990s many researcher such as Antony and Rao (2007), Fukuda, Nakamura and Takano, (2007), Rygel, O'Sullivan and Yarnal (2006); Tata and Schultz (1988); Sekhar, Indrayan, and Gupta (1991); Zagorski (1985) have used PCA to compute indexes. The method of constructing family status and family background indexes built from the weights generated using PCA have potential to explain earning differentials.

**Indicators Selection for an Index:** Various indicators were included in an index development keeping in mind the factors and in the light of literature that directly or indirectly represents the

Family Background and Family Status. In general, the indicators that are repeatedly discussed as family background were parent’s education, language used at home for communication purpose and parent’s occupation, income of the household. According to Duncan and Magnuson (2003), that parental educational attainment, home-learning environment and parent teaching-style have a strong correlation with the children achievement. Another indicator used as an indicator or family background is parent’s occupation. Generally, it has been assumed that father is the main figure who is responsible for the socio-economic wellbeing of the family (Afzal, 2011; 2014). The mother’s occupation is taken as a substitute only when father’s occupation is not available. But this approach has become questionable. As over the last decades, employment condition of the household has been changed drastically. Now even mothers contribute in the family income (Entwisle & Astone, 1994).

Indicators generally used as the representative of family status in Pakistan are the number of cars owned by the individual and their family members, residence, size of the house, spouse education, spouse income, income from other sources like from agriculture land and total number of phones and mobile phone in a household. In case of Pakistan all these are considered as an important representative indicators of family status. In many developing countries, especially in countries like Pakistan having car is one of the important indicator of family status. Ownership of a house along with the ownership of car(s) is consider as a high family status in Pakistan. (Afzal, 2011; 2014). However, few of these indicators were dropped from the analysis because of missing values.

### Testing the Appropriateness of a Principal Component Analysis:

The correlation between the indicators was checked before performing the PCA. Kaiser-Meyer-Olkin (KMO) has been used in the present study to check the sample adequacy.

Another test which is used to check the strength among the indicators is Bartlett’s Test of Sphericity. Maximum KMO can be 1.0. A value of 0.9 degree of common is considered as marvelous, 0.80 as meritorious, 0.7 as middling, 0.6 as mediocre, 0.5 miserable and any value below 0.5 is unacceptable. In current study KMO value for the family status index was 0.63 (degree of common variance is mediocre) and Bartlett's statistics is significant, as for family background index KMO value was 0.542 and Bartlett's statistics is significant which shows degree of common variance is miserable but data still can be used to perform PCA. Table 4 shows the results of KMO for both family background and family status index. These diagnostic procedure shows that PCA is appropriate for the data.

**Table 4**

**KMO and Bartlett’s Test of Sphericity**

KMO Measure of sample adequacy		Bartlett's Test of Sphericity		
		Chi-Square	Df	Sig
Family Background	0.542	464.009	6	.000
Family Status	0.63	258.695	28	.000

**Assessing Outliers, Normality and Linearity:** There are number of issues that need to be discussed which constructing an index using factor analysis (Nardo, Saisana, Saltelli, & Tarantola, 2005). There are few assumptions that need to be considering while developing composite indices based on factor or Principal Component Analysis. But often these assumptions are neglected by the researcher.

Presence of outliers can affect results of the factor analysis and their interpretations, as with the most of the statistical technique. In the data set outliers are the higher and lower values then the other values that can affect the correlation and therefore distort the results of factor analysis. Outliers in the data set can be checked using various SPSS techniques such as histogram or normal Q-Q plot in which observed values for each score is plotted against expected value, box-plot, histogram and descriptive statistics. In current study outliers were detected using box-plot and removed before applying PCA.

Secondly, PCA can be sensitive to non-linear relationship between variables. As the correlation coefficient undervalue/underestimate the strength of the relationship. If the sample size is small then this problem can be critical. But in case of current study sample size is not the issue. Tabachnick and Fidell (2007) noted that in case of large sample size 'skewness will not make a substantives difference'. Furthermore descriptive statistics, such as Skewness and Kurtosis are used to detect the type of distribution of the data. Skewness is used as a measure of symmetry and Kurtosis is used as a measure of peakedness.

## **Empirical Results and Interpretations:**

To estimate the earning differentials, an econometric model was estimated by using Ordinary least square (OLS) are given below:

1. Entire workforce of technical educational institutions (full sample).
2. Entire workforce of private sector technical educational institutions.
3. Entire workforce of public sector technical educational institutions.
4. Teaching workforce of private sector technical educational institutions.
5. Non-Teaching workforce of private sector technical educational institutions.
6. Teaching workforce of public sector technical educational institutions.
7. Non-Teaching workforce of public sector technical educational institutions.

Table 5.2 and 5.3 shows the OLS estimated results of semi-logarithmic earning equation for the workforce working in technical educational institutes of Lahore, when education of the workforce is measure by 'the years of schooling completed'.

## **Interpretation of PCA results**

- **Family Background Index:** Family background index was developed using four indicators. As an input to PCA correlation matrix used to extract the factors as indicators were not standardized. Results of Family Background index are represented in Table 5.
- **The Kaiser Criterion :** The number of factors extracted can be decided by the Kasier Criterion and Scree Plot techniques available in SPSS 21. One of the most worldwide

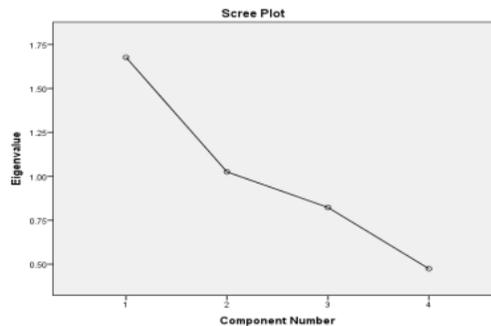
used techniques in order to select the number of factors is ‘Kaiser’s Criterion’ or the Eigenvalue Rule. This criterion was first proposed by Kaiser in 1960. Under this rule we can retain only those factors with the eigenvalues greater than one. The factor is dropped unless it extract as much as the Equivalent variance of one original indicator/variable we drop that factor. For Family Background, data revealed two factors whose Eigenvalue was greater than one and is shown in Table.

**Table 5**  
**Results of Family Background Index: Total Variance Explained**

Component	Eigenvalues		
	Total	Percentage of Variance	Cumulative Percentage
1	1.67	41.92	41.92
2	1.02	25.63	67.56
3	0.82	20.57	88.14
4	0.47	11.85	100.00

**Scree Plot:** A graphical technique that had been used to select the number of factors was the scree plot which is also known as Catell’s Scree Plot. This plot shows the Eigenvalue of the each factor or component versus the number of factor/component. After examining the Scree Plot only two components or factors were extracted for the analysis. Figure 1 represents the Scree Plot of Eigenvalues of the components.

**Figure 1: Scree Plot of Eigenvalues of the components (FBI)**



Results accounted for PCA using Varimax Rotation are shown in Table 5.1. Two factors accounted 67.57 percent of the total variance in the data are derived. The first factor includes mother education, father education and mother occupation shows the higher positive loadings. The first factor accounted 41.92 percent of the total variation in the data. This factor is the better representation of the family background which means that better family background representation of an individual is associated with mother education, father education and the mother occupation.

The second factor includes only one indicator i.e. father occupation which accounted 25.63 percent of the total variation in the data. This study may interpret that Family Background can also be measured by the single indicator i.e. fathers occupation as single indicator.

**Table 5.1**  
**Results of Family Background Index: Varimax Rotation Factor Matrix**

Indicators	Factor 1	Factor 2
Mother education	0.85	
Father education	0.71	
Mother occupation	0.65	
Father occupation		0.92
Percentage of Variance (67.566%)	41.92%	25.63%

Note: Indicator with a positive loading shows a negative association to the component.

**Calculation of Family Background Index:**As a first step in computing a single index, using regression method factor score coefficients which are also called component scores were estimated. To compute the factor scores for a given component or a factor, standardized scores of each variable is multiplied to the corresponding factor loading and then summed up these products. To calculate the factor scores SPSS 21 software was used and factor scores were saved as a variable in subsequent calculations involving factor scores.

The two factors explained 67.56 percent of the total variation with first and second factor explaining 41.92 percent and 25.63 percent, respectively. So, the importance of the factors in measuring Family Background is not the same. Therefore, Non-Standardized Family Background Index (NSFBI) was developed by using proportion of all these percentages as weights of the factor score coefficient. The formula for finding NSFBI is given below:

$$NSFBI = (41.929/67.566) * (\text{Factor 1 score}) + (25.637/67.566) * (\text{Factor 2 score})$$

The values of NSFBI could be positive or negative making an index difficult to interpret. Therefore Standardized Family Background Index (SFBI) was developed. The values of SFBI range from 0 to 100, The SFBI was developed by using following:

$$SFBI = \frac{NSFBI - \text{Mini NSFBI}}{\text{Max NSFBI} - \text{Mini NSFBI}} \times 100$$

$$SFBI = \frac{NSFBI - (-1.36)}{5.54 - (-1.36)} \times 100$$

$$SFBI = \frac{NSFBI - (-1.36)}{6.9} \times 100$$

A similar procedure was adopted by Antony and Rao (2007), Hightower (1978), Krishnan (2010) and Sekhar, Indrayan and Gupta (1991) in previous studies.

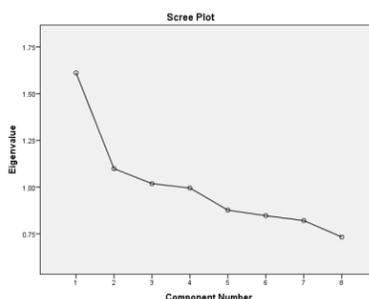
- **Family Status Index:**Family Status index was developed using eight indicators. As indicators were not standardized, that is why correlation matrix was used to extract the factors, as an input to PCA. Same as used for family background index. Results of Family Status Index are shown in Table 5.2.
- **The Kaiser Criterion:**Under Kaiser Criterion as we can retain only those factors with the Eigenvalues greater than one. We drop that factor, if it does not extract as much as the equivalent variance of one original indicator/variable. For Family Status Index, data revealed three factors whose Eigenvalue was greater than one as shown in Table 5.2.

**Table 5.2**  
**Results of Family Status Index: Total Variance Explained**

Component	Eigenvalues		
	Total	Percentage of Variance	Cumulative Percentage
1	1.61	20.14	20.14
2	1.09	13.73	33.87
3	1.01	12.73	46.6
4	0.99	12.43	59.03
5	0.87	10.95	69.99
6	0.84	10.58	80.58
7	0.82	10.25	90.84
8	0.73	9.16	100

- **Scree Plot:**Scree plot represents the Eigenvalue of the each factor or component versus the number of factors/component. After examining the Scree Plot only three components or factors were extracted for the analysis.

**Figure 2: Scree Plot of Eigenvalues of the Components (FSI)**



Results accounted for PCA (Family Status Index) using Varimax Rotation are shown in Table 5.3. Three factors accounted 46.60 percent of the total variance in the data. The first factor includes net per month salary of spouse in Rs/-, size of the house and number of cars owned by other family members shows the higher positive loadings while ownership of a car by respondent shows negative loading. Orthogonal rotation factor loading range from minus one to plus one as they are the correlation coefficients of each variable with the factor. By negative loading it means that result need to be interpreted in the opposite direction from the way it's stated. The

first factor accounted 20.14 percentage of the total variation in the data. This factor is the better representation of the family status which means that better Family Status representation of an individual is associated with the net per month salary of spouse in Rs/-, size of the house and number of cars owned by other family members and ownership of a car by respondent.

The second factor, it accounted 13.73 percentage of the total variation in the data. We may interpret that Family Status of an individual can also be measure by the spouse education, the income from the agriculture land and the total numbers of mobile phones in the household of respondents.

The third factor, it accounted 12.73 percentage of the total variation in the data.

**Table 5.3**  
**Results of Family Status Index: Varimax Rotation Factor Matrix**

Indicators	Factor 1	Factor 2	Factor 3
Per month spouse net salary in Rs/-	0.57		
Respondent's spouse education		0.42	-0.61
Respondent's residence			0.78
Size of house	0.69		
Agricultural income in Rs/-		0.59	
Ownership of car by respondent	-0.63		
Ownership of car by other family members	0.44		
Total No. of mobile phones in a household		0.589	
Percentage of Variance (46.60%)	20.14%	13.73%	12.73%

Note: Indicator with a positive loading shows a negative association to the component.

**Family Status Index Calculation:** Same steps of Family Background Index were followed while computing Family Status Index. As a first step in computing a single index, component scores were estimated using regression method factor score coefficients. To compute the factor scores for a given component or a factor, standardized scores of each variable is multiplied to the corresponding factor loading and then summed up these products. Same procedure as followed in case of Family Background Index. To calculate the factor scores SPSS 21 software was used and factor scores were saved as a variable in subsequent calculations involving factor scores.

The three factors explained 46.6 percent of the total variation with first, second and third factor explaining 20.14 percent, 13.73 percent and 12.73 percent respectively. So, the importance of the factors in measuring Family Status is not the same. Thus, Non-Standardized Family Status Index (NSFSI) was developed by using proportion of all these percentages as weights of the factor score coefficient. The formula for finding NSFBI is given below:

$$NSFSI = (20.14/46.600) * (\text{Factor 1 score}) + (13.73/46.600) * (\text{Factor 2 score}) + (12.73/46.600) * (\text{Factor 3 score})$$

The values of NSBI could be positive or negative making an index difficult to interpret. Therefore Standardized Family Status Index (SFSI) was developed. The values of SFSI range from 0 to 100, the SFBI was developed using following:

$$SFSI = \frac{NSFSI - \text{Mini } NSFSI}{\text{Max } NSFSI - \text{Mini } NSFSI} \times 100$$

$$SFSI = \frac{NSFSI - (-1.29)}{4.00 - (-1.29)} \times 100$$

$$SFSI = \frac{NSFSI - (-1.36)}{5.29} \times 100$$

## Empirical Results and Their Analysis

Table 5.4 presents OLS estimates of the ‘Basic Earnings Equation’ which is also known as ‘Basic Model’ as well as the ‘Augmented Earnings Equations’, also known as ‘Augmented Model’ for the workforce of entire private and entire public sector technical educational institution of Lahore. Table 5.5 provides the OLS estimates of the ‘Basic Model’ as well as the ‘Augmented Model’ (Semi-logarithmic earning equations) for the teaching and non-teaching workforce of private sector and also the teaching and non-teaching workforce of public sector technical educational institutions.

For the workforce working in **entire technical educational institution**, the results given in Table 5.4 show that, years of schooling completed, actual work experience, training acquired, foreign language proficiency and family status have a positive and significant impact on entire workforce earnings of technical educational institutions. Variable gender and secondary school certificate (SSC) are contributing negatively and insignificantly (Afzal, 2014).

For workforce working in **private sector technical educational institution** results given in Table 5.4 reveal that years of schooling completed, actual work experience, computer use, training acquired, gender, foreign language proficiency, family status and family background are the factors that positively and significantly contribute to the earnings of the workforce of private sector technical educational institutions, however SSC contributed as a negative factor.

For the workforce working in **public sector technical educational institution**, the results given in Table 5.4 reveal that the factors that positively and significantly contributed towards the earnings of the workforce are years of schooling completed, actual work experience, training acquired, gender, foreign language proficiency and family status. While family background contributes positively but insignificantly in the public workforce earnings, variable computer use and SSC are contributing as negative factors.

**Table 5.5**

**OLS Regression Results of Basic and Augmented Models**

**Response variable: ln earnings, where the education of the workforce working in technical educational institutions is measured by 'years of schooling completed'**

	Workforce of technical educational institutions by sector		Workforce of entire technical educational institutes
	Private Sector	Public Sector	
Basic Model			
Constant	8.226 (0.000)	8.612 (0.000)	8.204 (0.000)
Edu (in years)	0.093 (0.000)	0.105 (0.000)	0.108 (0.000)
Experi (in years)	0.067 (0.000)	0.030 (0.000)	0.056 (0.000)
(Experi2/100)* (in years)	-0.001 (0.000)	-0.004 (0.829)	-0.001 (0.000)
Augmented Model			
Constant	7.772 (0.000)	8.381 (0.000)	7.887 (0.000)
Edu (in years)	0.092 (0.000)	0.102 (0.000)	0.104 (0.000)
Experi (in years)	0.066 (0.000)	0.032 (0.000)	0.054 (0.000)
(Experi2/100)* (in years)	-0.001 (0.000)	-0.001 (0.471)	-0.001 (0.000)
Comp	0.056 (0.118)	-0.086 (0.001)	0.003 (0.915)
Train (Yes=1)	0.184 (0.002)	0.109 (0.082)	0.263 (0.000)
SSC (Govt=1)	-0.086 (0.051)	-0.013 (0.729)	-0.018 (0.596)
Gender (Male=1)	0.103 (0.097)	0.073 (0.011)	-0.050 (0.108)
Flang (Yes=1)	0.082 (0.019)	0.048 (0.069)	0.070 (0.005)
SFBI	0.004 (0.014)	0.001 (0.644)	0.002 (0.194)
SFSI	0.005 (0.002)	0.005 (0.000)	0.006 (0.000)
Obs	552	616	1168
Adj R <sup>2</sup> (Basic model)	0.543	0.483	0.651
Adj R <sup>2</sup> (Augmented model)	0.694	0.623	0.777
F Statistic (Basic Model)	76.423 (0.000)	192.2 (0.000)	285.537 (0.000)
F Statistic (Augmented Model)	29.509 (0.000)	66.299 (0.000)	97.697 (0.000)

Values in parentheses are p-values.

\*To get the coefficient value other than zero, experience squared term was divided by 100 as was done by Afzal (2014).

Table 5.4 revealed that factors that affect the earnings of the *entire workforce* positively and significantly are years of schooling completed, actual experience, computer use, training, foreign language proficiency, family background and family status.

The results given in the Table 5.4 shows that the coefficient of education variable contracts in case of *Augmented Model* confirming that returns to education does get effected by the other variables add in the model. Higher contraction was found in education and experience coefficients in case of *public sector workforce* which means that factor other than education and experience are more important in case of public sector workforce. Rate of returns to education were highest (10.5 percent and 10.2 percent in case Basic and Augmented Model, respectively) for public sector workforce as compared to the private sector workforce (9.3 percent and 9.2 percent in case of Basic and Augmented Model, respectively). These finding are consistent with the findings of Afzal (2014).

*Returns to experience* were highest in case of private sector workforce (6.6 percent) as compared to the public sector workforce (3.2 percent). Results given in Table 5.4 also indicates that **impact of trainings** on the earnings of the workforce of private sector technical institution were higher (18.4 percent) than that of the public sector (10.9 percent) educational institutions. Which mean people with the formal trainings earn 18.4 percent more in case of private sector technical educational institutes than that of the people with no formal trainings. And in case of public sector technical educational institutes, people with the formal trainings earn 10.9 percent more than the people with no formal trainings.

*Respondent's sector of secondary school certificate (SSC)* contributed negatively and significantly only in case of private sector technical institutions as was found in Afzal (2011) in case of university respondents. This implies that SSC completed from the private educational institute matter only to the private sector respondent. Those employees who have passed secondary school certificate from the private institutes earn 8.6 percent more than those who passed SSC from the government institute. Such respondents might have good communication and presentations skill.

Male workforce earns more than their counter parts in both private and public sector of technical educational institutes as shown in Table 5.5. This earning gap found to be higher in private sector. Male respondents are found to earn 10.3 percent and 7 .3 percent at private sector and public sector respectively. Females tend to pay less as compared to males although female are more educated (consistent with Hussain & Awan, 2007 and Afzal, 2011). This could be a result of male dominant society/male gender bias or better working environment for males.

*Family Background* is measured by developing an index based on four indicators i.e. mother education, father education, mother occupation and father occupation. The results given in Table 5.5 shows that family background found to be higher (4 percent) and significant in case of the workforce of private sector than the public sector (1 percent) technical educational institutions.

*Family Status* which is measured by an index based on eight indicators i.e. the number of cars owned by the individual as well as his family members, residence (whether they own the house, or live on rent or govt. accommodation etc.), size of the house, spouse education, spouse income,

income from other sources like from agriculture land and total number of mobile phone in a household. Family Status variables found to be positively and significantly contributed each of the workforces of private sector as well as in case of public sector as shown in Table 5.5.

**Table 5.5**

**OLS Regression results of Basic and Augmented models**

**Response variable: ln earnings, where education of the workforce of Technical Educational Institutions by sector is measured by ‘years of schooling completed’**

<b>Workforce of Technical Educational Institutions by sector</b>				
	<b>Public Sector</b>		<b>Private Sector</b>	
	<b>Teaching Workforce</b>	<b>Non-Teaching Workforce</b>	<b>Teaching Workforce</b>	<b>Non-Teaching Workforce</b>
<b>Basic Model</b>				
Constant	8.963 (0.000)	8.653 (0.000)	8.844 (0.000)	7.294 (0.000)
Edu (in years)	0.089 (0.000)	0.090 (0.000)	0.060 (0.000)	0.143 (0.000)
Experi (in years)	0.031 (0.000)	0.021 (0.069)	0.061 (0.000)	0.068 (0.000)
(Experi2/100)* (in years)	-0.002 (0.000)	-0.002 (0.492)	-0.001 (0.000)	-0.001 (0.018)
<b>Augmented Model</b>				
Constant	8.878 (0.000)	8.599 (0.000)	8.362 (0.000)	7.218 (0.000)
Edu (in years)	0.080 (0.000)	0.089 (0.000)	0.059 (0.000)	0.139 (0.000)
Experi (in years)	0.032 (0.000)	0.020 (0.104)	0.06 (0.000)	0.08 (0.000)
(Experi2/100)* (in years)	-0.003 (0.153)	-0.002 (0.507)	-0.001 (0.000)	-0.002 (0.004)
Comp	0.029 (0.294)	-0.038 (0.449)	0.151 (0.000)	-0.099 (0.158)
Train (Yes=1)	-0.051 (0.606)	-0.093 (0.165)	0.168 (0.082)	0.085 (0.316)
SSC (Govt=1)	0.043 (0.238)	-0.034 (0.621)	0.002 (0.996)	-0.268 (0.005)
Gender (Male=1)	0.139 (0.000)	0.084 (0.152)	0.059 (0.43)	0.065 (0.537)
Flang (Yes=1)	0.005 (0.845)	0.076 (0.099)	0.045 (0.239)	0.087 (0.180)
SFBI	0.001 (0.633)	0.001 (0.626)	0.004 (0.02)	0.002 (0.394)
SFSI	0.005 (0.000)	-0.005 (0.998)	0.005 (0.006)	0.007 (0.092)
Obs	473	143	398	154
Adj R <sup>2</sup> (Basic model)	0.69	0.72	0.48	0.67
Adj R <sup>2</sup> (Augmented model)	0.74	0.73	0.55	0.71
F Statistic (Basic Model)	148.54 (0.000)	48.91 (0.000)	38.16 (0.000)	40.18 (0.000)
F Statistic (Augmented Model)	54.22 (0.000)	15.16 (0.000)	16.44 (0.000)	14.88 (0.000)

Values in parentheses are p-values.

\*To get the coefficient value other than zero Experience squared term is divided by 100 as was done by Azal (2014).

Results presented in Table 5.5 revealed that the **rate of returns to education** in ‘Basic Model’ as well as ‘Augmented Model’ were higher for the teaching workforce of public sector technical educational institutions as compared to the teaching workforce of private sector technical educational institutions which is consistent with the finding of Afzal (2011) for the workforce of educational institution in general. However it was higher in case of non-teaching workforce of private sector as compared to the public sector non-teaching workforce. Coefficients of education shrink remarkably in case of ‘Augmented Model’ which confirms that the added variables in this model do affect the returns to education. Highest shrink has been found for the teaching workforce of public sector technical educational institution. This means that variables other than education and experience that affects the individual’s earnings are more important for the teaching workforce of the public sector technical educational institutions. Rate of returns to education was found to be less for the teaching workforce of private sector technical educational institutions as compared to the public sector technical educational institutions. But it was higher for non-teaching workforce of private sector as compared to the public sector non-teaching workforce. However in ‘Basic Model’ as well as ‘Augmented Model’ results showed in Table 5.6 that the impact of experience on the workforce earnings is higher for the private sector teaching and non-teaching workforce as compared to the public sector technical educational institutions workforce.

Factors that contribute positively and significantly towards the earnings of the **public sector teaching workforce** of the technical educational institutions presented in Table 5.5 are years of schooling completed, actual experience, gender and the family status. For the earnings of **non-teaching workforce of public sector** the result in Table 5.5 reveal that years of schooling, experience, gender and foreign language proficiency are the variables that positively and significantly contributed while family background is the variable which positively but insignificantly contribute in the respondent’s earnings.

For the **teaching workforce of private sector**, the result in Table 5.6 reveal that variables that effect the earnings positively and significantly are years of schooling completed, actual work experience, computer use, training acquired, family status and family background. As for **non-teaching private sector** workforce, education, actual experience, foreign language proficiency and family status are the variables that contribute positively and significantly in the individuals earnings while training acquired, gender and family background are the factors that also have positive but insignificant impact on individuals earnings. Variables that negatively affect the individual’s earnings are computer use and SSC.

The ‘**Augmented Model**’ of public sector in Table 5.5 revealed that returns to education found to be higher for the *non-teaching workforce* of technical educational institutions (8.9 percent) as compare to their counterparts of *teaching workforce* (8 percent). Similarly, for the **private sector also Tables 5.3** shows that the rate of returns to education was higher (13.9 percent) *non-teaching workforce* in comparison to *teaching workforce* (5.9 percent). **In case of public and private teaching workforce**, it has been found that rate of returns to education the *public sector teaching workforce* were higher (8 percent) than the *private sector teaching workforce* (5.9 percent). In comparison to this **in case of public and private non-teaching workforce**, results shown in Table 5.5 present that rate of returns to the *private sector non-teaching workforce* were higher (13.9 percent) than the *public sector teaching workforce* (8.9 percent).

The results in the **Table 5.5 ‘Augmented Model’ for the public sector workforce** reveals that the returns to experience were higher (3.2 percent) for the teaching workforce than the non-teaching workforce (2 percent). **For ‘Augmented Model’ private sector workforce Table 5.6** returns to an extra year of experience was higher for non-teaching workforce (8 percent) than the teaching workforce (6 percent). **In case of teaching workforce of public and private sector** results in Table 5.6 revealed that returns to experience were higher for the private sector teaching workforce (6 percent) as compare to the public sector teaching workforce (3.2 percent). **Results of Table 5.6 for non-teaching workforce of public and private sector showed that** returns to experience found to be higher in case of private sector (8 percent) as compared to public sector (2 percent).

**Result of ‘Augmented Model’ private sector given in Table 5.5** also indicates that impact of trainings on the earnings of the *teaching workforce* of private sector technical institution were higher (16.8 percent) than the *non-teaching* (8.5 percent). Which mean teachers with the formal trainings earn 16.8 percent more in case of private sector technical educational institutes then the teacher with no formal trainings and in case of non-teaching respondents the one with the formal trainings earn 8.5 percent more than the one with no formal trainings. Formal training acquire by the respondent was negatively but insignificantly contributed only **in case of public sector** which is consistent with Afzal (2014) study in case of teaching workforce of public sector educational institutions. Furthermore if we compare the **computer use for teaching workforce of private and public sector technical educational institutions** it was found that it was higher in private sector (15.1 percent) as compare to the public sector (2.9 percent). This means that in private sector teacher who use computer earn 15.1 percent more than that of the teacher who don’t use computer.

Gender gap results in the **Table 5.5 for ‘Augmented Model’ the private sector** workforce reveal non-teaching workforce tends to be high (6.5 percent) as compare to the teaching workforce (5.9 percent). This means that male non-teaching workforce 6.5 percent and male non-teaching workforce earn 5.9 percent more than their counter parts (Afzal, 2014).

Non-teaching workforce with the foreign proficiency have higher impact (8.7 percent and 7.6 percent of private and public sector, respectively) on earnings than the teaching workforce (4.5 percent and 0.5 percent of private and public sector, respectively) as revealed in Table 5.6. Which means that **non-teaching workforce public sector** with the foreign language proficiency earns 7.6 percent and **non-teaching workforce private sector** earns 8.7 percent more than the workforce with their counterparts. For **teaching workforce of private and public sector Table 5.6** shows that effect of foreign language proficiency on earnings was higher for private sector teaching workforce (4.5 percent) than the public sector teaching workforce (0.5 percent). And the **results presented in Table 5.6 for the non-teaching workforce of private and public sector** has been found that it was higher in case of private non-teaching workforce (8.7 percent) than the public non-teaching workforce (7.6 percent).

From the results given in Table 5.4, reveals that family background has been found to have highest (0.4 percent and significant) impact on individual’s earnings in case of the **teaching workforce of private sector**. As for the **teaching workforce of private and public sector** the results given in Table 5.5 shows that it is higher (0.4 percent) for the private sector teaching

workforce than that of public sector teaching workforce (0.1 percent). Table 5.6 results **for the non-teaching workforce of private and public sector** exposed that effect of family background on respondent's earnings was higher (0.1 percent) in case of public sector as compared the private sector non-teaching workforce (0.2 percent).

Impact of family status on earnings was found highest (0.7 percent) in case of **non-teaching workforce of private sector** given in Table 5.6. This means that people with the strong family status earn 0.7 percent more than its counterparts in case of non-teaching workforce of private sector technical educational institutions.

The results given in Table 5.4 and 5.3 shows that estimated coefficients associate with the actual work experience is positive and statistically significant for all models, however for the experience square term, the coefficient associated with the variable is negative which reveals parabolic association between earnings and actual working experience for each category of models. This implies that **experience-earning profile** is concave that is diminishing rate of return to actual work experience after a specific working experience. Concavity means earnings increases with the increase in actual work experience but at a decreasing rate.

The significance of the estimated coefficients associated with education, actual work experience and training variables shows the validity of Human Capital Model for the workforce of technical educational institutions of Pakistan. The higher returns associated with education, actual work experience and training variables provide a clear support to the human capital theory in case of the workforce working in technical educational institutions of Lahore, Pakistan.

## **Conclusion and Recommendations**

The current study has been carried out to measure the earning differentials of the workforce working in technical educational institutions of District Lahore of Punjab, Pakistan. The primary data based on the sample of 1168 respondents through using the survey method by questionnaire has been used collected by the researcher herself. It has been found that public sector respondents earn more although they spend less hours than the private sector respondents. The lowest marginal rate of returns to education has been found for the non-teaching workforce of private sector technical educational institutions.

Variables that positively and significantly contributed towards the earnings of the respondents are years of schooling completed, actual working experience, training acquired, gender, foreign language proficiency, family status and family background in case of private as well as public sector technical educational institutions. Factors such as education, actual experience and gender found as a positive and significant contributor towards the earnings of the teaching and non-teaching workforce of private and also the public sector educational institutions while foreign language proficiency was significant in case of non-teaching workforce of public sector and family background in case of teaching workforce of private sector. Factor such as years of schooling, actual experience, gender, foreign language, and family background positively contributed in the earnings of teaching and non-teaching workforce of private as well as public technical educational institutions of Lahore. Returns to experience were higher for the teaching workers of public sector technical educational institutes.

Higher returns couple with education, actual work experience and training gives a clear cut support to the 'Human Capital Theory' for the workforce working in technical educational institutions of Lahore, Pakistan. Furthermore, in current study concavity has also been observed in experience-earning profile.

**Recommendations:** *some recommendations are suggested keeping in view the above finding:*

- I. While formulations of development policies major factors that determines the earnings found in the current study should be taken under consideration in order to increase the earnings status of technical educational institutions in Pakistan.
- II. Earnings of the private sector teaching workforce must be raised at least to the extent or equal to the teaching workforce public sector technical educational institutions to raise their productivity and also to promote education.
- III. Attainment of formal training which is a part of person's along with the institutional productivity should be raised for all respondents whether it's teaching or non-teaching. There is need of such institutions that can train individuals to meet with the needs of rapidly changing technology.
- IV. Strong steps must be taken to raise the earnings of female workforce.
- V. To minimize the earning differentials among various occupation (i.e teaching & non-teaching workforce) as well as gender workforce earnings, development programs must restructured and rationalized.

### References

- A.R. Kemal (2005), Skill Development in Pakistan, *The Pakistan Development review*, Vol. 44, No. 4.
- M. Akram, and F. J. Khan, (2007), Public Provision of Education and Government Spending in Pakistan, *PIDE Working Paper Series* No. 2007:40.
- Alan B. Krueger (1993), How Computers have Changed the Wage Structure: Evidence from Microdata, 1984–1989, *The Quarterly Journal of Economics* (1993) 108 (1):33-60. DOI: 10.2307/2118494.
- Alison L. Booth (1993), Private Sector Trainings and Graduates Earnings, *Review of economics and statistics*, Vol.75, No.1.
- Ameeq-ul-Ameeq and Furqan Hanif (2013), Impact of Training on Employees Performance and Development in Hotel Industry of Lahore, Pakistan, *Journal of Bussiness Studies Quaterly*, Vol. 4, No.4.
- Ann P. Bartel (1994), Productivity Gains from the Implementation of Employee Training Programs, *Industrial Relations*, 33, Issue 4, October 1994, pp. 411-425.

G. M. Antony and K. V. Rao (2007), A Composite Index to Explain Variations in Poverty, Health, Nutritional Status and Standard of Living: Use of Multivariate Statistical Methods. *Public Health*, 121, 578-587.

Aragon Sanchez, A. Barba Aragon and I. Sanz Valle, R. (2003), Effects of Training on Business Results, *International Journal of Human Management*, 14(6): 956-980.

Barry Chiswick (1974), Income Inequality: Regional Analyses within a Human Capital Framework, *New York: National Bureau of Economic Research*.

Barry Chiswick and Jacob Mincer (1972), Time-Series Changes in Personal Income Inequality in the United States from 1939, with Projections to 1985, *Journal of Political Economy*, 80, May 1972, Supplement, pp. \$34-\$66

Barry T. Hirsch (1978), Earnings Inequality across Labor Markets: A Test of the Human Capital Model, *Southern Economic Journal*, 45, July 1978, forthcoming.

Bashir Ahmad Khilji, Zaheer Khan Kakar and Sabahat Subhan (2012), Impact of Vocational Training and Skill Development on Economic Growth of Pakistan, *World applied sciences, journal*. 17(10) :1298-1302.

G. Becker (1981), A Treatise on the Family. Cambridge, Mass: *Harvard University Press*.

G. Becker (1985), Human Capital, Effort, and the Sexual Division of Labour. *Journal of Labour Economics* 3: 33-58.

G. S. Becker and B. R. Chiswick (1966), Education and The Distribution of Earnings, *American Economic Review*, 56 (2), 358-69.

J. R. Behrman and P. Taubman (1976), Intergenerational Transmission of Income and Wealth, *American Economic Review*, 66 (2), 436-440.

Bill Lehr and Frank Lichtenberg (1999), Information Technology and Its Impact on Productivity: Firm-Level Evidence from Government and Private Data Sources, 1977-1993, *The Canadian Journal of Economics/Revue canadienne d'Economie* Vol. 32, No. 2, Special Issue on Service Sector Productivity and the Productivity Paradox (Apr., 1999), pp. 335-362.

J. Boelhouwer and I. Stoop (1999). Measuring well-being in the Netherlands: The SCP index from 1974 to 1997. *Social Indicators Research*, 48(1), 51-75.

L. Borghans and B ter Weel (2004), What Happens when Agent gets A Computer? The Labor Market Impact of Cost Efficient Computer Adoption., *Journal of Economic Behaviour and Organisation*, Vol.54, pp.137-151.

C. F. Kemerer and G. L. Sosa (1991), Systems Development Risks in Strategic Information Systems, *Information and Software Technology-Information and software economics*, Vol. 33, Issue 3, April 1991, Pages 212-223.

Carl Ralm (1979), Investment in Training and the Occupational Structure of Earnings in the United States, *Unpublished Ph.D. dissertation, Columbia*.

Deanna L. Sharpe and Mohamed Abdel-Ghany (2006), Determinants of Income Differentials: Comparing Asians with Whites and Blacks, *Journal of Family and Economic Issues* (2006) 27:588–600, DOI 10.1007/s10834-006-9034-7.

Denise F. Polit and Bernadette P. Hungler (1999), Nursing Research: Principles and Methods (6th Ed.) *Philadelphia, Lippincott*.

Dr. Iftikhar Hussain Shah, Fazalur Rahman, Dr. Muhammad Ajmal and Dr. Hafiz M Hamidullah (2011), Situation Analysis of Technical Education and Vocational Training: A Case Study from Pakistan, *International Journal of Academic Research* Vol. 3. No.1. January, 2011, Part III.

G. J. Duncan and K. Magnuson (2003). Off with Hollingshead: Socioeconomic Resources, Parenting, and Child Development. In M. H. Bornstein & R. H. Bradley (Eds.), *socioeconomic status, parenting, and child development*. Mahwah, New Jersey: Lawrence Erlbaum Associates.

DR Entwisle and NM Astone (1994), Some Practical Guidelines for Measuring Youth's Race/Ethnicity and Socioeconomic Status. *Child Dev* 1994; 65:1521-40.

Faridi Zahir, Malilk Shahnawaz and A.B. Basit (2009), Impact of Education on Female labour force participation in Pakistan: Empirical evidence from Primary Data Analysis. *Pakistan Journal of Social Sciences (PJSS)*. 29(1), 127-140.

Francine D. Blau and Lawrence M. Kahn (1995), Wage Structure and Gender Earning differentials: An International Comparison, *Economical* (1996) 63, S29-S62

Frank Levy and Richard J. Murnane (1992), U.S. Earnings Levels and Earnings Inequality: A Review of Recent Trends and Proposed Explanations, *Journal of Economic Literature*, Vol. 30, No. 3 (Sep., 1992), pp. 1333-1381.

Y. Fukuda, K. Nakamura and T. Takano (2007). Higher Mortality in Areas of Lower Socioeconomic Position Measured By a Single Index of Deprivation in Japan. *Public Health*, 121, 163-173.

Gabriella (2005), Training, Productivity And Wages in Italy, *Labor Economics*, Vol. 12, issue 4, pages 557-576.

Gazi Mahabubul Alam (2008), The Role of Technical and Vocational Education in the National Development of Bangladesh, *Research and Evaluation Division, BRAC, Dhaka, Bangladesh*, Received 23 May 2007; accepted in revised form 27 March 2008

Ghulam Yasin, Imran Sharif Chaudhry and Saima Afzal (2010): The Determinants of Gender Wage Discrimination in Pakistan, *Econometric Evidence from Punjab Province, Asian Social Science*, Vol. 6, No. 11; November 2010.

Global Wage Report 2016/17: Wage inequality in the workplace, *International Labour Office – Geneva: ILO, 2016*, ISBN 978-92-2-130928-4 (print), ISBN 978-92-2-130929-1 (web pdf)

S. Gorman and C. C. Yu (1990), Science achievement and home environment, *National Assessment of Educational Progress 1985–1986*.

Govt. of Pakistan, 1947. Proceedings of the Pakistan Educational Conference. Ministry of Interior, *Education Division, Karachi*, pp. 33-35.

Govt. of Pakistan. 1953. Report of Technical Education Committee, Appointed by Council of technical Education for Pakistan, Education Division. *Manga Publications, Karachi*, p. 5.

Govt. of Pakistan. 1972. The Education Policy, 1972-1980. *Ministry of Education, Islamabad*, pp. 17-19.

Govt. of Pakistan. 1998. National Education Policy, 1998-2010. *Ministry of Education, Islamabad*, pp. 55-63.

F. Green (1998), “The Value of Skills”, *Studies in Economics, University of Canterbury* No 98/19.

W. H. Green (2003), *Econometric Analysis*, Englewood Cliffs, NJ: Prentice Hall.

C. Greenhalgh (1980), Male-Female Wage Differentials in Great Britain: Is Marriage an Equal Opportunity? *Economic Journal*, 90: 751-775.

Hafiz Muhammad Inamullah, M. Naseeruddin, Ishtiaq Hussain, S. Iftikhar Shah (2009), The Development of Technical Education In Pakistan, *International Business & Economics Research Journal – January 2009* Vol. 8, Number 1.

Harry Anthony Patrinos (1995), Gender Earning Differentials in the Engineering Profession in Greece, *Higher Education*, Vol. 30, No. 4 (Dec., 1995), pp. 341-351.

Hege Torp (1994), The Impact of Training on Employment: Assessing a Norwegian Labour Market Programme, *The scandinavian journal of economics*, Vol. 96, No. 4.

Hightower, W. L. (1978). Development of an Index of Health Utilizing Factor Analysis. *Medical Care*, 16, 245-55.

R. D. Howard, Gordon Richard, J. Yocke, Cecilia Maldonado and Sterling J. Saddler (2007), Selected Career and Technical Education Teachers’ Perceptions of the No Child Left Behind Act (Public Law 107-110): An Exploratory Study, *Journal of Career and Technical Education*, Vol. 23, No. 1, Fall, 2007 – Page 121

I Semih Akcomak and Zehra Kasnakoglu (2002): The Determinates of Earning Differentials in Ankara and Istanbul, *ERC in Economics*, No: 96/10, Ankara: METU Economic Research Center.

Iftikhar Hussain Shah (2004). Problems and Prospects of technical education in Pakistan, (Doctoral thesis), University of Arid Agriculture, Rawawalpindi.

International Standard Classification of Occupation (ISCO-8), *international labour organization, 2012. Geneva.*

Jacob Mincer (1974a), "Progress in Human Capital Analyses of the Distribution of Earnings," *National Bureau of Economic Research Working Paper No. 53.*

Jacqueline Liza Fernandez (2009), Intra-Occupational Gender Earnings Gaps in Malaysia, *Journal Kemanusiaan bil.14*, December 2009.

Javed Ashraf and Birjees Ashraf (1993): "An Analysis of the Male-Female Differential in Pakistan", *The Pakistan Development Review* 32:4 Part II (Winter 1993) pp. 895-904.

Javed Ashraf and Birjees Ashraf (1998), Earnings In Karachi: Does Gender Make a Difference?, *Pakistan Economic and Social Review*, Vol. 36, No. 1 (Summer 1998), pp. 33-46 Published.

John Lauer mann (2006), Earning differentials by Industry: Testing the Theory of Compensating Wage Differentials, *UW-L Journal of Undergraduate Research IX (2006).*

Jonathan R. Veum, (1995) ,Sources of Training and Their Impact on Wages, *Industrials and labour relations review*, Vol .48, No.4 (July1995).

Joseph G. Altonji, Thomas A. Dunn (1995), The Effects of School and Family Characteristics on The Returns to Education. *NBER Working Paper No. 5072.*

Joseph L. Gastwirth (1975), Statistical Measures of Earning differentials, *The American Statistician*, Vol. 29, No. 1 (Feb., 1975), pp. 32-35.

Joyce R. Shackett and John M. Trapani (1987), Earning differentials and Market Structure, *The Journal of Human Resources*, Vol. 22, No. 4 (Autumn, 1987), pp. 518-531.

K. Sommerfeld (2013), Higher and higher? Performance pay and wage inequality in Germany, *Applied Economics*, 2013 Vol. 45, No. 30, 4236–4247, <http://dx.doi.org/10.1080/00036846.2013.783682>.

Z. Kasnakoglu and A. Kilic (1983), Ankara'da Gelir Farklılıklarını Belirleyen Etmenler 1977 (Determinants of Income Differentials in Ankara 1977), *METU Studies of Development*, 10 (2), 179-198.

M. Keeley (1977), The Economics of Family Formation. *Economic Inquiry* 15: 238- 250.

L. Kenny (1983), The Accumulation of Human Capital during Marriage by Males. *Economic Inquiry* 21: 223-23 1.

V. Krishnan (2010). Early Child Development: A Conceptual Model. Presented at the Early Childhood Council Annual Conference 2010, *Christchurch, New Zealand, 7 May, 2010*.

H. Lambropoulos and G. Psacharopoulos (1992), Educational Expansion and Earning differentials in Greece, *Comparative Education Review*, 36 (1), 52-70.

P. D. Leedy and J.E. Ormrod (2005), *Practical Research: Planning and Design* (8th ed.). paper Saddle River, NJ: Prentice Hall.

Lester Thurow (1975), *Generating Inequality: Mechanisms of Distribution in the U.S. Economy*, New York: Basic Books, 1975.

Liaqat Ali and Naveed Akhtar (2014), An Analysis of the Gender Earning Differentials in Pakistan, *Research Journal of Applied Sciences, Engineering and Technology* (13): 2772-2784, 2014.

Lorraine Dearden, Howard Reed and John Van Reenen (2006), The Impact of Training On Productivity and Wages: Evidence from British Panel Data, *Oxford Bulletin of Economics and Statistics*, 68, 397–421.

Ma del Mar Salinas-Jiménez, Marta Rahona-López and Inés P. Murillo-Huertas (2013), Gender Wage Differentials and Educational Mismatch: An Application to the Spanish Case, *Applied Economics*, 2013 Vol. 45, No. 30, 4226–4235, <http://dx.doi.org/10.1080/00036846.2013.781260>.

Martina Dieckhoff (2007), Does it work? Impact of Continuing Training on Labor Market Outcomes: A Comparative Study of Germany, Denmark and United Kingdom, *European sociological Review*, vol.23, No.3.

Masood Sarwar Awan and Zakir Hussain: Returns to Education and Gender Differentials in Wages in Pakistan, *The Lahore Journal of Economics*. 12:2 (Winter 2007) pp. 40-68.

Michael S. Retallick and Greg Miller (2010), Teacher Preparation in Career and Technical Education: A Model for Developing and Researching Early Field Experiences, *Journal of Career and Technical Education*, Vol. 25, No. 1, Spring, 2010 – Page 62

J. Mincer (1958), Investment in Human Capital and Personal Income Distribution. *J. of Pol. Economy* 66(4, August): 281-302.

J. Mincer (1974b), Schooling, Experience and Earnings, *National Bureau of Economic Research*, Volume ISBN: 0-870-14265-8, pp 1-4.

J. Mincer (1976). Progress in Human Capital Analyses of the Distribution of Earnings. *The Personal Distribution of Incomes*. A. B. Atkinson.

J. Mincer (1979). Human Capital and Earnings. Economic Dimensions of Education. *D. M. Windham, National Academy of Education*: 1-31.

J. Mincer (1997). The Production of Human Capital and the Life Cycle of Earnings. *J. of Labor Economics* 15(1, pt. 2): S26-S47.

J. Mincer and Y. Higuchi (1988). Wage Structures and Labor Turnover in the United States and Japan. *J. of the Japanese and Intl Economies* 2: 97-133.

R.D Morgenstern (1973), Direct and Indirect Effects on Earnings of Schooling and Socio-Economic Background, *The Review of Economics and Statistics*, 55 (2), 225-33.

Muhammad Afzal (2011), Micro-econometric Analysis of Private Returns to Education and Determinants of Earnings, *Pakistan Economic and Social Review* Volume 49, No. 1 (Summer 2011), pp. 39-68.

Muhammad Afzal (2014), Micro-econometric Analysis of Earnings Oriented Education System of Lahore (Pakistan), *Pakistan Economic and Social Review*, Volume 52, No. 2 (Winter 2014), pp. 227-254.

Muhammad Saqib Nawaz, Masoodul Hassan, Saad Hassan, Sadia Shaukat and Muhammad Ali Asadullah (2014), Impact of Employee Training and Empowerment on Employee Creativity Through Employee Engagement: Empirical Evidence from the Manufacturing Sector of Pakistan, *Middle-East Journal of Scientific Research* 19 (4): 593-601, 2014.

Muhammad Zahir Faridi, Shahzad Hussain and Farrukh Bashir (2010), Impact of Education on Students' Earnings: A Case of Public Sector Universities in Pakistan, *International Research Journal of Finance and Economics*, ISSN 1450-2887 Issue 42 (2010), © EuroJournals Publishing, Inc. 2010 <http://www.eurojournals.com/finance.htm>.

S. Munir (2002). Vocational Education and Training (VET): Pakistan Situation Analysis (1959-2002) and Partnership needs to Promote VET Through Research Study. *Paper presented at Conference on "Structural Change in Vocational Education: Promotion of Vocational Education Partnership between Europe and West and Central Asian Countries Forum hotel, Alexanderplatz, Berlin.*

Murray J Fisher and Andrea P Marshall (2009), Understanding Descriptive Statistics, *Australian College of Critical Care Nurses Ltd. Published by Elsevier Inc.*

N. Daneshvary (1993), Earning Differentials between Natives and Immigrants with College Degree, *the American Economist*, Vol. 37, No. 2 (Fall, 1993), pp. 46-52.

R. Nakosteen and M. Zimmer (1982) Marital Status and Earnings of Young Men. *Journal of Human Resources* 22: 248-268.

M. Nardo, M. Saisano, A. Saltelli and S. Tarantola (2005), Tools for Composite Indicators Building. Italy, *European Commission Joint Research Centre, Institute for the Protection and Security of the Citizen Econometrics and Statistical Support to Antifraud Unit.*

J.M. Oakes and P.H. Rossi (2003), The Measurement of SES in Health Research: Current Practice and Steps toward a New Approach. *Social Science & Medicine*, 56(4), 769- 784.

H.A Patrinos (1995), Socio-economic background, schooling, experience, ability and monetary rewards in Greece. *Economics of Education Review*, Volume 14(1), pp. 85-91.

Peter Doeringer and Michael Piore (1971), Internal Labor Markets and Manpower Analysis, *Lexington, Massachusetts: Heath*, 1971.

Peter Dolton and Panu Pelkonen (2007), The Impact of Computer Use, Computer Skills and Computer Use Intensity: Evidence from WERS 2004, *Centre for the Economics of Education London School of Economics Houghton Street London WC2A 2AE*, August 2007, ISBN 978 0 85328 200 6

G. Psacharopoulos (1977a), Family Background, Education and Achievement: a Path Model of Earnings Determinants in the U.K. and Some Alternatives, *British Journal of Sociology* 28 (3), 321-335.

G. Psacharopoulos and E. Velez (1996), Returns to Education during Economic Boom and Recession: Mexico 1984, 1989 and 1992, *Education Economics* 4 (3), 219-30.

Raja Abdul Ghafoor , Furqan Ahmed Khan and Dr. Muhammad Aslam (2011), Impact of Traing and Development on Organizational Performance, *Global journal of management and research*, Vol.11, Issue.7.

Rajarshi Majumder (2007), Earning Differentials across Social Groups: Evidences from India, *Indian Journal of Labor Economics*, Vol. 50, No.4.

Rehana Siddiqui, Rizwana Siddiqui and M. Ramzan Akhtar (1998), A Decomposition of Male-Female Earning differentials, *The Pakistan Development Review*, Vol. 37, No. 4, PART II (Winter 1998), pp. 37:4, 885-898.

Rene´ Bo¨heim Æ Helmut Hofer Æ Christine Zulehner (2007), Wage Differences between Austrian Men and Women: semper idem?, *Empirica* (2007) 34:213–229, DOI 10.1007/s10663-007-9038-z.

Reynaldo L. Martinez Jr. (2007), An Evolving Set of Values-Based Principles for Career and Technical Education, *Journal of Career and Technical Education*, Vol. 23, No. 1, Fall, 2007 – Page 72

Rosalind Chew (1990), Gender Earning Differentials in Singapore, *Indian Journal of Industrial Relations*, Vol. 26, No. 2 (Oct., 1990), pp. 122-133.

L. Rygel, D. O’Sullivan and B. Yarnal (2006). A Method for Constructing a Social Vulnerability Index: An Application to Hurricane Storm Surges in a Developed Country. *Migration and Adaptation Strategies for Global Change*, 11, 741-764.

Sandra E. Black and Lisa M. Lynch (2001), How to Compete: the Impact of Workplace Practices and Information Technology on Productivity. *The Review of Economics and Statistics* 83(3), 434-445.

Theodore W. Schultz, (1961), Investment in Human Capital, *The American Economic Review*,(1). L1.

U. Sekaran (2003), Research Methods for Business (4th ed.). *Hoboken, NJ: John Wiley & Sons.*

C. C. Sekhar, A. Indrayan, and S.M. Gupta (1991). *International Journal of Epidemiology*, 20(1), 246-250.

D. Shah (2003). Country Report on Decentralization in the Education System of Pakistan: Policies and Strategies, *Presented at UNESCO Seminar on Decentralization Policies and Strategies in Education, held at Buenos Aires, Argentina.*

N. M. Shah (1986), Changes in Women Role in Pakistan: Are the Volume and Pace Adequate? *The Pakistan Development Review*, Volume 25(3).

B. G. Tabachnick and L. S. Fidell (2007). Using Multivariate Statistics (5th edition). *Boston: Pearson Education.*

T. Tachibanaki (1980), Education Occupation and Earnings: Recursive Approach for France, *European Economic Review*, 13 (1), 103-27.

R. J. Tata and R.R. Schultz (1988). World Variation in Human Welfare: A New Index of Development Status. *Annals of the Association of American Geographers*, 78(4), 580-593.

Usman Mustafa, Kalbe Abbas and Amara Saeed (2005), Enhancing Vocational Training for Economic Growth in Pakistan, *The Pakistan Development Review*, Vol.44, No.4.

R. J. Willis (1986). Wage Determinants: A Survey and Reinterpretation of Human Capital Earnings Function. *Handbook of Labor Economics. 0.* Ashenfelter and R. Layard. Amsterdam, North-Holland.

Zafar Mueen Nasir (2000), Earnings Differential between Public and Private Sectors in Pakistan, *The Pakistan Development Review*, Vol. 39, No. 2 (Summer 2000), pp. 111-130.

K. Zagorski (1985). Composite Measures of Social, Economic, and Demographic Regional Differentiation in Australia: Application of Multi-Stage Principal Component Methods to Aggregate Data Analysis. *Social Indicators Research*,16, 131-156.

Zainab Javied and Asma Hyder (2009), Impact of Training on Earnings: Evidence from Pakistani Industries, *Asian Social Science*, Vol. 5, No. 11 (November 2009)