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# ANALYSIS OF GENDER WAGE GAP IN PAKISTAN



BY

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January, 2011**

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A Research Essay submitted to the Quaid-i-Azam University, Islamabad, in partial fulfillment of the requirements for the award of the degree of Masters in Economics.

## Certificate

This is to certify that this research essay by Ayisha Ashraf is accepted in its present form by the Quaid-i-Azam School of Economics, Quaid-i-Azam University, Islamabad as satisfying the requirements for the degree of Masters.

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A handwritten signature in blue ink, likely belonging to Dr. Muhammad Tariq Javed, written over a horizontal line.



Handwritten calligraphy in black ink, featuring large, bold, stylized letters. The text is arranged in a circular or semi-circular pattern, characteristic of a decorative title or a specific phrase in Urdu or Arabic script. The calligraphy is highly stylized, with thick, dark strokes and intricate flourishes. The words are difficult to decipher due to the artistic style, but they appear to be a significant phrase or title.



*Dedicated to,*

*My Beloved Parents*

## ACKNOWLEDGEMENT

In the name of Allah, the most Gracious and the most Merciful

Innumerable thanks to Allah almighty without Whose blessings, we can never succeed in any task of life. His unlimited and unpredictable blessings and sources of help always made me to win the honor of life.

First of all, I owe thanks from the core of my heart to my Supervisor, Muhammad Idrees, for all his encouragement and support. Kindness, dedication & devotion are really precious qualities of him. No doubt, he treats his students like a Father. I am thankful to Allah who has gifted me such a tremendous Spiritual Father i.e. Muhammad Idrees.

Secondly, I am thankful to my family support, specially my parents, whose prayers and belief on me always motivate me to accomplish any complicated & difficult work with ease. I am indebted to my Mother for all her love & encouragement for me.

In the end, I am thankful to all my friends for their moral support. I am grateful to my class fellow & brother Imran Saeed who helped me a lot in learning the computer skills. It will be unfair if I don't mention the names of Sajid Mehmood (LDC) & Tahir Mehmmod Ali Shah (Labortary Attendant) for their technical assistance.

Ayisha Ashraf  
15 February 2011

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## Abstract

Human capital is most important asset of any country which is restricting factor for economic development of a country. The basic objective of our study is to explore the factors causing gender wage-gap in Pakistan. In specific we worked out the role of education and age in gender wage-gap. The study is based on micro level data of Household Integrated Economic Survey (2006-07). First we estimated Mincerian Earnings function and analyzed gender wage gap due to age & education using Oaxaca-Blinder Decomposition technique for all earners of Pakistan. We found that female earn more due to more education and male earn more due to increase in age. We also found that gender wage gap is highest due to age and relative endowments.

Then we divide our analysis in two dimensions i.e. different employment status and industry of employment of earners. We have taken three employment status i.e. paid employed, self employed and employers. Six different sectors of industry of occupations were taken as Agriculture, Manufacturing, Construction, Trade sector, Social services sector and others(mining & quarrying, electricity, transport & storage, real estate, insurance & others).We found that female earn more due to increase in education and male earn more due to increase in age for all employment status and industry of occupation. Gender wage gap is highest due to age in all employment status and industry of occupation while gender wage gap due to relative endowments and relative returns varies with different employment status & industry of employment e.g. gender wage gap due to relative endowments is highest in agriculture sector and social sector while gender wage gap due to relative returns is higher for paid employed workers, self employed workers and others sector.

## **INTRODUCTION**

### **1.1. INTRODUCTION**

Human capital is the most important asset of a country. Human capital plays the key role in the development of a country. No country can achieve high growth rates without the active participation of its human capital. Witzke (1984) in a survey study on the determinants of economic development concluded that neither land nor physical capital but human capital and other human quality components are restricting factors for economic development in low-income countries in the long run. More specifically skilled or trained labour force is crucial of the economic development of a country. It is the general perception that earnings of an individual indicate its skill, experience etc. Highly efficient or skilled or experienced individual earns more and vice-versa. There are numerous factors that determine the earnings of an individual.

### **1.2. FACTORS DETERMINING EARNINGS**

There are many factors that determine the earnings of an individual. Education or skill, experience, nature of job and gender of worker are a few vital factors that determine the earnings of an individual.

Education is the key factor that determines the earnings of an individual. It makes individual more productive and increases the prospects of getting into the

labor market easily. Highly educated person in general earns more as compare to people having low education.

Experience is another factor that determines the earnings of an individual. In general experienced persons earn more as compare to new entrants. Apart from experience efficiency of an individual also affects his earnings. Young workers are usually more efficient and quick. That is why earnings are non-linearly related to age factor.

Another factor that determines the earnings of an individual is the nature of job. Few jobs are high paid and few are low paid, such as banker usually gets more as compare to a college teacher, though both have same education and age. People providing household services are usually low paid. A part of nature of job, its tenure also cause earning differentials, such as contract workers are paid more as compare to regular workers.

Region of residence or workplace also affects the earnings, for instance school teacher in village earn less than a school teacher working in city.

The race of an individual also matters a lot in his earning pattern in some area of the world e.g. there is relatively high wages of Whites as compared to the Black's in the west or European countries.

Yet another crucial factor that causes earning differentials between two workers of same skill or education and experience is the gender of an individual. In general, for the same job, women are paid less as compare to men. Especially in case of unskilled workers there exists huge gender wage-gap. This factor is very vital in Pakistan, where on average earnings of female workers are 35%

less than average earnings of male worker (Household Integrated Economic Survey HIES, various issues). There are many professions, such as agriculture, household services, handicraft and construction where females are paid low as compare to equally efficient male workers.

All these factors together cause earning differentials. So earning differentials may be on account of different levels of skill, different formal qualifications, between unionized and non-unionized firms, or between workers of different age, sex, or ethnic groups. Wage differentials between occupations also exist. Sometime employers pay more than market wages to capture quality workers.

### **1.3. EMPIRICAL ANALYSIS OF THE DETERMINANTS OF EARNINGS**

There exists a good enough literature on the empirical analysis of the determinants of earnings. In this regard 'Mincerian Earning Function' got much popularity. Mincer (1974) presented a log-linear earning function to explore effect of education and experience of the earnings of an individual.

The empirical analysis of 'gender wage gap' is also very important. In this regard 'Oaxaca-Blinder decomposition technique is widely used. Oaxaca and Blinder (1973) presented a technique that basically estimates the gender-wage gap.<sup>1</sup>

In Pakistan the studies by Shabbir and Khan (1991), Ashraf and Ashraf (1993) and Momna (2006) are few significant attempts that aimed to explore the

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<sup>1</sup> Detail discussion on Oaxaca-Blinder technique and Mincerian earning function is given in Chapter:3

to explore the determinants by utilizing the Mincerian earning function in its original and extended form. Few studies like that of Ashraf and Ashraf (1996), Siddique and Siddiqui (1998) employed 'Oaxaca-Blinder decomposition technique' which is more comprehensive in this regard.

The earlier studies that employed Mincerian earning function mainly focused on National or rural –urban level, by considering all employment groups at the same time. The present study aims to re-estimate Mincerian earning function for the latest data of 2006-07 for each employment group such as industry of occupation and employment status etc.

The present study shall mainly focus in quantifying the role of various factors in causing gender-wage-gap. In this regard we shall use Oaxaca-Blinder decomposition technique to quantify the separate contributions of group differences in measurable characteristics, such as education and age of earners to gender gaps in earnings.

#### **1.4. OBJECTIVE OF THE STUDY**

The present study aims at quantifying the factors causing wage-differentials among different segments of the society. Our special emphasis shall be on the gender wage-gap. In specific following are the objectives of the present study:

1. To estimate Mincerian Earning Function for Pakistan with and without gender distinction for the following categorizations:
  - i. All earners without any distinction

*This will give a broader picture of how education and age effect the earnings of an individual.*

- ii. All earners with respect to industry of employment

*The broader picture shall give us the mean effect of education and age of earners belonging to different industries, but the role of education and age is likely to vary with industry of employment. Therefore, we shall analyze the impact of education and age for each industry independently.*

- iii. All earners with respect to employment status

*We shall analyze the impact of education and age for each employment group independently.*

- 2. To analyze the gender-wage gap through Oaxaca-Blinder decomposition technique for above categorizations:

*The simplest way to workout gender-wage gap is to introduce a dummy variable for gender. The coefficient of dummy variable explains the gender wag-gap but fails to analyze the contributions of group differences in measurable characteristics to gender gaps in earnings. This task is well performed by Oaxaca-Blinder decomposition technique. Therefore, the present study shall employ it to quantify the effects of age and education on gender-wage gap with all categorizations mentioned above.*



## **1.5. PLAN OF THE STUDY**

The study consists of eight chapters. After introduction, in Chapter 2 we will present review of the earlier work done in this regard. Chapter 3 explains the methodology and estimation techniques that we will follow. A detailed discussion on data, variables and analytical framework is given in Chapter 4. Next three chapters are based on the discussion of our results. In specific Chapter 5 is based on results and discussion of all earners without any distinction of employment status and industry of employment. Results of our estimations based on employment status of earner are given in Chapter 6. At last in Chapter 7, we presented results and discussion based on earner's industry of employment. Finally summary and conclusions of the present study are presented in Chapter 8.

## REVIEW OF LITERATURE

### 2.1. INTRODUCTION

In this chapter, review of literature is presented. There exists a huge literature on the estimation of earning function in Pakistan and enough studies are conducted to analyze gender-wage gap. In this regard we have divided earlier studies in two groups. In section 2.2 we shall summarize the studies that merely focused on the estimation of earning function. Studies that analyzed gender-wage gap are discussed in section 2.3. Finally conclusions of the chapter are presented in section 2.4.

### 2.2. REVIEW OF STUDIES THAT ESTIMATED EARNING FUNCTION

There are many studies which are done to estimate earnings of individual by taking different methods & different independent variables. Some of these studies done in Pakistan are reviewed below.

Hamdani (1977) tested the human capital hypothesis i.e. education increases the individuals income. Author takes the data of males of Rawalpindi city from socio-economic survey of PIDE (1975). He estimated the earnings functions in log linear form on the basis of different educational level i.e. unschooled, incomplete primary, primary, secondary & post secondary. Independent variables were taken as age,  $age^2$ , helpers, employer, university &

literate. He showed the age earnings profiles by education level. He found that degree of income inequality declines by education level. The sample size was taken too small i.e. 1000 number of observations.

Khan (1983) had done an economic analysis of formal & informal sector of employment. She took the data of urban area of Punjab from LFS Lahore 1982. Independent variables of interest were education, experience, age, marital status, family size & unemployment. Age earning profiles by education level are separately shown for male & female earners. She concludes that human capital is most important variable for both sexes in formal sector to determine income while in informal sector experience matters a lot for male. Relative returns of female education are more.

Haque (1983) found the determination of distribution of income in RWP city. The data was taken from Socio-economic survey conducted by PIDE for RWP in 1975. Independent variables were taken as 10 different age groups, sex, marital status, 5 educational groups, 5 migration levels, 3 employment statuses, 6 occupational groups, hours worked, years on the job & number of un-paid helpers. Dependent variable was earning of an individuals. Regression in log-linear form was conducted. He found that human capital explains a large part of earning differentials. Income in informal sector is more than formal sector.

Irfan *et all* (1985) tried to find rate of returns to education and determinant of education in Pakistan. They computed private rates of return to different level of education. The data was taken from population, labor force and migration (PLM). Independent variables were taken as age, age<sup>2</sup>, three educational level, 2

province (Punjab & Sindh), 2 occupational groups and region. They used earning function method. They concluded that returns vary positively with level of education.

Shabbir (1989) determined individual earnings and its distributions in population. He threw a light on different latent structure of earning models e.g. Mincerian earning function (1974). He included the variable "Nature of Ability" which could affect earnings directly or indirectly. Ability was assumed to be variable which could affect both years of schooling (Ys) and earnings. He found that if ability is not controlled for in earning equation regression estimated of (Ys) is biased, and then he told methodology to control for omitted latent variable

Shabbir & Khan (1991) estimated the Mincerian earning function for Pakistan: a regional analysis. They estimated provincial MEF to find regional variation in determinants of individual earnings. They had taken data from PLM (Population labor migration survey) & HIES (Household income expenditure survey). Data period was taken since 1979. Shabbir & Khan used the Mincerian earning function technique in which dependent variable is earning & independent variables were Year of Schooling, experience,  $experience^2$ . They found that there was no homogeneity in parameters across provinces while they rejected the hypothesis that only intercept term varied across provinces.

Bilquees (1992) shed light on the trends of inter-sectoral wages in Pakistan. The period of analysis was 1977-91. The data was taken from NESPAK, Monthly statistical bulletins, Labor force survey, Pakistan economics survey. The author used the time series analysis on nominal wages for four

occupational groups' i.e. formal, informal, manufacturing, construction & agriculture sector deflated by CPI.

Nasir (1998) explored the role of human and non-human capital factor in determining the earnings of workers in Pakistan. Data was taken from LFS 1993-94. Independent variables were taken as age, age<sup>2</sup>, 5 educational groups, 8 different professional groups, sex, and region, technical training, and marital status dependency ratio. The log-linear form model was estimated in which earning was taken as dependent variable. He showed different earning profiles for different criteria's. It was find that education played an important role in wage determination and occupation and size of establishment also had an important affect. Sample selection bias was removed using Heckman procedure for female data.

### **2.3. REVIEW OF STUDIES THAT ANALYZED GENDER-WAGE GAP.**

The studies that focused on gender-wag gap can be categorized in two groups; *first*, studies that worked out gender-wage differentials by introducing a dummy variable for gender. *Second*, studies that quantify the separate contributions of various factors in gender-wag gap. In the following paragraphs we shall summarize few major studies in this regard<sup>2</sup>.

Nasir & Mahmood (1998) analysed the distribution of individual earning and reasons of dispersion in earning of workers in Pakistan. They used the data from HIES 1993-94. They used the Log Variance method using monthly earning as dependent variable while independent variables were six age groups, three

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<sup>2</sup> We have focused on only those studies that measured or decomposed gender-wage gap.

educational groups, sex, urban or rural area, marital status, employment, self employment and regular employment, formal or informal sector. They found that young age & old age contributed more to earning inequality. Personal earning inequality in Pak exists due to different market structures for male & female.

Shafi (2006) had done an analysis on role of human capital in earning differentials. She measured the gender wage gap on regional basis i.e. rural & urban area and for overall Pakistan. She had used the simple MEF in which dependent variables is log of earnings and dependent variables are years of schooling, experience & square of experience. She had taken data from HIES (2001-02). She concluded that Years of schooling yields higher returns for females than males for overall as well as for rural & urban areas of Pakistan. Similarly experience also gave higher returns to females.

Different techniques have been used to decompose the gender wage gap. But following studies only focus on Oaxaca-Blinder decomposition technique. First, we shall discuss the study of Ashraf & Ashraf(1993).

Ashraf & Ashraf (1993) estimated the gender wage gap in Pakistan. They conducted an analysis of male-female earning differentials. They had taken data from HIES. The period of analysis was 1979 & 1985-1986. They estimated Mincerain earning function and was the first study in Pakistan to employ Oaxaca model modified by Neumark(1988). Ashraf & Ashraf found that gender wage gap in Pakistan was decreasing due to female participation in labor market.

Shabbir (1994) estimates MEF for Pakistan. Only male data was taken from Population, Labour force and Migration Survey (PLMS) 1979. He estimated

traditional or strict MEF using age, age<sup>2</sup>, expenditure, (expenditure)<sup>2</sup> as independent variables. He had also estimated extended MEF by adding more independent variables i.e. province, occupation level agriculture, production and related workers, clerical and related workers, region. He had also done analysis rural vs. urban for Pakistan and by province level too

Yet in another study Ashraf & Ashraf (1996) provided separate estimates of the male-female earning differentials in Pakistan for each of the four provinces, and for nine major industrial groups, using data from 1984-85 HIES. According to the authors, gender wage gap during 1984-85 was higher as compared to the 1985-86.

Later on another study Ashraf & Ashraf (1998) tried to find whether gender makes a difference in earnings in Karachi or not. The data used for this study was from AERC/KDA Socio-Economic Survey of Karachi. The period of analysis was 1987-88. Oaxaca technique was used. The authors found that women earn less than men. But in Karachi gender wage gap was lower. This study was restricted to one city of Pakistan & considered to be representative of Pakistan which is the flaw of study

Siddiqui & Siddique (1998) estimated the gender earning behavior separately. They decomposed male-female earning differentials into productivity differences & gender differences. The authors attributed the differentials to the inter-group differences in human capital and personal characteristics. They used the Oaxaca technique introducing two models. Model 1 used only Mincerian earning function and Model 2 used all other variables too. Independent variables

were age, age2, years of schooling, area of residence, four provinces, nine occupational categories, employment status, eight industrial categories & days worked. The data was taken from HIES 1993-94. Authors found that rate of return of education for women were higher than rate of return for men while rate of return of experience for women were lower than while rate of return of experience for men.

#### **2.4. CONCLUSIONS**

This was a brief review of the studies that focused on gender-wage gap in Pakistan. Our study is an extension of the previous work. We have not only used the latest data set but have also analyzed the gender wag gap across different industries and across different employment groups.



## METHODOLOGY

### 3.1. INTRODUCTION

In this chapter we shall present the estimation techniques used in present study. The present study has dual objectives, **first** to estimate earning function and **second** to decompose gender-wage gap. For first objective we shall estimate Mincerian earning function and for second objective we shall employ Oaxaca-Blinder decomposition technique. Section 3.2 explains Mincerian earning function and Section 3.3 gives the details of Blinder-Oaxaca technique used for the decomposition of gender-wage gap.

### 3.2. THE MINCERIAN EARNING FUNCTION

The most appropriate and widely used method to estimate the earning function was presented by Mincerian (1974). The Mincerian earning function in its original form is written as:

$$\text{Ln}(\text{Wage}_i) = \alpha_0 + \alpha_1(\text{Age}_i) + \alpha_2(\text{Age}_i)^2 + \alpha_3(\text{Years of Schooling}_i) + \mu_i \quad (3.1)$$

Where, years of schooling refer to successful years of schooling. It is a log-linear model, showing that returns of education are not same for all years of schooling. The model shows that higher years of schooling contribute more to

earnings as compare to lower years of schooling. For instance, two years of education from graduate to post-graduate have higher returns as compare to two years of education from intermediate to graduation.

Similar arguments are valid for the impact of age. The square of age is taken to capture the non-linearity. In general the efficiency of an individual in the earlier age of life is more, so returns to the higher efficiency is the higher earnings while the efficiency of the aged or getting old person is low, so returns to lower efficiency is lower earning.<sup>3</sup>

There are numerous studies that have extended Mincerian earning function by adding qualitative variables of region, skill and occupation etc. For example Ashraf & Ashraf (1993, 1996 and 1998) estimated the Mincerian earning function by adding dummy variables for region, industry and language of earner. Our main focus is to workout the contribution of education and age in gender-wag gap, so we shall make use of original Mincerian earning function.

### **3.3. OAXACA-BLINDER DECOMPOSITION TECHNIQUE**

Decomposition of the gender wage gap is important to distinguish the part of the gap that can be explained due to differences in relative endowments of women and men, versus the part of the gap that is unexplained and instead be due to discrimination.

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<sup>3</sup> In few studies instead of age, the variable of experience is taken [see Momna (2006) for details] but since the exact data of experience is not available so we shall use age in our analysis.

Oaxaca's approach to estimating the gender wage gap is used for decomposition of the gender wage gap which was presented in 1973 and modified by Nuemark (1988).

The Oaxaca decomposition is

$$\text{Ln}(\bar{w}_m) - \text{Ln}(\bar{w}_f) = \hat{\alpha}_m(\bar{x}_m - \bar{x}_f) + \bar{x}_f(\hat{\alpha}_m - \hat{\alpha}_f) \quad (3.2)$$

Where,

$\bar{w}_m$  = Mean wage of male earners,

$\bar{w}_f$  = Mean wage of female earners,

$\bar{x}_m$  = vector of mean values of the explanatory variables for male earners,

$\bar{x}_f$  = vector of mean values of the explanatory variables for female earners,

$\hat{\alpha}_m$  = vector of the estimated coefficients of the explanatory variables for male earners

$\hat{\alpha}_f$  = vector of the estimated coefficients of the explanatory variables for female

The expression on right hand side of 3.2 decomposes the total gender-wage gap in two components. The first term  $\hat{\alpha}_m(\bar{x}_m - \bar{x}_f)$  is the portion of the gap that can be explained by differences in endowments between men and women and the second term  $\bar{x}_f(\hat{\alpha}_m - \hat{\alpha}_f)$  is the portion of the gap that is unexplained and could be due to discrimination. This latter portion is sometimes referred to as the theoretical gain that women would receive if they received the same returns as men on their productive endowments.

Oaxaca's approach (given in 3.2) has a problem that the decomposition results can differ depending on which reference group or which non-

discrimination wage structure is used. To overcome this problem Neumark (1988) proposed following generalized decomposition of the gender-wage gap:

$$\text{Ln}(\bar{w}_m) - \text{Ln}(\bar{w}_f) = \hat{\alpha}(\bar{x}_m - \bar{x}_f) + [(\hat{\alpha}_m - \hat{\alpha})\bar{x}_m + (\hat{\alpha} - \hat{\alpha}_f)\bar{x}_f] \quad (3.3)$$

Where,  $\hat{\alpha}$  is the non-discriminatory wage structure.

Now there can be three possibilities:

#### Possibility 1

If males are paid competitive wages and females are underpaid then male coefficients should be taken as the non-discriminatory wage structure, i.e.,  $\hat{\alpha}_m = \hat{\alpha}$

#### Possibility 2

If female earners get competitive wages and males are under paid then the female coefficients should be used as the non-discriminatory wage structure, i.e.,  $\hat{\alpha}_f = \hat{\alpha}$ .

#### Possibility 3

$\hat{\alpha}$  can be estimated from pooled sample

The expression on right hand side of 3.3 has three terms. With first two possibilities, one term will eliminate and interpretation of remaining terms is same as of equation 3.2. However if  $\hat{\alpha}$  is estimated from pooled sample, then first term is the gender wage gap attributable to differences in characteristics. The second and the third terms capture the difference between the actual and pooled returns for men and women respectively.

Since  $\bar{x}_m$  and  $\bar{x}_f$  are the vectors of mean values of the explanatory variables for male earners and female earners respectively. Age and years of schooling are two variables whose mean value have proper meaning, while mean variable of qualitative variables has no proper meaning and they are also subjected to the coding scheme. Therefore, the present study shall consider only age and education of earners.

## ANALYTICAL FRAMEWORK AND DATA

### 4.1. INTRODUCTION

In this chapter we shall present analytical framework and data of the present study. Section 4.2 presents analytical framework, mentioning all dimensions of research to be carried out in this study. In Section 4.3 we explain data and construction of the variables.

### 4.2. ANALYTICAL FRAMEWORK

The entire analysis can be divided into three parts:

#### 4.2.1. Gender-Wage Gap Analysis for All Earners in Pakistan

First we shall estimate Mincerian earning function for all earners of Pakistan with and without gender distinction i.e. all earners, male earners and female earners. After estimation of earning function we shall employ Blinder-Oaxaca decomposition technique in all three ways. That is,

- a. **Assuming that males are paid competitive wages and female are under paid.**

In this case the coefficient of age and education of regression from male data shall be taken as the non-discriminatory wage.

- b. **Assuming that female are paid competitive wages and male are under paid.**

In this case the coefficient of age and education of regression from female data shall be taken as the non-discriminatory wage.

- c. **Assuming that pooled sample of male-female earners are paid competitive wages.**

In this case the coefficient of age and education of regression from pooled data shall be taken as the non-discriminatory wage.

#### **4.2.2. Gender-Wage Gap Analysis for Each Industry Group in Pakistan**

The combine analysis for all earners, do not explore the intra-industry wage differentials. These analyses give the mean results for all earners belonging to different industrial groups. The role of education and age is likely to vary across industry. In this section we shall repeat above analysis for each industry group.

In specific we shall carry out regression for each of the following industry group, with and without gender-distinction.

- a. Agriculture
- b. Manufacturing
- c. Construction
- d. Trade sector (wholesale & retail services)

- e. Social services
- f. Others (mining & quarrying, electricity, transport & storage, real estate insurance & others)

After estimating above regression we shall employ Blinder-Oaxaca decomposition technique in all three ways (as explained in Section 4.2.1). These analyses will help us to quantify the role of education and age in gender-wage gap for each industry group.

#### **4.2.2. Gender-Wage Gap Analysis for Each Employment Status in Pakistan**

Finally following the pattern of previous sections, we shall examine the role of education and age in gender-wage gap for the following employment groups:

- a. Paid Employed
- b. Self employed
- c. Employers

### **4.3. DATA AND CONSTRUCTION OF VARIABLES**

#### **4.3.1. Data Source**

The present study shall use the micro-level data of Household Intergated Economic Survey (HIES) for its analysis<sup>4</sup>. The reason of using micro data is its comprehensiveness. It provides complete information regarding gender, age,

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<sup>4</sup> The data statistic of different employment status, industry and for overall Pakistan is presented in appendix in table A-1.



education, employment status and industry each earner. The analysis is carried out for the latest surveyed year, which is 2006-07.

#### **4.3.2. Construction of Variables**

Earnings, gender, age, education, employment status and industry of employment are the variables used in present study. The detail of each variable is given below:

##### **i. Earnings**

We have considered annual earnings of an individual. Earnings are the sum of income received for main occupation and secondary occupation.

##### **ii. Age of Earner**

Age of the earner is taken in years.

##### **iii. Education of Earner**

Education is measured in successful years of schooling. We have taken 0 to 18 years of successful schooling. '0' means that earner is illiterate, '1' indicates that an earner has passed only class one and so '16' represents education of M.A. / M.Sc. or equivalent. '17' means that a person has degree of MBBS and 18 represents that an earner is M.Phil.<sup>5</sup>

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<sup>5</sup> In HIES M.Phil. and Ph.D are given collectively. We have not information the either earner is M.Phil. or Ph.D. So we have taken all as '18' years of schooling. The percentage of such earners is not even 0.50%. Another problem was with informal education, it has no fixed years or schooling, so we have simply dropped such earners from our analysis. The Earners with informal education are not more than 2%.

#### iv. **Employment Status of Earner**

We shall use three different kinds of employment status i.e. paid employed, self employed & employers.

**Paid employed** workers are those who work for other and are paid wages against their services. It includes all employees. **Self employed** worker are those who work for themselves they neither sell their services nor they buy services of others e.g. small shopkeepers, small framers etc. **Employers** are those who work themselves and also hire the services of other. It includes industrialist, owners of big general stores etc.

#### v. **Industry of Occupation**

We shall use six different industrial sectors i.e. agriculture, manufacturing, construction, trade sector, social services & others.

**Agriculture sector** comprises of worker who are affiliated with working in fields, cropping and harvesting. The workers in agriculture sector can earn by growing raw material or food. **Manufacturing sector** deals with workers who sell their services to industry or any firm which sell the final product e.g. workers in cloth making industry. Labor who worked at daily wages and contributes their services in building roads and infrastructure belongs to **construction sector**. **Trade sector** which is actually the wholesale & retail services provided by an individual. **Social services** of an individual are for the welfare of other people or society e.g. workers in UNESCO. **Others industries** consists of different small sectors of industry i.e. mining & quarrying, electricity, transport & storage, real estate insurance & others.

## Chapter 5

# GENDER-WAGE GAP ANALYSIS FOR ALL EARNERS OF PAKISTAN

### 5.1. INTRODUCTION

In this chapter we shall present our analysis for all earners of Pakistan without any distinction of employment status or industry of employment. The chapter is divided into three sections. After introduction in Section 5.2 we shall discuss the results of Mincerian Earning Function and Oaxaca-Blinder decomposition for Pakistan overall with and without gender distinction. Finally we shall conclude the findings of this chapter in Section 5.3

### 5.2. ANALYSIS FOR ALL EARNERS OF PAKISTAN

To initiate the study we have regressed log of earnings on age, age square and education of earners. This is done in three ways, first for male earners of Pakistan, second for female earners of Pakistan and finally for all earners of Pakistan. After estimating Mincerian earning function we have applied Oaxaca-Blinder decomposition technique to quantify the effect of education and age on gender-wage gap. First we shall discuss the results of Mincerian earning function and after that Oaxaca-Blinder decomposition is presented.

### 5.2.1. Mincerian Earning Function for all Earners of Pakistan.

The results of Mincerian earning function are presented in Table 5.1

**Table 5.1 Results of Mincerian Earning Function for Pakistan**

| Estimators              | Male Earners        | Female Earners      | All Earners         |
|-------------------------|---------------------|---------------------|---------------------|
| Intercept               | 6.65544<br>(0.0000) | 5.7920<br>(0.0000)  | 6.4772<br>(0.0000)  |
| Age                     | 0.07018<br>(0.0000) | 0.05300<br>(0.0000) | 0.0713<br>(0.0000)  |
| Age Square              | -0.0007<br>(0.0000) | -0.0005<br>(0.0000) | -0.0007<br>(0.0000) |
| Years of Schooling      | 0.0572<br>(0.0000)  | 0.1193<br>(0.0000)  | 0.0669<br>(0.0000)  |
| R <sup>2</sup>          | 0.2480              | 0.3695              | 0.2564              |
| Adjusted R <sup>2</sup> | 0.2479              | 0.3693              | 0.2564              |
| F. Static               | 10907.3<br>(0.0000) | 1791.76<br>(0.0000) | 12464.2<br>(0.0000) |

*(p-values are presented in parenthesis)*

The estimation for Male data shows that all estimators are highly significant. The coefficient of age is 0.07018 which indicates that, on average, if age of earner increase by a year then earnings would increase by 7.018%. In general, the earnings are proportionally more in younger age of male as compared to older age of male. Although age has positive impact on earnings but earnings increased at decreasing rate as an individual gets older. This fact is shown by negative coefficient of variable 'age square'. Earnings of an individual are also affected by education level. An increase in one successful year of schooling results in increase in earnings too. Estimations shows that earnings of a male individual increase by 5.723% when one successful year of schooling is completed.

Now we shall discuss the results of estimation on data of female earners. All estimators for female data are also highly significant. When a female individual gets older by one year, her earnings increased by 5.297%. Earnings of female with passage for time can be effected by her marital status, children responsibility etc. So the earnings of female are proportionally more in younger age. Negative sign of 'age square' shows that earnings increased at decreasing rate due to one year increase in age. Education plays an important role for determination of an individual's earnings. For the female data coefficient of education is 0.11931 which shows that earnings of female increased by 11.931% when they completed one more year of successful schooling.

The comparison of male and female data estimations show that when one year of age is increased, the returns on earnings of male data are comparatively higher than females. Earnings of both male & female are increased due to increase in age but at decreasing rate. Female's earnings increased more than male if one successful year of schooling is increased. This indicates that in general, education enhances the earning potential of female more as compare to male earners.

Finally the results based on combined data of male and female earners also show similar pattern. Here we applied Chow Test (1960) to test whether pooling of male and female data is permissible or not. The results of Chow test showed that the coefficients of restricted equations are structurally different.

The regression analysis shown above clearly depicts that effect of age and education for male & female in Pakistan are different. Now we shall explore

the effect of these two factors on gender-wage gap by using Oaxaca-Blinder decomposition

### 5.1.2. Oaxaca-Blinder Decomposition of Gender-Wage Gap for all Earners of Pakistan.

As already explained in Chapter 4 we shall employ Oaxaca-Blinder decomposition in three ways, First we shall assume that male earners are paid competitive wages and female earners are under paid. Second, we shall assume that female earners are paid competitive wages and male earners are under paid. Finally we will consider a possibility when weighted average wages of male and female are competitive. The results under these three assumptions are presented in Tables 5.2a to 5.2c.

**Table 5.2 a. Oaxaca-Blinder Decomposition of Gender-Wage Gap When Male Earners are Paid Competitive Wages and Female Earners are Under Paid.**

| Factors   | Total Gap         | Decomposition of Total Gap |                  |
|-----------|-------------------|----------------------------|------------------|
|           |                   | Relative Endowments        | Relative Returns |
| Age       | 25.1057 (103.16%) | 3.5359 (14.53%)            | 21.5698 (49.39%) |
| Education | -0.7691 (-3.16%)  | 0.1145 (0.47%)             | -0.8836 (-3.63%) |
| Total     | 24.3366(100%)     | 3.6504 (15.00%)            | 20.6862 (85.00%) |

**Table 5.2 b. Oaxaca-Blinder Decomposition of Gender-Wage Gap When Female Earners are Paid Competitive Wages and Male Earners are Under Paid.**

| Factors   | Total Gap       | Decomposition of Total Gap |                  |
|-----------|-----------------|----------------------------|------------------|
|           |                 | Relative Endowments        | Relative Returns |
| Age       | 24.4708(89.99%) | 0.2649(0.97%)              | 24.2059(89.01%)  |
| Education | 2.7228(10.01%)  | 0.1059(0.39%)              | 2.6169(9.62%)    |
| Total     | 27.1936(100%)   | 0.3708(1.36%)              | 26.8228(98.64%)  |

**Table 5.2 c. Oaxaca-Blinder Decomposition of Gender-Wage Gap When Weighted Average of Male and Female earners are Competitive Wages.**

| Factors   | Total Gap       | Decomposition of Total Gap |                  |
|-----------|-----------------|----------------------------|------------------|
|           |                 | Relative Endowments        | Relative Returns |
| Age       | 0.9175(81.20%)  | 0.3563(32.11%)             | 0.5454(49.09%)   |
| Education | 0.2092 (18.80%) | 0.1425(12.80%)             | 0.0667 (6.00%)   |
| Total     | 1.1109(100%)    | 0.4988(44.91%)             | 0.6121(55.09%)   |

Oaxaca decomposition explains wage gap due to age and education. When males are paid competitive wages, according to the decomposition, gender wage gap due to difference in age is 103.16%. It means that 103.16% difference in wages of male and female are due to age. Only -3.16% wage gap is due to difference in education. Further, Oaxaca-Blinder technique decomposed the wage gap in two categories i.e. wage gap due to relative endowments and relative returns.

Wage gap due to relative endowment means that the portion of gap that can be explained by differences in endowments between men and women. Wage gap due to relative returns refers to the portion that is unexplained & could be due to discrimination. This portion also referred as theoretical gain that women would receive if they received the same returns as men on their productive

endowments. Here the portion of gender wage gap that is explained due to relative endowment is 15.00% and the portion due to different returns to productive factors is 85.00% is gain that women would receive if they would receive same wages as males.

However, when women are paid complete wages, gender wage gap due to difference in age is decreased i.e. 89.99%. Due to difference in education, gap is increased i.e. 10.01%. Gap due to relative endowments is now 1.36% and due to relative returns is 98.64%.

When both male & female earners are paid competitively then wage gap due to difference in age is 81.20% & due to difference in education is 18.80%. Further decomposition shows that wage gap due to relative endowments is 44.91% & due to relative returns is 55.09%

### **5.3. CONCLUSIONS**

By comparing the MEF estimations, we can conclude that females are comparatively less paid due to increase in age and highly paid due to increase in education as compared to men. Oaxaca-Blinder technique tells us that age and relative returns contributes a major share in gender wage gap.

All above results of earning estimations and gender wage gap decomposition are driven by using overall data of Pakistan in which we do not include disparities among individuals regarding their employment status i.e.



whether they are daily paid worker, self employed, paid employed or employers etc. Now we are going to estimate the earnings of paid employer workers, self employed workers & employers and determine the gender wage gap in these three employment status.

## Chapter 6

# GENDER-WAGE GAP ANALYSIS FOR ALL EARNERS OF PAKISTAN WITH RESPECT TO EMPLOYMENT STATUS

### 6.1. INTRODUCTION

In this chapter we shall present our analysis for all earners of Pakistan with distinction of employment status. We have taken three different employment status i.e. paid employed, self employed & employers. The chapter is divided into three sections. After introduction in Section 6.2 we shall discuss the results of Mincerian Earning Function and Oaxaca-Blinder decomposition for Pakistan overall with and without gender distinction for paid employed workers. In section 6.3, we shall repeat all analysis for self employed earners. Section 6.4 will show the results for employers. Finally we shall conclude the findings of this chapter in Section 6.5.

### 6.2. ANALYSIS OF PAID EMPLOYEES

Paid employed are workers who earn by working for another person or who is selling his services for earnings e.g. accountant, clerk etc. First of all, we shall regress earnings on age, age square and education of earners in three ways. We have estimated earnings for male paid employed worker, female paid employed worker & finally for all <sup>Paid</sup> employers of Pakistan. We have applied Oaxaca-Blinder decomposition technique to quantify the effect of education and

age on gender-wage gap after estimating MEF. First we shall discuss the results of Mincerian earning function and after that Oaxaca-Blinder decomposition is presented.

### 6.2.1. Mincerian Earning Function for Paid Employed

The results of Mincerian earning function are presented in Table 6.1

**Table 6.1 Results of Mincerian Earning Function for Paid Employed in Pakistan**

| Estimators              | Male Earners           | Female Earners        | All Earners           |
|-------------------------|------------------------|-----------------------|-----------------------|
| Intercept               | 6.432353<br>(0.0000)   | 5.793489<br>(0.0000)  | 6.267474<br>(0.0000)  |
| Age                     | 0.079474<br>(0.0000)   | 0.048354<br>(0.0000)  | 0.078442<br>(0.0000)  |
| Age Square              | -0.000828<br>(0.0000)) | -0.000436<br>(0.0000) | -0.000803<br>(0.0000) |
| Years of Schooling      | 0.059986<br>(0.0000)   | 0.129681<br>(0.0000)  | 0.072804<br>(0.0000)  |
| R <sup>2</sup>          | 0.346670               | 0.439078              | 0.335963              |
| Adjusted R <sup>2</sup> | 0.346633               | 0.438830              | 0.335929              |
| F. Static               | 10907.35<br>(0.0000)   | 1791.766<br>(0.0000)  | 12464.25<br>(0.0000)  |

*(p-values are presented in parenthesis)*

The estimations <sup>for</sup> data of male paid employed workers show that all variables are highly significant. The wage of paid employed male workers increased by 7.9474% when the worker's age increased by 1 year. The relation between age & earnings is positive but increasing at decreasing rate. So when paid employed male worker gets older, his wage increases at decreasing rate. Negative sign of variable (age<sup>2</sup>) explains the same phenomenon. When male paid employed male worker get educated for one more year, his wage or earning increased by 5.9986%.

All estimators in estimation of female paid employed workers are highly significant. Earnings of female paid employed worker increase by 4.8354% when her age increases by 1 year. In fact age effects the earnings of a female individual as a female gets older, her efficiency & consideration diverts to her family and children. As age increases earnings also increases but at decreasing. The Negative sign of ( $\text{age}^2$ ) shows that earnings increase with increasing age but at decreasing rate. For a female paid employed worker, the returns of her job increase by 12.9681% when she completes one year of successful education.

Now we shall compare the estimation results of male employed data & female paid employed data in Pak. From the results, we come to know that returns on earnings for male paid employed worker are higher than that of female paid employed due to increase in age. For both earnings increase at decreasing rate while due to increase in education, female paid employed workers gets higher returns as compared to the male paid employed workers.

For the overall Pakistan data, all estimators are highly significant. In Pakistan, the earnings of an individual increases by 7.8442% when age is increased by 1 year. But earnings increase at decreasing rate due to change in age. The variable ( $\text{age}^2$ ) explains this fact very well. When one more year of successful schooling is completed by a paid employed individual in Pak, his earnings rises by 7.2804%. Here we apply chow test which shows that coefficients of restricted equations are structurally different. The Chow test tells us that pooling is not permissible here<sup>6</sup>.

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<sup>6</sup> Chow test shows the similar results for self employed workers and employers.

### 6.2.2. Oaxaca-Blinder Decomposition of Gender-Wage Gap for Paid Employed

We have applied Oaxaca-Blinder technique in three different ways i.e. when males are competitively paid & female are under paid, when females are competitively paid & males are under paid and when both are paid competitive wages. The results under these three assumptions are presented in Tables 6.2.2.a to 6.2.2.c

**Table 6.2.2.a Oaxaca-Blinder Decomposition of Gender-Wage Gap When Male Earners are Paid Competitive Wages and Female Earners are Under Paid.**

| Factors   | Total Gap      | Decomposition of Total Gap |                  |
|-----------|----------------|----------------------------|------------------|
|           |                | Relative Endowments        | Relative Returns |
| Age       | 1.1236(82.70%) | 0.1589(11.70%)             | 0.9647(71.00%)   |
| Education | 0.2351(17.30%) | 0.0794(5.85%)              | 0.1556(11.45%)   |
| Total     | 1.3587(100%)   | 0.2383(17.55%)             | 1.1203(82.45%)   |

**Table 6.2.2.b Oaxaca-Blinder Decomposition of Gender-Wage Gap When Female Earners are Paid Competitive Wages and Male Earners are Under Paid.**

| Factors   | Total Gap      | Decomposition of Total Gap |                  |
|-----------|----------------|----------------------------|------------------|
|           |                | Relative Endowments        | Relative Returns |
| Age       | 1.1236(82.70%) | 0.0967(7.12%)              | 1.0267(75.58%)   |
| Education | 0.2351(17.30%) | 0.0484(3.56%)              | 0.1867(13.74%)   |
| Total     | 1.3587(100%)   | 0.1451(10.67%)             | 1.2134(89.32%)   |

**Table 6.2.2 c Oaxaca-Blinder Decomposition of Gender-Wage Gap When Weighted Average of Male and Female earners are paid competitive Wages.**

| Factors   | Total Gap        | Decomposition of Total Gap |                   |
|-----------|------------------|----------------------------|-------------------|
|           |                  | Relative Endowments        | Relative Returns  |
| Age       | -22.1731(84.71%) | 0.1569(-0.599%)            | -22.330(85.31%)   |
| Education | -4.0008(15.29%)  | 0.0784(-0.299%)            | -4.0792(%15.58)   |
| Total     | -26.1739(100%)   | 0.2353(-0.898%)            | -26.4092(100.89%) |

When male paid employed worker is paid competitive wages, average wage gap is 82.70% while wage gap due to education in paid employed workers in Pakistan is 17.30%. Average wage gap due to relative endowment is 17.55%. Average wage gap due to relative returns is 82.45%.

It is surprising that gender wage gap due to difference in age & education appears to be same in this case when males are competitive paid and when females are competitive paid. But average wage gap due to relative endowment is 10.67%. Average wage gap due to relative returns is 89.32%.

Oaxaca decomposition shows that for average gender wage gap for paid employed workers is 84.71% due to age when paid workers are paid competitive wages, while due to education gender wage gap is just 15.29%. Average gender wage gap due to relative endowments is negative & very small i.e. -0.8991%. It shows that wage gap is decreased by 0.898% due to difference in endowment between male & female. Average gender wage gap due to relative returns is 100.89%. So woman would gain 100.89% if they receive some returns as men on their productive endowments.

### 6.3. ANALYSIS OF SELF EMPLOYED EARNERS

Self employed workers are those who earn by working for themselves. They don't work for another company or person e.g. tailors etc. Here we shall do analysis following the same pattern done in section 6.2.

#### 6.3.1. Mincerian Earning Function for Self Employed Earners

The results of Mincerian earning function are presented in Table 6.3.

**Table 6.3 Results of Mincerian Earning Function for Self Employed in Pakistan**

| Estimators              | Male Earners          | Female Earners        | All Earners           |
|-------------------------|-----------------------|-----------------------|-----------------------|
| Intercept               | 6.881156<br>(0.0000)  | 6.246560<br>(0.0000)  | 6.479057<br>(0.0000)  |
| Age                     | 0.063068<br>(0.0000)  | 0.036361<br>(0.0000)  | 0.063281<br>(0.0000)  |
| Age Square              | -0.000612<br>(0.0000) | -0.000279<br>(0.0037) | -0.000596<br>(0.0000) |
| Years of Schooling      | 0.066207<br>(0.0000)  | 0.081567<br>(0.0000)  | 0.073525<br>(0.0000)  |
| R <sup>2</sup>          | 0.214170              | 0.138846              | 0.218294              |
| Adjusted R <sup>2</sup> | 0.214097              | 0.137585              | 0.218226              |
| F. Statistic            | 2947.790<br>(0.0000)  | 110.1216<br>(0.0000)  | 3211.498<br>(0.0000)  |

*(p-values are presented in parenthesis)*

Male self employed data results in highly significant variables. The coefficient of age is 0.063068 which shows that earnings of an individual increased by 6.3068% when one year of age is increased. Age has positive impact on earnings but in such a way that earnings are proportionally more in younger age than the older age. So that's why the variable (age<sup>2</sup>) is included in the model which shows that earnings increase at decreasing due to change in

age of male person. The earnings of male self employed person increase by 65.6207% when one more year of successful schooling is completed.

Female self employed workers data's estimation shows that all variables are highly significant earnings of female worker increased by 3.6361% when a women's age increased by one year. Earnings are affected by age Earnings increased at decreasing rate due to change in age. Negative sign of coefficient of age shows the some effect. Earnings of a female self employed worker are increased by 8.1567% when she completes one more successful year of schooling.

The estimators of MEF are highly significant for both male & female self employed workers. The percentage increase in earnings due to change in age for male is more than for female. Overall the impact on earnings due to change in age is positive but increasing at decreasing rate. The impact of change in education on earnings is more for female than male worker.

For overall Pakistan, the earnings of self employed workers are increased by 6.3281% due to 1 year increased in age. But earnings increased at decreasing rate for both male & female self employed worker. Overall earnings in Pak are increased by 7.3525% due to 1 more successful years of schooling.

Finally the results based on combined data of male and female earners also show similar pattern



### 6.3.2. Oaxaca-Blinder Decomposition of Gender-Wage Gap for Self Employed Earners

We shall employ Oaxaca-Blinder decomposition in three ways, First we shall assume that male earners are paid competitive wages and female earners are under paid. Second, we shall assume that female earners are paid competitive wages and male earners are under paid. Finally we will consider a possibility when weighted average wages of male and female are competitive. The results under these three assumptions are presented in Tables 6.3.2a to 6.3.2c.

**Table 6.3.2 a. Oaxaca-Blinder Decomposition of Gender-Wage Gap When Male Earners are Paid Competitive Wages and Female Earners are Under Paid.**

| Factors   | Total Gap      | Decomposition of Total Gap |                  |
|-----------|----------------|----------------------------|------------------|
|           |                | Relative Endowments        | Relative Returns |
| Age       | 1.2233(85.56%) | 0.3153(22.13%)             | 0.9080(63.73%)   |
| Education | 0.2015(14.14%) | 0.1214(8.52%)              | 0.0801(5.62%)    |
| Total     | 1.4248(100%)   | 0.4367(30.64%)             | 0.9881(69.35%)   |

**Table 6.3.2 b. Oaxaca-Blinder Decomposition of Gender-Wage Gap When Female Earners are Paid Competitive Wages and Male Earners are Under Paid.**

| Factors   | Total Gap      | Decomposition of Total Gap |                  |
|-----------|----------------|----------------------------|------------------|
|           |                | Relative Endowments        | Relative Returns |
| Age       | 1.2234(85.57%) | 0.1818(12.71%)             | 1.0416(72.86%)   |
| Education | 0.2062(14.43%) | 0.0727(5.09%)              | 0.1335(9.34%)    |
| Total     | 1.4296(100%)   | 0.2545(17.80%)             | 1.1751(82.20%)   |

**Table 6.3.2 c Oaxaca-Blinder Decomposition of Gender-Wage Gap When Weighted Average of Male and Female earners are paid Competitive Wages.**

| Factors   | Total Gap      | Decomposition of Total Gap |                  |
|-----------|----------------|----------------------------|------------------|
|           |                | Relative Endowments        | Relative Returns |
| Age       | 1.2234(71.43%) | 0.3164(22.13%)             | 0.9070(63.44%)   |
| Education | 0.2063(28.57%) | 0.1266(8.85%)              | 0.0797(5.57%)    |
| Total     | 1.4297(100%)   | 0.443(30.98%)              | 0.9867(69.01%)   |

When male self employed worker is paid competitive wages, average wage gap is 85.56% while wage gap due to education in paid employed worker in Pakistan is 14.14%. Average wage gap due to relative endowment is 30.64%. Average wage gap due to relative returns is 69.35%.

When female self employed worker are paid competitive wages, average wage gap due to age is increased i.e. 85.57% while wage gap due to education in self employed worker is increased i.e. 14.43%. Average wage gap due to relative endowment is 17.80%. Average wage gap due to relative returns is 82.20%.

Oaxaca decomposition shows that when paid workers are paid competitive wages, average gender wage gap is 71.43% for self employed worker in Pakistan due to age while due to education gender wage gap is just 28.57%. Average gender wage gap due to relative endowments is 30.98%. It shows that wage gap is increased by 30.98% due to difference in endowment between male & female. Average gender wage gap due to relative returns is 69.01%. So woman would gain 69.01% if they receive some returns as men on their productive endowment.

## 6.4 ANALYSIS FOR EMPLOYERS

Employer is a person or group that hires workers and pays one or more worker. Following the same pattern of section 6.2, &section 6.2, here we repeat the analysis for all employers in Pakistan.

### 6.4.1. Mincerian Earning Function for Employer

The results of Mincerian earning function are presented in Table 6.3.

**Table 6.3 Results of Mincerian Earning Function for Employer in Pakistan**

| Estimators              | Male Earners          | Female Earners         | All Earners           |
|-------------------------|-----------------------|------------------------|-----------------------|
| Intercept               | 7.448153<br>(0.0000)  | 7.405832<br>(0.0000)   | 7.430667<br>(0.0000)  |
| Age                     | 0.041653<br>(0.0000)  | 0.013901<br>(0.5442)   | 0.040656<br>(0.0000)  |
| Age Square              | -0.000379<br>(0.0000) | -0.000195<br>(0.4708)  | -0.000363<br>(0.0000) |
| Years of Schooling      | 0.036645<br>(0.0000)  | 0.041027<br>(0.0164)   | 0.039225<br>(0.0000)  |
| R <sup>2</sup>          | 0.053597              | 0.021363               | 0.056704              |
| Adjusted R <sup>2</sup> | 0.053398              | 0.011983               | 0.056509              |
| F. Static               | 268.1000<br>(0.0000)  | 2.277513<br>(0.079609) | 290.9061<br>(0.0000)  |

*(p-values are presented in parenthesis)*

Estimated results of male employer data show that all variables are highly significant. Earnings of male employer increase by 4.1653% when age is increased by one year. Earnings are positively affected due to change in age. Earnings increase at decreasing rate due to change in age. Earnings of male employer increase by 3.6645% due to 1 more year of successful schooling.

Estimated results of female employer workers show that all variables are highly significant except age. As probability of age is 5.442% which is more than

5%, so age is insignificant variable. Earnings of female employer worker is increased by 4.1027% due to increase in one more year of successful schooling is completed.

Now we shall compare the results of estimations of male & female employer. The change in earnings of male employer is more than change in earnings of female employer due to change in age. For both male & female employer earnings increased at decreasing rate due to change in age. But the variable age is insignificant for female employers which mean that age doesn't explain variations in earnings of female employer. Returns for female employer due to increase in education is more than male employer.

Now let's focus on overall results of estimation of employers in Pakistan. Earnings of an employer changes by 4.0656% due to change in age. Overall earnings increased at decreasing rate. When years of schooling changed then earnings changed by 5.6704%. Chow test don't allow pooling here.

*As variable age is appeared to be insignificant, so we shall not apply Oaxaca-Blinder technique to measure gender wage gap. However, the results of Oaxaca-Blinder technique are presented in appendix A-2 (tables A-2.a to A-2.c).*

#### **6.4. CONCLUSIONS**

By Comparison of MEF for male paid employed, male self employed & male employers of Pakistan, we come to know that earnings of male paid employed worker is higher than male self employed & male employer due to one year increase in age. Similarly female paid employed worker is paid higher wages due to change in age. But for female employer, age is insignificant

variable. Overall, male belonging from any employment status are paid higher due to change in age as compare to female earner. One more successful year of schooling gives higher returns to female paid employed & male self employed worker and lowers to male & female employer. Overall education gives higher returns to female in all employment status than male.

In all previous analysis, we have estimate MEF & gender wage gap for all earners in and the three employment status in Pakistan. But gender wage gap can exist in industrial sector of Pakistan. Now we include five different sector of industrial sector of Pakistan i.e. agriculture, manufacturing, wholesale & retail sector i.e. traders sector, social services sector & construction sector.

## Chapter 7

# GENDER-WAGE GAP ANALYSIS FOR ALL EARNERS OF PAKISTAN WITH RESPECT TO INDUSTRY OF EMPLOYMENT

### 7.1. INTRODUCTION

This chapter is divided in eight sections. Section 7.2 deals with the results of Mincerian Earning Function and Oaxaca-Blinder decomposition for Agriculture sector with and without gender distinction. Section 7.3 analyzes the results from manufacturing sector. Similarly section 7.4 comprises of results from Construction sector, section 7.5 for trade sector, section 7.6 for social services sector, Section 7.7 shows the results for others sectors of industry i.e. mining & quarrying, electricity, transport & storage, real estate insurance & others. Finally conclusion is presents in section 7.8.

### 7.2. ANALYSIS OF EARNERS BELONGING TO AGRICULTURE, FORESTRY AND MINING SECTOR

First of all, we have regressed log of earnings on age, age square and education of earners in three ways. We have estimated earnings for male worker, female worker & finally for all workers in agriculture sector of Pakistan. We have applied Oaxaca-Blinder decomposition technique to quantify the effect of education and age on gender-wage gap after estimating MEF. First we shall discuss the results of Mincerian earning function and after that Oaxaca-Blinder decomposition is applied.

### 7.2.1. Mincerian Earning Function for Agriculture, Forestry and Mining

The results of Mincerian earning function are presented in Table 7.1.

**Table 7.1**

| Estimators              | Male Earners          | Female Earners        | All Earners           |
|-------------------------|-----------------------|-----------------------|-----------------------|
| Intercept               | 6.895553<br>(0.0000)  | 5.792036<br>(0.0000)  | 6.651662<br>(0.0000)  |
| Age                     | 0.057800<br>(0.0000)  | 0.052974<br>(0.0000)  | 0.061372<br>(0.0000)  |
| Age Square              | -0.000537<br>(0.0000) | -0.000482<br>(0.0000) | -0.000548<br>(0.0000) |
| Years of Schooling      | 0.04398<br>(0.0000)   | 0.119310<br>(0.0000)  | 0.05622<br>(0.0000)   |
| R <sup>2</sup>          | 0.113285              | 0.369480              | 0.144069              |
| Adjusted R <sup>2</sup> | 0.113187              | 0.369273              | 0.143982              |
| F. Static               | 0.113187<br>(0.0000)  | 1791.766<br>(0.0000)  | 1661.746<br>(0.0000)  |

*(p-values are presented in parenthesis)*

The estimated results of male workers in agriculture sector show that all variables are highly significant. Earnings of male worker in agriculture sector change by 5.7800% due to change in age. But earnings in younger age are comparatively more than earnings in older age. So the negative sign of age<sup>2</sup> shows that earnings increase at decreasing rate due to change in age. One more successful year of schooling increased earnings by 4.3986%.

Estimations of female workers in agriculture sector show that all variables are highly significant. Increase in age by one year results in increase in earnings of female worker by 5.2974%. But earnings increase at decreasing rate due to change in age. So the same pattern is shown by negative sign of (age<sup>2</sup>). One more year of successful schooling results in increase in earnings by 11.9310%.

Now comparing the estimated results of male & female worker, we come to know that due to change in age, earnings of male worker in agriculture sector increased relatively more than increase of female worker. Both male & female worker get increased earnings at decreasing rate due to change in age. But the returns to female earner are more than male earner due to increase in education.

For agriculture sector in Pak, an individual's earnings increased by 6.1372% due to increase in age. But earning increased at decreasing rate in Pakistan. For a Pakistani individual, earnings increased by 5.6252% due to one more year of schooling. Finally we have applied chow test. But Chow test don't allow pooling here<sup>7</sup>.

### 7.2.2. Oaxaca-Blinder Decomposition of Gender-Wage Gap for Agriculture, Forestry and Mining

Oaxaca-Blinder technique is applied in three different ways to calculate gender wage gap. The results are presented in tables from 7.2.2a to 7.2.2c

**Table 7.2.2 a. Oaxaca-Blinder Decomposition of Gender-Wage Gap When Male Earners are Paid Competitive Wages and Female Earners are Under Paid.**

| Factors   | Total Gap      | Decomposition of Total Gap |                  |
|-----------|----------------|----------------------------|------------------|
|           |                | Relative Endowments        | Relative Returns |
| Age       | 0.8037(86.45%) | 0.4624(49.74%)             | 0.3413(36.71%)   |
| Education | 0.1259(13.55%) | 0.1156(12.44%)             | 0.0103(1.11%)    |
| Total     | 0.9296(100%)   | 0.5780(62.18%)             | 0.3516(37.82%)   |

<sup>7</sup> Chow test gives similar results for industries other than agriculture i.e. manufacturing, construction, social services, traders sector & others. Chow test tells that pooling is not permissible.



**Table 7.2.2 b. Oaxaca-Blinder Decomposition of Gender-Wage Gap When Female Earners are Paid Competitive Wages and Male Earners are Under Paid.**

| Factors   | Total Gap      | Decomposition of Total Gap |                  |
|-----------|----------------|----------------------------|------------------|
|           |                | Relative Endowments        | Relative Returns |
| Age       | 0.6217(83.77%) | 0.4238(57.11%)             | 0.1979(26.66%)   |
| Education | 0.1205(16.23%) | 0.1060(14.28%)             | 0.0145(1.95%)    |
| Total     | 0.7422(100%)   | 0.5298(71.39%)             | 0.2124(28.61%)   |

**Table 7.2.2 c Oaxaca-Blinder Decomposition of Gender-Wage Gap When Weighted Average of Male and Female earners are paid Competitive Wages.**

| Factors   | Total Gap      | Decomposition of Total Gap |                  |
|-----------|----------------|----------------------------|------------------|
|           |                | Relative Endowments        | Relative Returns |
| Age       | 0.8036(86.46%) | 0.491(52.82%)              | 0.3126(33.64%)   |
| Education | 0.1259(13.54%) | 0.1227(13.20%)             | 0.0032(0.34%)    |
| Total     | 0.9295(100%)   | 0.6137(66.02%)             | 0.3158(33.98%)   |

When Male Earners are Paid Competitive Wages and Female Earners are Under Paid, Average wage gap due to relative endowments is 62.18%. Average wage gap due to relative returns is 37.82%. Average wage gap due to age is 86.45%. Average wage gap due to education is 13.55%.

When female are paid competitive wages, Average wage gap due to relative endowments is 71.39%. Average wage gap due to relative returns is 28.61%. Average wage gap due to age is 83.77%. Average wage gap due to education is 16.23%.

When both male and female are competitively paid, Average gender wage gap due to relative endowment i.e. change in endowments of male & female worker, is 66.02%. Average gender wage gap due to relative returns for male &

female worker is 33.98%. Average wage gap due to age in Pak is 86.46%. Average wage gap due to education is 13.54%.

### 7.3. ANALYSIS OF EARNERS BELONGING TO MANUFACTURING SECTOR

Same pattern of section 7.1 is repeated here for the analysis of earners belonging to manufacturing sector.

#### 7.3.1. Mincerian Earning Function for Manufacturing

The results of Mincerian earning function are presented in Table 7.2

**Table 7.2**

| Estimators              | Male Earners          | Female Earners        | All Earners           |
|-------------------------|-----------------------|-----------------------|-----------------------|
| Intercept               | 6.646836<br>(0.0000)  | 6.462384<br>(0.0000)  | 6.503979<br>(0.0000)  |
| Age                     | 0.072429<br>(0.0000)  | 0.017585<br>(0.1273)  | 0.069158<br>(0.0000)  |
| Age Square              | -0.000685<br>(0.0000) | -5.98E-05<br>(0.7151) | -0.000628<br>(0.0000) |
| Years of Schooling      | 0.061130<br>(0.0000)  | 0.081598<br>(0.0000)  | 0.075530<br>(0.0000)  |
| R <sup>2</sup>          | 0.316991              | 0.111234              | 0.301959              |
| Adjusted R <sup>2</sup> | 0.316765              | 0.108317              | 0.301750              |
| F. Static               | 1403.006<br>(0.0000)  | 38.13061<br>(0.0000)  | 1440.207<br>(0.0000)  |

*(p-values are presented in parenthesis)*

The results of MEF estimation for male worker in Pak show that all variables are highly significant. Earnings of male worker change by 7.2429% due to one year change of age. As age changes returns also changes. In older ages, the earnings are comparatively lower. Negative sign of age<sup>2</sup> shows that earnings

increase at decreasing rate due to change in age. Male worker earn 6.1130% more due to one more year of successful schooling.

MEF estimated for female worker shows that all variables are highly significant. Female worker earnings changes by 1.7585% due to one year change of age. When a female worker gets older by one year then how earnings increase by 1.7585%.but the variable age is insignificant because of high probability. This means that age don't explain the variations in earnings of female earner. As age of female worker increase, her efficiency goes down due to marriage or child rearing. That's why the sign of age<sup>2</sup> is negative.

By comparison we come to know that returns for male due to change in age are higher then female. For both men & women earnings increase at decreasing rate. The returns for female worker are more than male worker due to change in education. Overall variables of MEF are highly significant.

For overall worker in manufacturing sector of Pak, all variables of MEF are highly significant. Earnings of an individual increase by 6.9158% but at decreasing rate due to change in age. Earnings of an individual increases by 7.5530% due to change 1year change in education. Chow test don't allow polling here.

*As age becomes an insignificant variable in case female worker in manufacturing sector, s we shall not apply Oaxaca decomposition. However, results are presented for an overview in appendix in tables A-2.a to A-2.c.*

#### 7.4. ANALYSIS OF EARNERS BELONGING TO CONSTRUCTION

MEF for construction sector is estimated separately for male & female and for all workers in manufacturing sector. Then Oaxaca-Blinder decomposition is used to quantify gender wage gap.

##### 7.4.1. Mincerian Earning Function for Construction

The results of Mincerian earning function are presented in Table 7.3.

**Table 7.3**

| Estimators              | Male Earners          | Female Earners       | All Earners           |
|-------------------------|-----------------------|----------------------|-----------------------|
| Intercept               | 7.075628<br>(0.0000)  | 7.104398<br>(0.0000) | 7.053365<br>(0.0000)  |
| Age                     | 0.048102<br>(0.0000)  | 0.015818<br>(0.5749) | 0.048873<br>(0.0000)  |
| Age Square              | -0.000446<br>(0.0000) | 9.30E-06<br>(0.9822) | -0.000454<br>(0.0000) |
| Years of Schooling      | 0.038752<br>(0.0000)  | 0.080130<br>(0.0000) | 0.039515<br>(0.0000)  |
| R <sup>2</sup>          | 0.166392              | 0.241022             | 0.170699              |
| Adjusted R <sup>2</sup> | 0.166116              | 0.221726             | 0.170427              |
| F. Static               | 601.2778<br>(0.0000)  | 12.49077<br>(0.0000) | 628.4136<br>(0.0000)  |

*(p-values are presented in parenthesis)*

The results of MEF estimation for male worker in Pak show that all variables are highly significant. Earnings of male worker change by 4.8102% due to one year change of age. As age changes returns also changes. In older ages, the earnings are comparatively lower. Negative sign of age<sup>2</sup> shows that earnings increase at decreasing rate due to change in age. Male worker earn 3.8752% more due to one more year of successful schooling.

MEF estimated for female worker shows that all variables are highly significant. Female worker earnings changes by 1.5818% due to one year change of age. When a female worker gets older by one year then how earnings increase by 1.5818%. As age of female worker increase, her efficiency goes down due to marriage or child rearing. That's why the sign of age<sup>2</sup> is negative. But here age is appeared to insignificant variable for female. Earnings of female are increased by 8.0130% due to 1 more year of schooling.

By comparison we come to know that returns for male due to change in age are higher than female. For both men & women earnings increase at decreasing rate. The returns for female worker are more than male worker due to change in education. Overall variables of MEF are highly significant.

For overall worker in manufacturing sector of Pak, all variables of MEF are highly significant. Earnings of an individual increase by 6.9158% but at decreasing rate due to change in age. Earnings of an individual increases by 7.5530% due to change 1year change in education. *Here variable age becomes insignificant for female, so we don't apply Oaxaca-Blinder technique. However results are presented in appendix in A-4 (tables from A-4.a to A-4. c) .*

## **7.5 ANALYSIS OF EARNERS BELONGING TO TRADE SECTOR**

Trade sector comprises of wholesale & retail services in Pakistan. MEF for trade sector is estimated separately for male & female and for all workers in trade sector. Then Oaxaca-Blinder decomposition is used to quantify gender wage gap.

### 7.5.1. Mincerian Earning Function for Traders

The results of Mincerian earning function are presented in Table 7.4.

**Table 7.4**

| Estimators              | Male Earners          | Female Earners       | All Earners           |
|-------------------------|-----------------------|----------------------|-----------------------|
| Intercept               | 6.556445<br>(0.0000)  | 7.341911<br>(0.0000) | 6.560830<br>(0.0000)  |
| Age                     | 0.079287<br>(0.0000)  | 0.003933<br>(0.7908) | 0.078026<br>(0.0000)  |
| Age Square              | -0.000744<br>(0.0000) | 2.99E-05<br>(0.8705) | -0.000730<br>(0.0000) |
| Years of Schooling      | 0.054117<br>(0.0000)  | 0.086023<br>(0.0000) | 0.056103<br>(0.0000)  |
| R <sup>2</sup>          | 0.256584              | 0.200538             | 0.255187              |
| Adjusted R <sup>2</sup> | 0.256448              | 0.190200             | 0.255052              |
| F. Static               | 1875.275<br>(0.0000)  | 19.39841<br>(0.0000) | 1888.514<br>(0.0000)  |

*(p-values are presented in parenthesis)*

MEF estimated for male workers shows that all variables are highly significant. Earnings of male worker increase by 7.9287% due to increase of 1 year in age. But earnings increased at decreasing rate. Male workers earn 5.4117 more due to more education.

MEF estimated for female workers in whole sale & Retail shows that all variables are highly significant. Estimations show that earnings of female worker increase by 0.3933% due to 1 year increase in age. But earnings increase at decreasing rate. Variable age is insignificant here because probability 0.7908 is too high. Earnings of female worker increase by 8.6023% due to one more year of successful schooling.

Now comparing the results of male & female workers in manufacturing sector, it is clear that female worker earn more than male due to more education & male worker earn more than female due to increase in age.

Overall in Pak, MEF estimations depicts that all variables are highly significant. An individual gets 7.8026% more earnings due to increase in age. But earnings increase at decreasing rate due to change in age.

*Here variable age for female earner becomes insignificant, so we don't apply Oaxaca-Blinder technique. However results are presented in appendix in table A-5.a to A-5.c*

## 7.6 ANALYSIS OF EARNERS BELONGING TO SOCIAL SERVICES SECTOR

Following the same pattern of section 7.5, MEF for social services sector is estimated separately for male & female and for all workers in social services sector. Then Oaxaca-Blinder decomposition is used to quantify gender wage gap.

### 7.6.1. Mincerian Earning Function for Social Services Sector

The results of Mincerian earning function are presented in Table 7.5.

**Table 7.5**

| Estimators              | Male Earners          | Female Earners        | All Earners           |
|-------------------------|-----------------------|-----------------------|-----------------------|
| Intercept               | 6.417406<br>(0.0000)  | 5.357262<br>(0.0000)  | 6.220554<br>(0.0000)  |
| Age                     | 0.079762<br>(0.0000)  | 0.079043<br>(0.0000)  | 0.81244<br>(0.0000)   |
| Age Square              | -0.000802<br>(0.0000) | -0.000754<br>(0.0000) | -0.000800<br>(0.0000) |
| Years of Schooling      | 0.062976<br>(0.0000)  | 0.115665<br>(0.0000)  | 0.070617<br>(0.0000)  |
| R <sup>2</sup>          | 0.368332              | 0.440061              | 0.352670              |
| Adjusted R <sup>2</sup> | 0.368251              | 0.439615              | 0.352598              |
| F. Static               | 4558.559<br>(0.0000)  | 985.0072<br>(0.0000)  | 4942.849<br>(0.0000)  |

*(p-values are presented in parenthesis)*

Estimations of MEF for male data show that all variables are highly significant. Coefficient of age is 0.079762 which shows that earnings of a male worker in social services increases by 7.9762% due to 1 year increase in age. Although age has positive impact on earnings but it increases earnings increasing at decreasing rate. That's why the sign of age squared is negative. Education of individual is important in determining the earnings. The earnings of male worker increase by 6.2976% due to 1 more year of successful schooling.

For female data, all estimators are highly significant. Earnings of female workers increase by 7.9043% due to 1 year increase in age. But earnings increase at decreasing rate due to change in age. This fact is shown by negative sign of age squared. Female's earnings are affected by marital status, child rearing etc. 1 more year of education increase the female earning by 11.5665%.

Now comparing the results of male & female data, we come to know that all estimators are highly significant for both sex. Earnings of male & female increase at decreasing rate due to increase in age. But returns for male are higher than female due to change in age. Education also increases earnings of male & female worker. But returns to female are higher than male due to change in education.

For overall Pakistan, earnings of an individual increase by 8.1244% due to 1 year increase in age. But earnings increase at decreasing rate due to increase in age. One more successful year of schooling increases earnings by 7.0617%.



### 7.6.2. Oaxaca-Blinder Decomposition of Gender-Wage Gap for Social Services Sector

Oaxaca-Blinder technique is applied in three different ways which are presented in the following tables.

**Table 7.6.2 a. Oaxaca-Blinder Decomposition of Gender-Wage Gap When Male Earners are Paid Competitive Wages and Female Earners are Under Paid**

| Factors   | Total Gap      | Decomposition of Total Gap |                  |
|-----------|----------------|----------------------------|------------------|
|           |                | Relative Endowments        | Relative Returns |
| Age       | 0.3306(98.75%) | 0.3190(109.91%)            | 0.0116(3.46%)    |
| Education | 0.0042(1.25%)  | 0.0000(0.0000%)            | 0.0042(1.25%)    |
| Total     | 0.3348(100%)   | 0.3190(95.28%)             | 0.0158(4.72%)    |

**Table 7.6.2 b. Oaxaca-Blinder Decomposition of Gender-Wage Gap When Female Earners are Paid Competitive Wages and Male Earners are Under Paid.**

| Factors   | Total Gap      | Decomposition of Total Gap |                  |
|-----------|----------------|----------------------------|------------------|
|           |                | Relative Endowments        | Relative Returns |
| Age       | 0.3421(98.35%) | 0.3162(90.90%)             | 0.0259(7.44%)    |
| Education | 0.0058(1.65%)  | 0.0000(0.0000%)            | 0.0058(1.65%)    |
| Total     | 0.3479(100%)   | 0.3162(90.90%)             | 0.0317(9.10%)    |

**Table 7.6.2 c. Oaxaca-Blinder Decomposition of Gender-Wage Gap When Weighted Average of Male and Female earners are paid Competitive Wages.**

| Factors   | Total Gap      | Decomposition of Total Gap |                  |
|-----------|----------------|----------------------------|------------------|
|           |                | Relative Endowments        | Relative Returns |
| Age       | 1.9387(54.48%) | 0.0498(1.40%)              | 1.8889(53.08%)   |
| Education | 1.6197(45.52%) | 0.0000(0.0000%)            | 1.6197(45.52%)   |
| Total     | 3.5584(100%)   | 0.0498(1.40%)              | 3.5086(98.60%)   |

When Male Earners are Paid Competitive Wages and Female Earners are Under Paid, Average gender wage gap due to relative endowments is 95.28%. Average gender wage gap due to relative returns is 4.72% i.e. women would gain 4.72% if they are productive same as male worker. Average gender wage gap due to age is 98.75%. Average gender wage gap due to education is 1.25%.

When female are paid competitive wages, Average wage gap due to relative endowments is 1.40%. Average wage gap due to relative returns is 98.60%. Average wage gap due to age is 98.35%. Average wage gap due to education is 1.65%.

When both male and female are competitively paid, Average gender wage gap due to relative endowments is 93.44%. Average gender wage gap due to relative returns is 6.56%. Average gender wage gap due to age is 54.48%. Average gender wage gap due to education is 45.52%.

## 7.7 Analysis OF EARNERS BELONGING TO OTHER SECTORS

MEF for other sector is estimated separately for male & female and for all workers in social services sector. Then Oaxaca-Blinder decomposition is used to quantify gender wage gap.

### 7.1. Mincerian Earning Function for Others Sector

The results of Mincerian earning function are presented in Table 7.6.

**Table 7.6**

| Estimators              | Male Earners         | Female Earners       | All Earners          |
|-------------------------|----------------------|----------------------|----------------------|
| Intercept               | 6.385787<br>(0.0000) | 5.472445<br>(0.0000) | 5.98389<br>(0.0000)  |
| Age                     | 0.088228<br>(0.0000) | 0.036006<br>(0.0000) | 0.09208<br>(0.0000)  |
| Age Square              | -0.00093<br>(0.0000) | -0.00023<br>(0.1194) | -0.00094<br>(0.0000) |
| Years of Schooling      | 0.056033<br>(0.0000) | 0.163631<br>(0.0000) | 0.08228<br>(0.0000)  |
| R <sup>2</sup>          | 0.254417             | 0.357428             | 0.27543              |
| Adjusted R <sup>2</sup> | 0.254256             | 0.356204             | 0.27529              |
| F. Static               | 1587.41<br>(0.0000)  | 291.8442<br>(0.0000) | 1968.29<br>(0.0000)  |

*(p-values are presented in parenthesis)*

The estimation for Male data shows that all estimators are highly significant. The coefficient of age is 0.08823 which indicates that, on average, if age of earner increase by a year then earnings would increase by 8.8228%. In general, the earnings are proportionally more in younger age male as compared to older age of male. Although age has positive impact on earnings but earnings increased at decreasing rate as an individual gets older. This fact is shown by negative coefficient of variable (age<sup>2</sup>). Earnings of an individual are also affected by education level. An increase in one successful year of schooling results in

increase in earnings too. Estimations shows that earnings of a male individual increase by 5.603% when one successful year of schooling is completed.

All estimators for female data are highly significant. When a female individual gets older by one year, her earnings increased by 3.6006% Earnings of female with passage for time can be effected by her marital status, children responsibility etc. So the earnings of female are proportionally more in younger age. Negative sign of  $(age^2)$  shows that earnings increased at decreasing rate due to one year increase in age. But  $(age^2)$  is appeared to be insignificant here. Education plays an important role for determination of an individual's earnings. For the female data coefficient of education is 0.163631 which shows that earnings of female increased by 16.3631% when they completed one more year of successful schooling.

Now comparing the results of male & female data for Pakistan, it is clear that when one year of age increases, the returns on earnings of male data are comparatively higher than females. Earnings of both male & female are increase due to increase in age but at decreasing rate. Female's earnings increase more than of male if one successful year of schooling is increased.

The overall estimations for data for Pakistan show that all estimators are highly significant. Due to increase in age, earnings of an individual raises by 9.2083%. But earnings increased at decreasing rate with the passage of time due to change in age. Earnings increase by 8.2280% when one successful year of schooling is completed by an individual in Pakistan.

### 7.7.2. Oaxaca-Blinder Decomposition of Gender-Wage Gap for Other sectors

Oaxaca-Blinder technique is applied in three different ways. Results are presented in table 7.7.2a to 7.7.2c.

**Table 7.7.2 a. Oaxaca-Blinder Decomposition of Gender-Wage Gap When Male Earners are Paid Competitive Wages and Female Earners are under Paid**

| Factors   | Total Gap      | Decomposition of Total Gap |                  |
|-----------|----------------|----------------------------|------------------|
|           |                | Relative Endowments        | Relative Returns |
| Age       | 2.0578(83.00%) | 0.4911(19.81%)             | 1.5667(63.20%)   |
| Education | 0.4214(17.00%) | 0.2647(10.68%)             | 0.1567(6.32%)    |
| Total     | 2.4792(100%)   | 0.7558(30.49%)             | 1.7234(69.51%)   |

**Table 7.7.2 b. Oaxaca-Blinder Decomposition of Gender-Wage Gap When Female Earners are Paid Competitive Wages and Male Earners are Under Paid.**

| Factors   | Total Gap      | Decomposition of Total Gap |                  |
|-----------|----------------|----------------------------|------------------|
|           |                | Relative Endowments        | Relative Returns |
| Age       | 2.0078(82.65%) | 0.1800(7.41%)              | 1.8278(75.24%)   |
| Education | 0.4213(17.35%) | 0.1080(4.45%)              | 0.3133(12.90%)   |
| Total     | 2.4291(100%)   | 0.288(11.86%)              | 2.1411(88.14%)   |

**Table 7.7.2 c. Oaxaca-Blinder Decomposition of Gender-Wage Gap When Weighted Average of Male and Female earners are paid Competitive Wages.**

| Factors   | Total Gap      | Decomposition of Total Gap |                  |
|-----------|----------------|----------------------------|------------------|
|           |                | Relative Endowments        | Relative Returns |
| Age       | 2.0078(82.65%) | 0.4604(18.95%)             | 1.5474(63.70%)   |
| Education | 0.4213(17.35%) | 0.2762(11.37%)             | 0.1451(5.97%)    |
| Total     | 2.4291(100%)   | 0.7366(30.33%)             | 1.6925(69.67%)   |

When male are paid competitive wages, average wage gap due to relative endowments is 30.49%. Average wage gap due to relative returns is 69.51%. Average wage gap due to age is 83.00%. Average wage gap due to education is 17.00%.

When female earners are paid competitive wages and female earners are under paid, Average gender wage gap due to relative endowments is 11.86%. Average gender wage gap due to relative returns is 88.14%. Average gender wage gap due to age is 82.65%. Average gender wage gap due to education is 17.35%.

When both male and female are competitively paid, Average gender wage gap due to relative endowments is 30.33%. Average gender wage gap due to relative returns is 69.67%. Average gender wage gap due to age is 82.65%. Average gender wage gap due to education is 17.35%.

## 7.8 CONCLUSIONS

By comparison, we come to know that due to increase in age, the male earners in others sectors are highly paid than in trade sector earners and lower paid male earners are in construction sector. Female earners are comparatively lowered paid than male due to increase in age. The highest returns for female are in social sector & lowest in trade sector due to change in age. For overall Pakistan data, highest returns are in others sector and lowest in construction sector due to change in age & highest in others sector and lowest in construction sector due to change in education.

## CHAPTER 8

### SUMMARY AND CONCLUSIONS

Gender wage gap still exists in the era of globalization. The problem of gender wage gap is present in almost all the countries of world whether it is developing country or developed country. The objective of our study was to analyze the gender wage gap in Pakistan. Pakistan is an agricultural country in which literacy rate is too low. We know that human capital matters a lot in accumulation of growth of a country and returns to human capital are different for different sectors of economy.

We have done our analysis of analyzing gender wage gap which can be due to difference in human capital. The analysis of our thesis was done in two different ways i.e. measuring the earnings of individuals and quantifying the gender wage gap.

We have started our analysis by estimating earnings of individuals in three different ways. Firstly, we have estimated Mincerian Earning Function for Pakistan with and without gender distinction for all earners without any distinction. Secondly, we have estimated earnings of individuals for all earners with respect to employment status and finally we have estimated earnings for all earners with respect to industry of employment

After estimating the Mincerian earning function for different categories of individuals, we have used Oaxaca-Blinder technique to analyze the gender wage gap for all individuals with the distinction of employment status and industry which were used in estimating earnings.



Data was taken from Household Integrated Economic Survey (HIES) 2005-06. Data was consisting of following variables i.e. marital status, age, different industrial sectors, employment status, region etc. we have estimated MEF for all different categories. For quantifying gender wage gap, we have used Oaxaca-Blinder technique.

Estimation of MEF for all earners of Pakistan shows that the returns for male of age are higher than female earners while returns for female due to more education are higher. Oaxaca-Blinder decomposition shows that gender wage gap due to age is higher and lower due to education. Gender wage gap due to relative endowments are higher.

Estimations for employment status of earners shows that earnings of male paid employed & male self employed workers earn relatively higher due to change in age as compared to female paid employed & self employed worker. Variable age is insignificant for female employers. Female paid employed & self employed workers earn more due to change in education. According to Oaxaca-Blinder technique, gender wage is higher due to age and relative returns for all three employment status.

Earnings of male individuals belonging to construction sector of the industry are lowest and highest for others sector due to increase in age. Females are comparatively lower paid in all industries due to increase in age. For the female workers who are working in traders sector, construction and manufacturing sector, age is insignificant. Female workers are comparatively highly paid due to change in education. Oaxaca-Blinder decomposition shows

that gender wage gap in agriculture & social sector is highest due to age and relative endowments. For construction and wholesale sector, the gender wage gap is highest due to relative returns and age,

## References

- Hamdani, k.A (1977) "Education & income analysis for Rawalpindi city", *The Pakistan Development Review*, Vol. 26(2):144-164.
  
- Irfan (1979) "Effect of unionization, product market concentration and foreign trade on inter-industry wage structure", *The Pakistan Development Review*, Vol. XVIII, No.1:35-53.
  
- Khan,s (1983) "An economic analysis of personal earnings in urban formal & informal sector of employment", *Pakistan Economic & Social Review*, Vol. XXI (1&2): 1-24.
  
- Haque (1983) "An economic analysis of personal earnings in RWP city", *The Pakistan Development Review*, Vol. XVI (4): 353-382
  
- Irfan *et all* (1985) "Rate of returns to education and the determinants of earnings in Pakistan", *The Pakistan Development Review*, Vol. XXIV (3 & 4), 671-680
  
- Shabbir (1989) "Latent structure of Earning model", *The Pakistan Development Review*, Vol. 28: 4 part 2, 903-910.

- Shabbir, Khan (1991) "Mincerian earning function for Pakistan", *Pakistan Economic and social Review*, Vol. XXIX No.2, 99-112.
- Bilquees (1992) "Trends in Intersectoral wages in Pakistan" *The Pakistan Development Review*, 31:4 Part 2, 1243-1253.
- Ashraf, Ashraf (1993) "An analysis of the Male-Female earning differentials in Pakistan", *The Pakistan Development Review*, 32:4 & 895-904.
- Shabbir (1994) "Mincerian earnings function for Pakistan", *The Pakistan Development Review*, Vol. 33:1, 1-18
- Ashraf, Ashraf (1996) "Evidence on gender wage discrimination from the 1984-85 HIES: A note", *Pakistan Journal of Applied Economics*, Vol.XII No.1, pp.85-94
- Ashraf, Ashraf (1998) "Earnings in Karachi: Does gender make a difference?", *Pakistan Economic and social Review*, Vol. XXXVI No.1, pp. 33-46.
- Siddiqui, Siddique (1998) "A decomposition of Male-Female earning differentials", *The Pakistan Development Review* 37:4 Part 2 & 895-904.

- Nasir, Mahmood (1998) "Personal earning inequality in Pakistan: Findings from HIES1993-94", *The Pakistan Development Review*, 37:4 Part 2 & 781-792
  
- Nasir (1998) "Determining of personal earnings in Pakistan: findings from the labor force survey 1993-94", *The Pakistan Development Review*, Vol. 37:3, 251-274.
  
- Shafi.M (2006) "Role of human capital in causing earnings differentials"  
The Unpublished M.phil thesis, Quaid-i-Azam University, Islamabad, Pakistan.

## Appendix tables

**Table A-1: Data statistics**

| Pakistan overall | Gender | No. of observations | Mean of age     | Mean of education | Mean of earnings |
|------------------|--------|---------------------|-----------------|-------------------|------------------|
|                  |        | $n$                 | $\bar{x}_{age}$ | $\bar{x}_{edu}$   | $\bar{w}$        |
|                  | Male   | 99250               | 37              | 6                 | 6831.82          |
|                  | Female | 9177                | 32              | 4                 | 3329.44          |

| Employment status | Gender | No. of observations | Mean of age     | Mean of education | Mean of earnings |
|-------------------|--------|---------------------|-----------------|-------------------|------------------|
|                   |        | $n$                 | $\bar{x}_{age}$ | $\bar{x}_{edu}$   | $\bar{w}$        |
| Paid employed     | Male   | 52592               | 33              | 6                 | 5940.35          |
|                   | Female | 2053                | 31              | 5                 | 3523.51          |
| Self employed     | Male   | 32452               | 39              | 5                 | 7851.35          |
|                   | Female | 2053                | 34              | 3                 | 2701.54          |
| Employer          | Male   | 14206               | 44              | 3                 | 7803.14          |
|                   | Female | 317                 | 39              | 1                 | 3230.31          |

| Industry               | Gender | No. of observations | Mean of age     | Mean of education | Mean of earnings |
|------------------------|--------|---------------------|-----------------|-------------------|------------------|
|                        |        | $n$                 | $\bar{x}_{age}$ | $\bar{x}_{edu}$   | $\bar{w}$        |
| Agriculture            | Male   | 27068               | 41              | 3                 | 6170.35          |
|                        | Female | 2553                | 33              | 1                 | 1799.93          |
| Manufacturing          | Male   | 9073                | 32              | 6                 | 7300.85          |
|                        | Female | 918                 | 29              | 3                 | 2237.57          |
| Construction           | Male   | 9041                | 33              | 4                 | 4782.40          |
|                        | Female | 122                 | 25              | 3                 | 3311.83          |
| Trade sector           | Male   | 16304               | 36              | 6                 | 8068.45          |
|                        | Female | 236                 | 36              | 4                 | 3402             |
| Social services sector | Male   | 23457               | 36              | 8                 | 7212.35          |
|                        | Female | 3764                | 32              | 8                 | 4997.45          |
| others                 | Male   | 13960               | 35              | 6                 | 7002.93          |
|                        | Female | 1578                | 30              | 3                 | 2436.72          |

Others: mining & quarrying, electricity, transport & storage, real estate & insurance and others.

## Appendix A-2 Employers

**Table A-2.a Oaxaca-Blinder Decomposition of Gender-Wage Gap When Male Earners are Paid Competitive Wages and Female Earners are Under Paid.**

| Factors   | Total Gap      | Decomposition of Total Gap |                  |
|-----------|----------------|----------------------------|------------------|
|           |                | Relative Endowments        | Relative Returns |
| Age       | 1.2906(92.08%) | 0.2083(14.86%)             | 1.0823(77.23%)   |
| Education | 0.1111(7.92%)  | 0.0833(5.94%)              | 0.0278(1.97%)    |
| Total     | 1.4017(100%)   | 0.2916(20.80%)             | 1.1101(79.20%)   |

**Table A-2.b Oaxaca-Blinder Decomposition of Gender-Wage Gap When Female Earners are Paid Competitive Wages and Male Earners are Under Paid.**

| Factors   | Total Gap      | Decomposition of Total Gap |                  |
|-----------|----------------|----------------------------|------------------|
|           |                | Relative Endowments        | Relative Returns |
| Age       | 1.2905(92.08%) | 0.0695(4.96%)              | 1.2211(87.12%)   |
| Education | 0.1111(7.92%)  | 0.0278(1.98%)              | 0.0833(5.94%)    |
| Total     | 1.4016(100%)   | 0.0973(6.94%)              | 1.3044(93.06%)   |

**Table A-2.c Oaxaca-Blinder Decomposition of Gender-Wage Gap When Weighted Average of Male and Female earners are paid Competitive Wages.**

| Factors   | Total Gap      | Decomposition of Total Gap |                  |
|-----------|----------------|----------------------------|------------------|
|           |                | Relative Endowments        | Relative Returns |
| Age       | 1.2906(92.08%) | 0.2033(14.50%)             | 1.0873(77.57%)   |
| Education | 0.1111(7.92%)  | 0.0813(5.80%)              | 0.0298(2.12%)    |
| Total     | 1.4017(100%)   | 0.2846(20.30%)             | 1.1171(79.69%)   |

**Appendix A-3 Manufacturing Sector**

**Table A-3.a Oaxaca-Blinder Decomposition of Gender-Wage Gap When Male Earners are Paid Competitive Wages and Female Earners are Under Paid.**

| Factors   | Total Gap      | Decomposition of Total Gap |                  |
|-----------|----------------|----------------------------|------------------|
|           |                | Relative Endowments        | Relative Returns |
| Age       | 1.8078(82.56%) | 0.2173(9.92%)              | 1.5905(72.64%)   |
| Education | 0.3818(17.44%) | 0.2173(9.92%)              | 0.1645(7.51%)    |
| Total     | 2.1896(100%)   | 0.4346(19.84%)             | 1.755(80.15%)    |

**Table A-3.b Oaxaca-Blinder Decomposition of Gender-Wage Gap When Female Earners are Paid Competitive Wages and Male Earners are Under Paid.**

| Factors   | Total Gap      | Decomposition of Total Gap |                  |
|-----------|----------------|----------------------------|------------------|
|           |                | Relative Endowments        | Relative Returns |
| Age       | 1.8078(82.56%) | 0.0528(2.41%)              | 1.755(80.15%)    |
| Education | 0.3819(17.44%) | 0.0528(2.40%)              | 0.3291(15.02%)   |
| Total     | 2.1897(100%)   | 0.1056(4.81%)              | 1.7879(95.18%)   |

**Table A-3.c Oaxaca-Blinder Decomposition of Gender-Wage Gap When Weighted Average of Male and Female earners are paid Competitive Wages.**

| Factors   | Total Gap      | Decomposition of Total Gap |                  |
|-----------|----------------|----------------------------|------------------|
|           |                | Relative Endowments        | Relative Returns |
| Age       | 1.8078(82.56%) | 0.2075(9.475%)             | 1.6003(73.09%)   |
| Education | 0.3818(17.44%) | 0.2075(9.475%)             | 0.1743(7.96%)    |
| Total     | 2.1896(100%)   | 0.415(19.95%)              | 1.7746(81.05%)   |



**Appendix A-4 Construction sector**

**Table A-4.a Oaxaca-Blinder Decomposition of Gender-Wage Gap When Male Earners are Paid Competitive Wages and Female Earners are Under Paid.**

| Factors   | Total Gap     | Decomposition of Total Gap |                  |
|-----------|---------------|----------------------------|------------------|
|           |               | Relative Endowments        | Relative Returns |
| Age       | 1.321(90.12%) | 0.3848(26.25%)             | 0.9362(63.87%)   |
| Education | 0.1449(9.88%) | 0.0481(3.28%)              | 0.0968(6.60%)    |
| Total     | 1.4659(100%)  | 0.4329(29.53%)             | 1.033(70.47%)    |

**Table A-4.b Oaxaca-Blinder Decomposition of Gender-Wage Gap When Female Earners are Paid Competitive Wages and Male Earners are Under Paid**

| Factors   | Total Gap      | Decomposition of Total Gap |                  |
|-----------|----------------|----------------------------|------------------|
|           |                | Relative Endowments        | Relative Returns |
| Age       | 1.1919(83.53%) | 0.1265(8.87%)              | 1.0654(74.66%)   |
| Education | 0.2349(16.47%) | 0.0158(1.11%)              | 0.2191(15.36%)   |
| Total     | 1.4268(100%)   | 0.1423(9.98%)              | 1.2845(90.02%)   |

**Table A-4.c Oaxaca-Blinder Decomposition of Gender-Wage Gap When Weighted Average of Male and Female earners are paid Competitive Wages.**

| Factors   | Total Gap      | Decomposition of Total Gap |                  |
|-----------|----------------|----------------------------|------------------|
|           |                | Relative Endowments        | Relative Returns |
| Age       | 1.1939(89.16%) | 0.391(29.20%)              | 0.8029(59.96%)   |
| Education | 0.1452(10.84%) | 0.0489(3.65%)              | 0.0963(7.19%)    |
| Total     | 1.3391(100%)   | 0.4399(32.85%)             | 0.8992(67.15%)   |

**Appendix A-5 Traders Sector**

**Table A-5.a Oaxaca-Blinder Decomposition of Gender-Wage Gap When Male Earners are Paid Competitive Wages and Female Earners are Under Paid.**

| Factors   | Total Gap      | Decomposition of Total Gap |                  |
|-----------|----------------|----------------------------|------------------|
|           |                | Relative Endowments        | Relative Returns |
| Age       | 2.7127(85.50%) | 0.0000(0.00%)              | 2.7127(85.50%)   |
| Education | 0.46(14.50%)   | 0.1586(5.00%)              | 0.3014(9.50%)    |
| Total     | 3.1727(100%)   | 0.1586(5.00%)              | 3.0141(95.00%)   |

**Table A-5.b Oaxaca-Blinder Decomposition of Gender-Wage Gap When Female Earners are Paid Competitive Wages and Male Earners are Under Paid.**

| Factors   | Total Gap       | Decomposition of Total Gap |                  |
|-----------|-----------------|----------------------------|------------------|
|           |                 | Relative Endowments        | Relative Returns |
| Age       | 2.7127 (83.64%) | 0.0000(0.00%)              | 2.7127(83.64%)   |
| Education | 0.5308(16.36%)  | 0.0787(2.43%)              | 0.4521(13.94%)   |
| Total     | 3.2435 (100%)   | 0.0787(2.43%)              | 3.1648(97.57%)   |

**Table A-5.c Oaxaca-Blinder Decomposition of Gender-Wage Gap When Weighted Average of Male and Female earners are paid Competitive Wages.**

| Factors   | Total Gap      | Decomposition of Total Gap |                  |
|-----------|----------------|----------------------------|------------------|
|           |                | Relative Endowments        | Relative Returns |
| Age       | 2.7127(85.50%) | 0.0000(0.00%)              | 2.7127(85.50%)   |
| Education | 0.4599(14.50%) | 0.1560(4.92%)              | 0.3039(9.58%)    |
| Total     | 3.1726(%)      | 0.1560(4.92%)              | 3.0166(95.08%)   |