

ESTIMATION OF GENDER WAGE DIFFERENTIALS IN EGYPT USING OAXACA DECOMPOSITION TECHNIQUE*

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ABSTRACT

This paper focuses on estimating wage differences between males and females in Egypt to understand the determinants of gender wage gap and control of this variation. The methodology of this paper is based on studying and analyzing the topic of wage differentials between males and females by using Oaxaca decomposition technique. The data used in the analysis is obtained from Egypt Labor Market Panel Survey 2006 and 2012 (ELMPS 2006, 2012), which was presented by Central Agency for Public Mobilization and Statistics (CAPMAS) in cooperation with Economic Research Forum (ERF). The findings of this paper help in deep understanding of wage gap between males and females in Egypt by determining differences in wages due to real variations in characteristics between both genders, for example, education and experience and differences due to discrimination against women in addition to determine differences due to selectivity bias. It is estimated that, the wage gap between males and females is 25% and 21% in 2006 and 2012, respectively. The results ascertain that the overall gap is attributed to discrimination against women in 2006 and 2012.

KEYWORDS: Income Inequalities- Gender wage inequality- Wage differentials- Oaxaca decomposition technique- Egypt.

1. INTRODUCTION

Wage inequality between males and females is a topic that has received a great deal of attention in the economic literature. The issue of difference in income between males and females is of great importance because it affects a very large number of people. This implies that, the gender wage gap affect women and their children and future generations as well. If the determinants of the gender wage gap can be found, policy could be implemented to reduce the income disparities.

In recent decades, male-female earnings differentials have been studied in many developed and developing countries around the world, including Egypt. The existence of such differentials is usually associated with discrimination against women in the labor market. It has been asserted

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that, discrimination has important economic, political and social consequences that call for corrective actions. Females' jobs do pay less than males' jobs, even after accounting for observable differences in worker and job characteristics; a considerable fraction of the gender wage gap remains unexplained. An unexplained gender wage gap has often been explained as evidence of labor market discrimination. However, it could reflect additional unobserved or unmeasured differences in worker and job characteristics between males and females (Wood et al., 1993 and Blau and Kahn, 2000).

The fact that females are more likely to choose occupations that offer more flexibility and that do not require continual investments in skills unique to a firm, or occupations where skills do not depreciate significantly because of career interruptions helps in explaining the selection hypothesis. The higher concentration of females in these jobs would then explain why female-dominated occupations pay lower wages than male-dominated ones (Görlich and de Grip, 2008 and ILO, 2010).

This paper focuses on estimating wage differences between males and females in Egypt to understand the determinants of gender wage gap and control of this variation. This study help in deep understanding of wage gap between males and females in Egypt by determining differences in wages due to real variations in characteristics between both genders and other differences due to discrimination against women. The study attempts to answer one important question i.e. what are the main determinants of gender wage differentials in Egypt? The methodology of this paper is based on studying and analyzing the topic of wage differentials between males and females by using Oaxaca-Blinder decomposition technique and examining the selection bias effect using Neuman-Oaxaca decomposition technique.

This paper consists of five main sections, including introduction and conclusion. The first section surveys the wages system in Egypt and its structure, the trends and profile of the Egyptian labor market. The second section presents the data description and the characteristics of males' and females' samples. The third part proposes the empirical model, its estimation and the results of the regression analysis of males' and females' samples.

2. BACKGROUND

2.1 THE WAGES SYSTEM IN EGYPT: MAJOR CHARACTERISTICS

Wage can be defined as a monetary reward that is paid to an employee for the services provided by him. There are a number of principles of a comprehensive wage policy. For example, the wage policy should achieve the national objective of economic growth with social justice; reduce the relative poverty of the working class; promote employment, productivity and capital formation; remove imbalances among sectors and wage differentials and ensure rising real wages that are consistent with the capacity of the industry and the national economy. The wage structure depends on many factors, such as, wage settlements, labor market situation and the nature and size of different institutions. In addition, the wage structure consists of certain grades and scales; each scale has a minimum and a maximum limit and the actual pay in a grade

depends on the length of service and the performance of the employee. The wage structure in Egypt generally consists of basic wage, bonus and other incentives.

A rational wage policy must effectively fix a minimum and maximum wage strategy. This means that, there is a need to provide a wage, which would be necessary for the fulfillment of the basic needs. On the other hand, the need for a wage ceiling is essential in order to check the upward inflationary trend of the wages. This implies that, the wage structure must contribute to price stability.

The wages system in Egypt has many problems and it has been criticized because of its complexity and inequality. For example, the basic salary on which the bonus and the pension payments after retirement are calculated represents approximately 20% of the total wage. Furthermore, the system of wages suffers from inequities between the public and private sector. It has been asserted that, the minimum wage for workers is different in both public and private sectors. Employees who doing similar jobs whether in the public sector or private one often earn very different wages depending on the ministry (Abdelhamid and El Baradei, 2010). Many employees have demanded a minimum wages policy to be settled by the government, this request increased heavily especially after the 25th of January Egyptian revolution in 2011. According to the International Labor Convention (1970), the minimum wages policies should be established and regularly updated within the rule of law. The National Council for Wages was established by Law 12 of 2003 as the entity, which is responsible for drawing up the wages policy in Egypt and ensuring that wages are suitable to the cost of living and are adequate to cover rising prices. There are many different laws and regulations controlling the wages system in Egypt. A revision of all laws and legislations that affect the wages system in Egypt is an important issue that should be taken into consideration.

Another characteristic of the complexity of the Egyptian wages system is the series of special bonuses, annual increases and incentive structures. Before the 25th of January Egyptian revolution in 2011, there was a correlation between the presidential election year and the increase in the percentage of special bonuses that should be added to the basic wage. However, there is an increase level of dissatisfaction, especially among employees in the public sector, with the wage level, which lacks the international standards of minimum wages. Egyptian Law guarantees the minimum wage for all government and non-government employees, in addition to yearly increments to salary ranging usually between 10-15%.

In Egypt, the minimum wage policy should take into consideration the differences between sectors and geographical areas. Moreover, this policy should be modified to be compatible with the level of productivity and the increased level of inflation rates as well. At least one quarter of Egyptians live in harsh poverty, spending no more than LE3444 (\$500) each year. In July 2012, a minimum wage of LE700 (\$100) was set in the public sector for the first time since 1980s. From January 2014, Egyptian public sector workers will have a minimum monthly wage of LE1200 (\$171). Egypt's annual urban inflation rose to 10.1% in the 12 months to September 2013, up from 9.7% recorded in year-to-August (CAPMAS, Egypt in Figures, 2013).

The inflationary pressure from a minimum wage increase can be contained if the government follows a sound policy to enhance production. Then again, Egypt's heavy reliance on imports for

basic necessities makes it unlikely that raising minimum wage would result in an increase in local production. Egypt spent around LE33 billion (\$4.8 billion) on imports in the first eight months of 2013. Moreover, Egypt's official unemployment rate reached 13.3% of the country's labor force in the second quarter of 2013, with 74% of job seekers aged between 15 and 29 years old (CAPMAS, Egypt in Figures, 2013).

To sum, it can be said that, reforming the wages system in Egypt requires an overall plan and a civil service reform that would satisfy the objectives of employer and employees as well and that would lead to efficient and responsive government system. It can be said that, parallel political reform allowing for greater levels of accountability and transparency in government operations and the staged implementation of reforms, are important issues to achieve the target of reforming the wages system in Egypt.

2.2 THE EGYPTIAN LABOR MARKET: TRENDS AND PROFILE

The main components of the labor market in Egypt are a large public sector, a growing private sector and an informal sector. For a long time, the government guarantees employment associated with lifetime job security and several other benefits such as public health insurance for every secondary and postsecondary graduate. These characteristics have changed in the context of the economic reform and structural adjustment program initiated in 1991. The government has increased the waiting period for government appointments. As a result, public sector work force growth rate declined and private sector growth rate increased resulting from privatization process. Moreover, pay and work conditions have changed resulting from the changes in the labor market structure (Assad, 1997).

Despite significant progress in female labor force participation over the past years, gender differences remain in productivity and earnings across different sectors and jobs. In spite of lower earnings and productivity, women are not worse workers than men. Instead, the gender differences in labor productivity and earnings are mainly the result of differences in the economic activities of men and women, in addition to gender differences in human capital and in the returns to worker and job characteristics. In fact, males' and females' jobs differ greatly, across sectors, industries or types of firms. Women all over the world appear to be concentrated in low-productivity jobs. They work in small farms and run small firms. They are overrepresented among unpaid family workers and in the informal sector. Women are more likely to work in jobs that offer flexible working arrangements, so that they can combine work with care responsibilities, for instance, part-time or informal jobs. These jobs often pay lower wages than full-time and formal jobs. Sometimes, they rise to positions of power in the labor market (World Development Report, 2012).

Over the past years, women have joined the labor market in increasing numbers, partially closing the gender participation gap. Between 1980 and 2009, the global rate of female labor force participation rose from 50.2 % to 51.8 %, while the male rate fell from 82.0 % to 77.7 %. It can be said that, female labor force participation is lowest in the Middle East and North Africa (26 %) and South Asia (35 %) and highest in East Asia and Pacific (64 %) and Sub-Saharan Africa (61 %). The changes in female participation rates over the past 25 years can be attributed to the

effects of economic development and rising levels of education among women, which increase the demand for female labor (World Bank, 2011).

In Egypt, it is a fact that marriage has usually been associated with a decline in female labor force participation. Some women rejoin the labor force several years after marriage. The exit rates for women working in an informal firms or household enterprises are higher than the exit rate of government employees. Exit rates are determined mainly by marriage, but the effect of marriage on exit among informal sector employees is considerably higher than government employees. Moreover, increases in the age of marriage and declines in the percentage of fertility are thus likely to have contributed to higher participation rates. To sum, the impact of economic development and changes in the levels of education and family formation on female labor force participation varies across individuals and regions and depends on institutions and individual preferences. (World Bank, 2010).

The majority of working urban women held government jobs, and in rural areas, the government and household enterprises reported more than 70 % of female employment. Private sector firms accounted for less than a quarter of female employment in urban Egypt in 2006. Their share in rural female employment was lower (approximately 8 %). Work in the public sector is more compatible with women’s needs since it offers shorter hours, more access to childcare and greater assistance for maternity leave. In 2006, the proportion of workers who reported having been at work during their last pregnancy was significantly higher in the public sector. It has been asserted that, 86 % of public sector workers who had a baby while working were given paid maternity leave of at least six weeks, in contrast to only 47 % of those working in the formal private sector. Furthermore, the percentage of working women aged 15–29 years who complain of long working hours is significantly higher in the private sector (50 %) than in the public sector (32 %) (World Bank, 2010).

Table (1) demonstrates the employment growth from 1988 to 2011 depending on the data of ELMPS 2012. Employment has increased from 14,508 thousand in 1998 to 19,987 thousand in 2006 and to 22,487 in 2011. Over the same period, job creation has changed and it reached 1,488 thousand in 2011. Similarly, job exit has fluctuated from 1998 to 2003 and then increased gradually since 2003 to 2011. The net job growth has declined from 4.6% in 1998 to 1.1% in 2011; this could be explained by the growing number of job exit. In addition, the working age population growth has decreased over the same period and has reached 2% in 2011.

Table (1): Employment Growth, 1998-2011

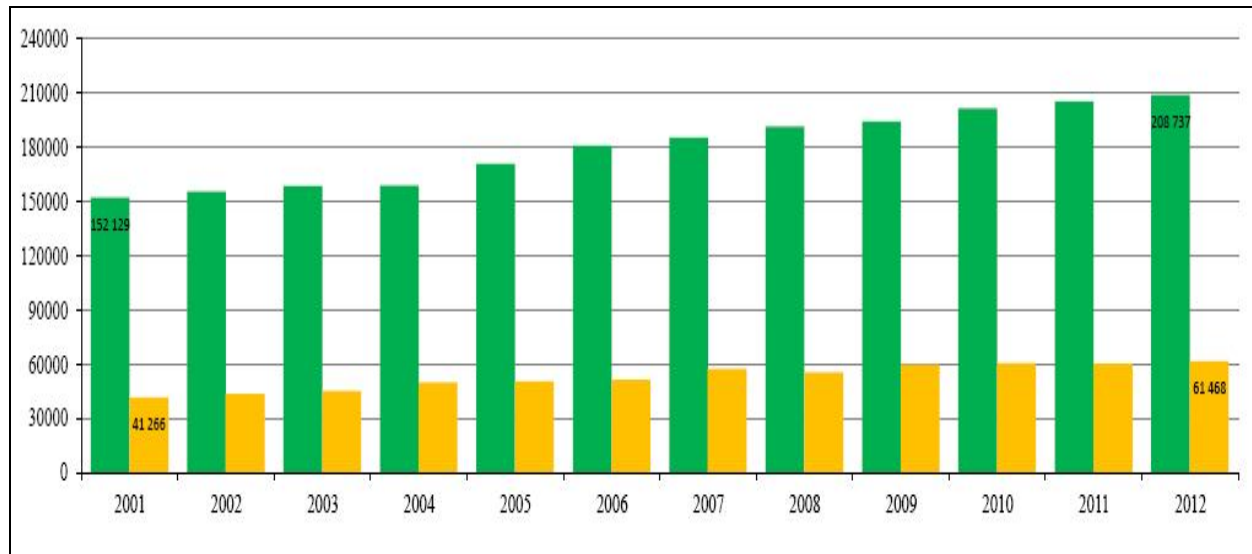
Year	Employment (Thousands)	Job Creation (Thousands)	Job Exit (Thousands)	Net Job Growth (Thousands)	Net Job Growth (%)	Working Age pop. Growth (%)
1998	14,508	1,251	599	652	4.6	4.3
1999	15,125	1,216	611	605	4.1	4.4

2000	15,915	1,580	801	779	5.0	4.0
2001	16,678	1,449	709	740	4.5	3.7
2002	17,371	1,472	774	698	4.1	4.2
2003	17,910	1,270	678	592	3.3	3.7
2004	18,621	1,425	760	665	3.6	3.0
2005	19,393	1,631	901	730	3.8	3.2
2006	19,987	1,515	948	567	2.9	2.7
2007	20,484	1,386	903	483	2.4	2.5
2008	21,063	1,616	1,074	542	2.6	2.4
2009	21,695	1,754	1,137	617	2.9	2.4
2010	22,218	1,697	1,328	369	1.7	2.1
2011	22,487	1,488	1,245	243	1.1	2.0

Source: Assaad and Krafft, 2013.

The labor force in Egypt has increased from 19.3 million in 2001 to 27 million in 2012, however females' labor force has only increased from 4.1 million in 2001 to 6.1 million in 2012 (see Figure 1). In contrast, males' labor force participation rates have been increasing over this period; in fact, males' labor force has increased from 15.2 million in 2001 to 20.9 million in 2012. In terms of unemployment, females have continued to face much higher rates over the whole period. The female unemployment rate has been approximately 3 to 4 times higher than that of males.

Figure (1): Annual Estimates of Labor Force by Sex (2001-2012)



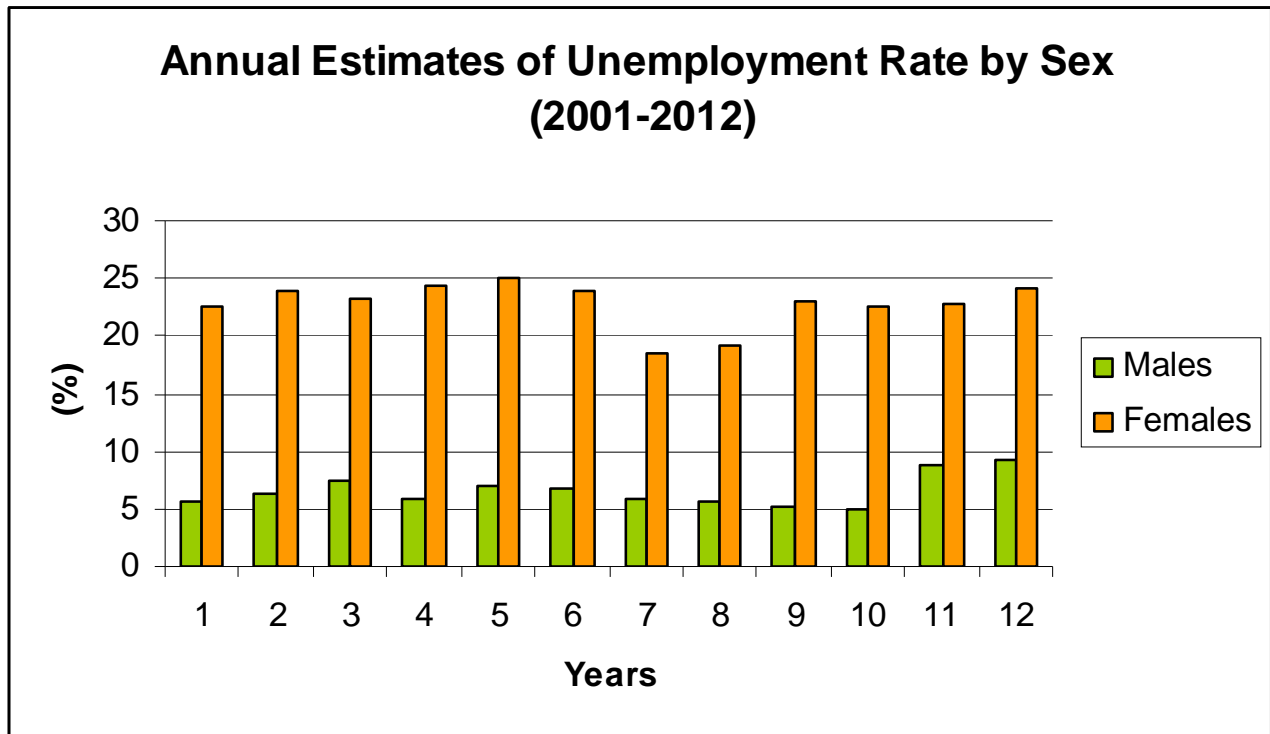
(1) All numbers in Y axis are in hundreds.

(2) ■ Males ■ Females

Source: CAPMAS, Annual Statistical Book, 2013.

Figure (2) illustrates that, the male unemployment rate as reported by the Labor Force Sample Surveys (LFSSs) conducted by Central Agency for Public Mobilization and Statistics (CAPMAS) nearly doubled from 2010 to 2011 i.e. from 4.9% to 8.9%. This could be attributed to the economic slowdown caused by 25th of January Egyptian revolution. It then increased in 2012 to 9.3%. On the contrary, the female unemployment rate was not affected heavily by the revolution; it increased from 22.57% in 2010 to 22.73% in 2011 and reached 24.1% in 2012. The overall unemployment rate increased from 9% in 2010 to 12.7% in 2012.

Figure (2): Annual Estimates of Unemployment Rate by Sex (2001-2012)



Source: CAPMAS, Annual Statistical Book, 2013.

There have been substantial changes in the composition of employment over time in Egypt. The public sector employing 25% of the workforce in 2006 and 26% in 2012. Public enterprises continued to decrease, from 7% in 1998 to 5% in 2006 and 4% of employment in 2012. Moreover, formal private regular wage employment has increased from 8% in 1998 to 9% in 2006 and 11% in 2012, while the informal private regular wage employment has decreased from 17% in 2006 to 15% in 2012. Comparing between Egypt Labor Market Panel Survey 2006 (ELMPS 2006) and Egypt Labor Market Panel Survey 2012 (ELMPS 2012), it has been asserted that, the largest change was the substantial increase in irregular wage work. While 8% of the employed were irregular wage workers in 2006, this had increased to 17% of the employed in 2012. Regarding males and females, there has been very little decrease in the share of the public sector in males' and females' employment over the 1998 to 2012 period. A small increase in formal private regular work has occurred over time among males and females. The informal private regular wage work decreased among males over the 2006 to 2012 period. Similarly, the informal private regular wage work declined among females, from 9% in 2006 to 7% in 2012. Furthermore, males experienced a significant increase in irregular wage work, from 9% in 2006 to 20% in 2012, while a small number of females are engaged in irregular wage work over the 2006 to 2012 period (Assaad and Krafft, 2013).

2.3 RELATED LITERATURE REVIEW

There are a large number of previous studies of gender wage differentials. Shaban et al. (1993) and Assaad (1997) estimated joint models of sector choice and wage determination in the public and private sector using 1987 and 1988 household-level labor force sample survey data. Assaad (1997) attempted to quantify the value of non-wage benefits in the public sector. Kanellopoulos and Mavromaras (1999) presented an empirical study of the development of labor market participation and wage differentials between males and females in Greece between 1988 and 1994. This paper used recent survey data generated by the National Statistical Service. The authors used selectivity corrected earnings estimations. The results show that the adverse treatment of female labor market participation is the largest identifiable reason why the wage gap is there and why it increased between 1988 and 1994. The study found that the observed lower female relative pay can be primarily attributed to the factors which determine paid employment participation. The participation process was found to be highly discriminatory in favor of males.

Assaad (1999) compares the earnings of workers in and out of public enterprise, while taking account of differences in non-wage benefits and non-random sector selection. The author relates workers' losses to observable characteristics such as seniority, age, educational attainment, and gender and evaluates how well alternative redundancy pay formulas typically used in severance programs match compensation payments to these estimated losses. The results of this study show that women more than men tend to face strong barriers to entry into wage jobs in the private sector and thus have poorer earning prospects.

El-Hamidi and Said (2005) studied the changes in the distribution of returns to education and gender wage in the Egypt and Morocco market using joint models of educational choice and wage determination. Their empirical analysis is based on the 1988 and 1998 Egypt Labor Force Sample Surveys and The Morocco Living Standard Measurement Studies of 1990/1991 and 1998/1999. In Egypt, the male public sector wage premium declined from 7% in 1991 to 3% in 1998; whereas the female one remained almost the same at 16-17%. Overall, wage inequality by education and gender appears to have declined substantially in Egypt during that decade of pursuing economic liberalization policies. By contrast, all changes in public sector premiums and unexplained wage gaps in Morocco appear to be in the opposite direction. Male premiums in the public sector increased from 33% in 1991 to 58% in 1999 and so did female premiums, which dramatically jumped from 14% in 1991 to 81% in 1999. In general, the nineties appear to be a decade of increasing wage inequality by gender and education in Morocco.

Schafgans and Stelcner (2006) re-examined the gender decomposition of wages in the presence of selection bias. They derived the appropriate sample selection corrections, based on a reduced form model for the joint participation decisions of both couples. The influence that husbands' participation decision has on the female participation decision also highlights the importance of using data on both spouses for the analysis of the gender wage gap. The authors analyzed the gender earnings differential using Canadian census data. They found that adding additional controls for field of study did not significantly affect the decomposition analysis, but there was some reduction in discrimination when additional controls for occupation and industry were added.

Hass (2006) studied the difference in income between men and women, the greatest equity is found in Switzerland, which has a male-to-female wage ratio of 1.11, meaning that men make approximately 1.11 times as much as women. The greatest inequality is seen in Egypt, with a ratio of 3.84, implying that men make almost quadruple the wages of women. This study examined the relationship between the gender wage gap and the degree of economic development of a country as measured by the gross domestic product per capita. This study used the United Nations Human Development Index as a more comprehensive measure of development. It also analyzed the relationship of educational attainment and general wage inequality to the size of the gender wage gap. The results suggested that the decrease in gender wage inequality is not expected to be seen until countries reach development levels close to 0.80 on the Human Development Index. Herrera and Badr (2011) suggested that the returns to education and experience in Egypt increase with firm size and are larger in the formal sector. Given the fact that females are overrepresented among informal workers, this would translate into female jobs paying less than male jobs.

Abdelhamid and El Baradei (2010) identified what needs to be done to reform the pay system for government employees in Egypt through proposing a set of policy solutions and strategies. The authors propose a system for pay adjustment and strategies to resolve the problem. For example, securing the needed extra funding for increasing government employees' pay, right sizing the government civil service, enhancing transparency, reducing wage discrepancies, reforming the minimum wage policy and establishing a better link between pay and performance. Moreover, the study emphasizes an urgent need for capacity building in government staff, as much as for salary and wage revision.

Yasin et al. (2010) concentrated on the gender employment positions and wage differentials in Pakistan. They analyzed the determinants of gender wage discrimination in Pakistan using descriptive and regression analysis based on the cross-sectional data of Pakistan labor force survey. It is concluded that, illiteracy, poor and low levels of education as well as low vocational, technical and professional competence are important features of the labor market participants in Pakistan. The results of empirical analysis showed that dissimilarity in attainment of jobs is a remarkable phenomenon between males and females. It is also proved that, some socio-economic and cultural constraints hinder the participation of females. Moreover, the results confirmed that women were not different in their productivity from men and without discrimination; women could earn more as compared to men in some cases.

3. DATA, METHODOLOGY AND ANALYSIS

The data used in the analysis is obtained from ELMPS 2006 and 2012, which was presented by CAPMAS in cooperation with Economic Research Forum (ERF). The questionnaire of the ELMPS 2006 is composed of three major sections; the first section proposes the household questionnaire administered to the head of household that contains information on basic demographic characteristics of household members. The second section presents the individual questionnaire administered to the individual containing information on parental background, detailed education histories, detailed employment characteristics, job characteristics and earnings. The third section discusses the income sources of the household.

The ELMPS 2012 intends to analyze the characteristics of the Egyptian labor market. It is considered as a follow-up survey to the same households that have interviewed in 2006, in addition to a new sample, which was selected within a random sample to participate in the survey to be able to analyze the evolution of the labor market in Egypt over time. The questionnaire of the ELMPS 2012 consists of three chapters. The first chapter introduces the household questionnaire that contains information on basic characteristics, housing services and facilities, and durable goods. The second chapter presents the individual questionnaire that includes information on father's and mother's characteristics, siblings and health, in addition to detailed education histories and earnings. The third chapter proposes information about migration, remittances, non-agricultural and agricultural enterprises.

The size of the sample of males is 5107 and 5853 individuals and the size of females' sample is 1465 and 1729 individuals in 2006 and 2012, respectively. The samples contain waged workers whose ages range from 15 to 64 years. Those individuals answer all the questions needed for the estimation of Mincerian equation and basic earnings functions and the equation that determines the wage differentials between males and females.

The empirical framework follows Mincer's estimation of the simple schooling model, which relates earnings to work experience and years of schooling. The dependent variable in the log earnings regression is the log of a respondent's total wage. The methodology of this paper is based on analyzing wage differentials between males and females by using Oaxaca and Blinder decomposition technique. Oaxaca/ Blinder decomposition technique explains whether differences in wages between males and females are due to variations in characteristics between them or alternatively due to discrimination.

Tables (2) and (3) present the variables that are used in the estimation of the empirical model:

- 1- *Age*: The age of males' sample ranged from 15 to 64 years old in 2006 and 2012, while for females' sample, it varied from 15 to 62 years in 2006 and from 15 to 64 years in 2012. In addition, the mean values of age were 35.86 years in 2006 and 36.5 years in 2012 for males. On the other hand, the mean values of age for females were 36.34 and 37.43 years in 2006 and 2012, respectively.
- 2- *W*: The wages of males ranged from 90 to 20340 Egyptian pounds per month in 2006 and from 300 to 60000 Egyptian pounds per month in 2012, while it ranged from 85 to 15000 Egyptian pounds per month for females in 2006 and from 240 to 60000 Egyptian pounds per month in 2012. Moreover, the mean values of wages were 709.5 and 536.4 Egyptian pounds per month for the samples of males and females, respectively in 2006 and they reached 3729.4 and 3013.2 Egyptian pounds per month for the samples of males and females, respectively in 2012. It is clear that, the wages of males per month are greater than females and this is the wage gap, which will be decomposed.
- 3- *lnW*: The mean values of the log wages were 6.2 and 5.95 for males and females, respectively in 2006. In 2012, these values were 7.96 and 7.75 for males and females, respectively.

- 4- *S*: The number of years of schooling (*S*) ranged from 0 to 20 years for both genders in 2006 and it ranged from 0 to 16 years for males and females in 2012. Tables (2) and (3) show that, the mean value of *S* was greater for females than males in 2006 and 2012.
- 5- *T*: There is a difference in the mean value of the number of years of experience (*T*) between the samples of males and females. While the mean values of *T* were 19.9 and 16.9 years for males in 2006 and 2012, respectively, they were 17.3 and 17.9 years for females in 2006 and 2012, respectively.

Table (2): List of the Variables used in the Model (Sample of Males)

Variable	No. of Observations		Mean		Std. Dev.		Min.		Max.	
	2006	2012	2006	2012	2006	2012	2006	2012	2006	2012
<i>Age</i>	5107	5853	35.86	36.49	11.28	10.85	15	15	64	64
<i>W</i>	5107	5853	709.5	3729.4	1247	4059.7	90	300	20340	60000
<i>lnW</i>	5107	5853	6.2	7.96	0.702	0.674	4.5	5.7	9.9	11
<i>S</i>	4675	5852	10.9	11.3	5.05	4.61	0	0	20	16
<i>SS</i>	5107	5853	132.3	148.5	94.27	81.57	0	0	400	256
<i>experience</i>	5107	5781	19.9	16.9	12.89	11.13	0	0	58	58
<i>expexp</i>	5107	5853	561.1	404.3	637.7	479.7	0	0	3364	3364
<i>Urban/rural</i>	5107	5853	0.602	0.524	0.489	0.499	0	0	1	1
<i>Marital Status</i>	5107	5853	0.724	0.795	0.447	0.404	0	0	1	1
<i>Sector of emp.</i>	4373	5853	0.566	0.500	0.496	0.500	0	0	1	1

Source: Author's calculations based on ELMPS 2006 and 2012.

Table (3): List of the Variables used in the Analysis (Sample of Females)

Variable	No. of Observations		Mean		Std. Dev.		Min.		Max.	
	2006	2012	2006	2012	2006	2012	2006	2012	2006	2012
<i>Age</i>	1465	1729	36.34	37.43	10.8	10.9	15	15	62	64
<i>W</i>	1465	1729	536.4	3013.2	839.5	2921	85	240	15000	60000
<i>lnW</i>	1465	1729	5.95	7.75	0.715	0.719	4.4	5.5	9.6	11
<i>S</i>	1412	1724	13.49	13.55	3.14	3.44	0	0	20	16
<i>SS</i>	1465	1729	185.1	194.95	76.5	70.5	0	0	400	256
<i>experience</i>	1465	1729	17.34	17.91	11.42	11.91	0	0	54	58
<i>expexp</i>	1465	1729	431.2	462.5	461.3	496.4	0	0	2916	3364
<i>Urban/rural</i>	1465	1729	0.773	0.679	0.419	.467	0	0	1	1
<i>Marital Status</i>	1465	1729	0.661	0.717	0.474	0.451	0	0	1	1
<i>Sector of emp.</i>	1450	1729	0.761	0.818	0.427	0.386	0	0	1	1

Source: Author's calculations based on ELMPS 2006 and 2012.

• THE CHARACTERISTICS OF MALES' AND FEMALES' SAMPLES

Tables (2) and (3) illustrate that, in 2006, the average earnings were 709.5 and 536.4 pounds per month for males and females, respectively. In addition, the average age was 35.86 years for males and 36.34 years for females, the average number of years of schooling was 10.9 years for males and 13.5 years for females, the average family size was 6 individuals for both genders and the average number of years of experience was 19.9 and 17.3 years for males and females, respectively. In 2012, the average earnings were 3729.4 and 3013.2 pounds per month for males and females, respectively. In addition, the average age was 36.49 years for males and 37.43 years for females, the average number of years of schooling was 11.3 years for males and 13.6 years for females and the average numbers of years of experience were 16.9 and 17.9 years for males and females, respectively.

Moreover, the average level of schooling of an individual's parents was low for both genders; however, the females' parents were more educated. In 2006, it was found that, 60.2% and 77.3% of the males' and females' samples, respectively, live in urban areas. In 2012, these percentages were decreased to be 52.4% and 67.9%. In addition, the data shows that, in 2006, 72.4% and

66.1% of the samples of males and females, respectively, were married. In 2012, 79.5% of the sample of males and 71.7% of the sample of females were married.

It is concluded that, in 2006, 56.6% and 76.1% of the males' and females' samples, respectively, were employed in government and public enterprises. The average number of working days was 6 days per week for both genders and the average number of working hours was 8.6 hours per day for males and 7.5 hours per day for females. In 2012, 50% of the males' sample and 81.8% of the females' sample were employed in government and public enterprises. The average number of working days was 6 days per week for both genders and the average number of working hours was 8.7 and 7.2 hours per day for males and females, respectively.

4. EMPIRICAL MODEL, ESTIMATION AND RESULTS

This section attempts to provide an answer to the question: "What are the determinants of the wage gap between males and females in the Egyptian labor market?". In order to do that, two methods of decomposition will be used. They rely on estimating log earnings functions based on "Human Capital Theory" for each gender separately. The standard Oaxaca-Blinder procedure is used to estimate the extent to which the overall wage gap between males and females can be explained by differences in observed human capital characteristics such as education and experience (Oaxaca 1973; Blinder 1973). Then, the Neuman-Oaxaca decomposition technique is applied to correct for the selectivity bias effect.

4.1 THE EMPIRICAL MODEL

The earnings function is,

$$\ln W_j = B_0 + B_1 S_j + B_2 T_j + B_3 T_j^2 + u_j. \quad (1)$$

Where W represents the monthly wage of an individual, S reflects his/ her years of schooling. The variable $S = 0$ for illiterates, $S = 6$ for primary education, $S = 9$ for preparatory education, $S = 12$ for secondary education, $S = 14$ for above intermediate education, $S = 16$ for university education and $S = 20$ for post graduate studies. Furthermore, T_j represent the number of years of experience for individual j . It is assumed that this function exhibits positive but diminishing marginal returns to experience. The number of years of experience (T_j) is calculated by using a simple rule, that is,

$$T_j = A_j - S_j - 6, \quad (2)$$

where A is the age of an individual and S is the number of years of schooling.

The earnings functions for males and females are,

$$\ln W_{mi} = b_0 + b_1 S_{mi} + b_2 T_{mi} + b_3 T_{mi}^2 + u_{mi} \quad (3)$$

$$\ln W_{fi} = B_0 + B_1 S_{fi} + B_2 T_{fi} + B_3 T_{fi}^2 + u_{fi} \quad (4)$$

The total difference in wages for both genders can be expressed by,

$$\Delta \ln W = \ln \bar{W}_m - \ln \bar{W}_f . \quad (5)$$

The Oaxaca-Blinder decomposition equation is,

$$\begin{aligned} \ln \bar{W}_m - \ln \bar{W}_f &= \bar{X}_m \hat{B}_m - \bar{X}_f \hat{B}_f + \bar{X}_f \hat{B}_m - \bar{X}_f \hat{B}_m \\ \therefore \ln \bar{W}_m - \ln \bar{W}_f &= (\bar{X}_m - \bar{X}_f) \hat{B}_m + (\hat{B}_m - \hat{B}_f) \bar{X}_f \end{aligned} \quad (6)$$

Where the first term $(\bar{X}_m - \bar{X}_f) \hat{B}_m$ refers to differences in characteristics between males and females and the second term $(\hat{B}_m - \hat{B}_f) \bar{X}_f$ captures the discrimination effect.

The selectivity-corrected wage equation is,

$$\ln \bar{W}_m - \ln \bar{W}_f = (\bar{X}_m - \bar{X}_f) \hat{B}_m + (\hat{B}_m - \hat{B}_f) \bar{X}_f + (\hat{\theta}_m \hat{\lambda}_m - \hat{\theta}_f \hat{\lambda}_f) . \quad (7)$$

Where the term $(\hat{\theta}_m \hat{\lambda}_m - \hat{\theta}_f \hat{\lambda}_f)$ denotes the selectivity bias effect.

4.2 ESTIMATION AND RESULTS

• RESULTS OF WAGE FUNCTIONS ESTIMATION

Tables (4) and (5) present the results of estimation of the wage functions for males and females. The results show that, the private rate of return to education was 3.9% in 2006 and 4.4% in 2012 for males while it reached 8.4% in 2006 and 8.8% in 2012 for females. It is clear from the results that, there is a positive relationship between the number of years of experience and the earnings for both genders. In addition, the wages of males and females will increase with decreasing rate as the number of years of experience increases, because b_3 is negative in tables (4) and (5).

Moreover, the rate of return to the number of years of experience was 1.91% for males and 3.55% for females in 2006. In 2012, the rate of return to the number of years of experience was 1.4% for males and 2.8% for females.

Table (4): The Regression Results of Wage Function (Males' Sample)

<i>lnW</i>	Coefficient		Std. Err.		t		P> t	
	2006	2012	2006	2012	2006	2012	2006	2012
<i>S</i>	0.0380	0.0433	0.002	0.002	17.79	22.13	0.000	0.000
<i>experience</i>	0.0295	0.0207	0.003	0.003	10.74	7.87	0.000	0.000
<i>expexp</i>	-0.0003	-0.0002	0.000	0.000	-4.47	-3.29	0.000	0.001
<i>cons</i>	5.38	7.21	0.038	0.034	140.79	210.04	0.000	0.000

Source: Author's calculations based on ELMPS 2006 and 2012.

Table (5): The Regression Results of Wage Function (Females' Sample)

<i>lnW</i>	Coefficient		Std. Err.		t		P> t	
	2006	2012	2006	2012	2006	2012	2006	2012
<i>S</i>	0.0802	0.084	0.005	0.005	15.40	16.55	0.000	0.000
<i>experience</i>	0.044	0.031	0.005	0.005	8.88	6.55	0.000	0.000
<i>expexp</i>	-0.0003	-0.0001	0.000	0.000	-1.99	-0.97	0.047	0.330
<i>cons</i>	4.25	6.10	0.083	0.085	50.99	72.04	0.000	0.000

Source: Author's calculations based on ELMPS 2006 and 2012.

• OAXACA-BLINDER GENDER WAGE GAP DECOMPOSITION RESULTS

As mentioned above, the first method of decomposition is simple and it depends on Oaxaca (1973) and Blinder (1973) decomposition technique. By subtracting the earnings functions by parts, it is possible to decompose the earnings gap into two different components. The first component is the part of the gap that can be attributed to the differences in mean human capital characteristics of the two groups and this component is called differences in characteristics. The second component is the part of the gap that can be attributed to differences in the estimated parameters of the earnings functions of males and females, this part is called discrimination. This method of decomposition can be illustrated by equation (6).

The results of estimation of gender wage differentials using Oaxaca-Blinder decomposition technique are illustrated in table (6). The mean value of real monthly wages amounted to 709.5

Egyptian pounds for males and 536.4 Egyptian pounds for females in 2006 (The wage gap is: 709.5- 536.4 = 173.1 Egyptian pounds). The characteristics of the sample imply that the average number of years of schooling S is greater for females (13.5 years) than males (10.9 years). Given the characteristics of the females' sample, the estimation of the model implies that, without discrimination against women, their monthly wages should be equaled to 749.8 Egyptian pounds. This means that, resulting from discrimination; females are receiving 213.4 Egyptian pounds less in terms of their real monthly wages. The value of discrimination represents 39.8% of the mean value of real monthly wages they are actually receiving.

Using ELMPS 2012, it is clear that the mean value of real monthly wages amounted to 3729.4 Egyptian pounds for males and 3013.2 Egyptian pounds for females (The wage gap is: 3729.4 - 3013.2 = 716.2 Egyptian pounds). The estimation of equation (6) indicates that, without discrimination against women, their monthly wages should be equaled to 4086.19 Egyptian pounds. This implies that, resulting from discrimination; females are receiving 1072.99 Egyptian pounds less in terms of their real monthly wages. The value of discrimination represents 35.6% of the mean value of real monthly wages they are actually receiving.

Table (6): Oaxaca-Blinder Wage Decomposition Results

Wage Decomposition components	Males		Females	
	2006	2012	2006	2012
Mean value of real monthly wages	709.5	3729.4	536.4	3013.2
Overall wage gap in 2006 and 2012	173.1		716.2	
Endowments effect			-40.3	-356.79
Discrimination effect			213.4	1072.99
Wage without discrimination effect			749.8	4086.19

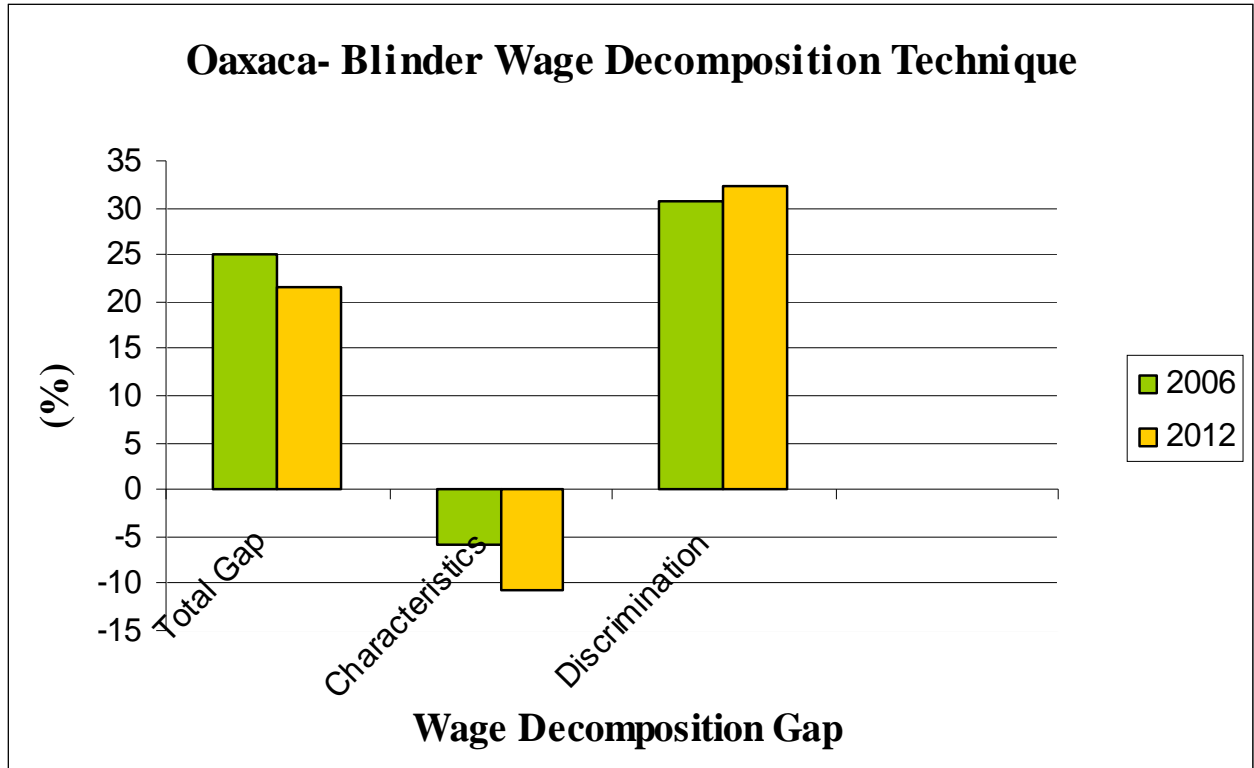
(1) All values in the table are in Egyptian pounds.

Source: Author's calculations based on ELMPS 2006 and 2012.

Figure (3) reports the results of the Oaxaca-Blinder wage decomposition. The overall gap is attributed to discrimination. In 2006, the data ascertains that males have higher potential years of experience and females have more years of education that made them better endowed in terms of overall human capital characteristics. It is estimated that, the wage gap was 25%, where $\ln \bar{W}_m - \ln \bar{W}_f = 0.25$, the endowments or characteristics effect was -5.8%, where $(\bar{X}_m - \bar{X}_f) \hat{B}_m = -0.058$ and the discrimination effect was 30.8%, where $(\hat{B}_m - \hat{B}_f) \bar{X}_f = 0.308$. The discrimination effect includes differences in coefficients in addition to differences in the constant term.

In 2012, the data implies that females have higher potential years of experience and also they have more years of education that made them better endowed in terms of overall human capital characteristics. It is estimated that, the wage gap was 21.5%, where $\ln \bar{W}_m - \ln \bar{W}_f = 0.215$, the endowments or characteristics effect was -10.8%, where $(\bar{X}_m - \bar{X}_f)\hat{B}_m = -0.108$ and the discrimination effect was 32.3%, where $(\hat{B}_m - \hat{B}_f)\bar{X}_f = 0.323$.

Figure (3): Oaxaca- Blinder Wage Decomposition Technique



Source: Author's calculations based on ELMPS 2006 and 2012.

• **NEUMAN-OAXACA GENDER WAGE GAP DECOMPOSITION RESULTS**

The second method of decomposition is more complicated and it depends on wage decomposition with selectivity-corrected wage equation adopted by Neuman and Oaxaca (2004). The estimates of males and females wage equations adopted Heckman's two step estimates with correction for selection bias. The fact that some people have chosen to work as employees in the public/ private sector could be a random choice. However, problems arise when those employees have some common characteristics that are responsible for their particular choice. In order to account for the selection bias effect on the earnings function, the two-stage selectivity correction method is used (Heckman, 1979). This method can be illustrated by equation (7), in which:

$$\ln \bar{W}_m - \ln \bar{W}_f = (\bar{X}_m - \bar{X}_f)\hat{B}_m + (\hat{B}_m - \hat{B}_f)\bar{X}_f + (\hat{\theta}_m\hat{\lambda}_m - \hat{\theta}_f\hat{\lambda}_f)$$

where $\ln \bar{W}$ is the mean value of log wage, \bar{X} is the mean vector of wage determining variables i.e. the number of years of education and the number of years of experience, \hat{B} is vector of coefficients i.e. the estimated returns to the wage determinants, $\hat{\theta}$ is an estimate of $\rho\sigma_u$ and $\hat{\lambda}$ is an estimate of the mean Inverse Mills Ratio (IMR). The first two terms in this equation are the discrimination and human capital components. Moreover, the last term signifies the selectivity bias effect.

According to this method, a selection equation using the two-stage Heckman selection model of the probability of employment in the private sector is estimated for males and females separately [see tables (7) and (8)]. The explanatory variables are the number of years of education, age, dummy variable for residence in urban or rural areas and marital status. Then, the Inverse Mill's Ratio (IMR) is calculated and the earnings functions are re-estimated separately for males and females and subtracted by parts to get the new decomposition of the gender earnings gap that includes a third component, corresponding to selectivity.

Table (7): Heckman Selection Model -- Two-Step Estimates (Sample of Males)

	Coefficient		Std. Err.		z		P> z	
	2006	2012	2006	2012	2006	2012	2006	2012
ln W								
S	0.046	0.049	0.009	0.005	4.94	10.14	0.000	0.000
experience	0.049	0.006	0.007	0.004	7.26	1.34	0.000	0.179
expexp	-0.001	0.000	0.000	0.000	-6.36	0.54	0.000	0.592
_cons	5.142	7.445	0.100	0.131	51.30	56.92	0.000	0.000
Sector of employment								
S	-0.073	0.092	0.005	0.004	-15.18	21.41	0.000	0.000
age	-0.065	0.058	0.003	0.002	-23.58	28.22	0.000	0.000
urban/rural	0.359	-0.193	0.048	0.037	7.51	-5.21	0.000	0.000
marital status	-0.278	0.276	0.058	0.052	-4.76	5.36	0.000	0.000
_cons	2.94	-3.27	0.109	0.096	27.02	-34.10	0.000	0.000
mills								

lambda	0.030	-0.239	0.116	0.061	0.26	-3.92	0.796	0.000
rho	0.048	-0.356						
sigma	0.635	0.672						

Source: Author's calculations based on ELMPS 2006 and 2012.

Table (8): Heckman Selection Model -- Two-Step Estimates (Sample of Females)

	Coefficient		Std. Err.		z		P> z	
	2006	2012	2006	2012	2006	2012	2006	2012
ln W								
S	0.090	0.095	0.009	0.009	10.06	10.54	0.000	0.000
experience	0.039	0.031	0.007	0.006	5.31	5.09	0.000	0.000
expexp	-0.000	-0.000	0.000	0.000	-0.65	-0.36	0.513	0.722
_cons	4.11	5.91	0.198	0.178	20.76	33.14	0.000	0.000
Sector of employment								
S	0.105	0.135	0.014	0.011	7.47	12.13	0.000	0.000
age	0.064	0.051	0.005	0.005	12.39	11.32	0.000	0.000
urban/rural	-0.461	-0.312	0.115	0.093	-4.01	-3.35	0.000	0.001
marital status	0.801	0.901	0.094	0.085	8.56	10.64	0.000	0.000
_cons	-2.89	-2.99	0.262	0.246	-11.05	-12.18	0.000	0.000
mills								
lambda	0.035	0.094	0.105	0.098	0.34	0.96	0.737	0.336
rho	0.063	0.153						
sigma	0.557	0.613						

Source: Author's calculations based on ELMPS 2006 and 2012.

The results of estimation of gender wage differentials using Neuman-Oaxaca wage decomposition technique are displayed in table (9). The estimation of the model using ELMPS 2006 implies that, without discrimination against women, their monthly wages should be equaled to 797.5 Egyptian pounds. This means that, resulting from discrimination; females are receiving 261.1 Egyptian pounds less in terms of their real monthly wages. Furthermore, the value of selectivity bias effect is 34.8 Egyptian pounds; this value is small but it reduces the gender wage gap. In 2012, it is estimated that, the monthly wages of females should be equaled to 4700.5 Egyptian pounds in the absence of discrimination effect. This indicates that, resulting from discrimination; females are receiving 1687.3 Egyptian pounds less in terms of their real monthly wages. In addition, the value of selectivity bias effect is 610.6 Egyptian pounds.

Table (9): Neuman-Oaxaca Wage Decomposition Results

Wage Decomposition components	Males		Females	
	2006	2012	2006	2012
Mean value of real monthly wages	709.5	3729.4	536.4	3013.2
Overall wage gap in 2006 and 2012	173.1		716.2	
Endowments effect			-53.2	-360.5
Selectivity effect			-34.8	-610.6
Discrimination effect			261.1	1687.3
Wage without discrimination effect			797.5	4700.5

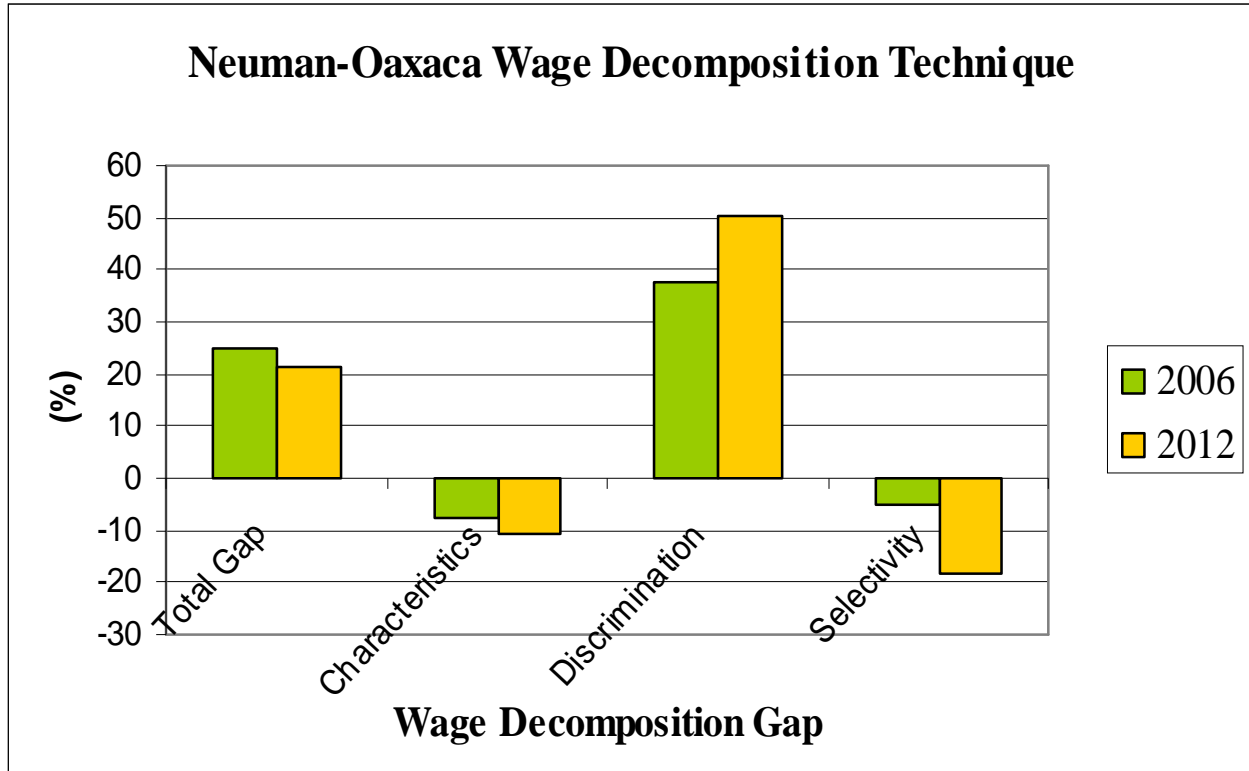
Source: Author's calculations based on ELMPS 2006 and 2012.

All values in the table are in Egyptian pounds.

Figure (4) demonstrates the results of the Neuman-Oaxaca wage decomposition. It is estimated that, the endowments or characteristics effect was -7.7% in 2006 and -10.8% in 2012, where $(\bar{X}_m - \bar{X}_f)\hat{B}_m = -0.077$ and -0.108 in 2006 and 2012, respectively. The selectivity effect was -5% in 2006 and -18.2% in 2012, where $(\hat{\theta}_m\hat{\lambda}_m - \hat{\theta}_f\hat{\lambda}_f) = -0.05$ and -0.182 in 2006 and 2012, respectively, in addition, the discrimination effect was 37.7% in 2006 and 50.5% in 2012, where $(\hat{B}_m - \hat{B}_f)\bar{X}_f = 0.377$ and 0.505 in 2006 and 2012, respectively. The results illustrated in figure (4) take into account the issue of selectivity in the private/public sector jobs, using the Neuman and Oaxaca (2004) method of decomposition. It appears that the effect of selectivity is small, but it tends to reduce the gender gap. For example, without selectivity the earning gap as a proportion of the average male wage would be 5% higher in 2006 and 18.2% higher in 2012.

Again, the observed wage gap is attributed totally to the discrimination effect, while differences in human capital characteristics tend to decrease the earnings gap between the two genders.

Figure (4): Neuman-Oaxaca Wage Decomposition Technique



Source: Author’s calculations based on ELMPS 2006 and 2012.

5. CONCLUSION

This paper concentrates on the wage gap differentials in Egypt in order to help government and decision-makers involved in the design of the wage policy to control for the income inequalities and the distortion of wages between males and females in the Egyptian labor market. The findings of this paper help in understanding the wage gap between males and females in Egypt by determining differences in wages due to real variations in characteristics between both genders and other differences due to discrimination against women. This study uses ELMPS (2006) to estimate the size of the gender wage gap in Egypt. The data shows that the real monthly wages are higher for males than females.

The Oaxaca-Blinder decomposition of the gender wage gap demonstrates that the gap is due to the discrimination against women in the labor market not to low levels of human capital characteristics (i.e. lower education levels or less experience). Using the Neuman and Oaxaca (2004) method of decomposition, it appears that the effect of selectivity is small, but it tends to

reduce the gender gap. For example, without selectivity in 2006 the earning gap as a proportion of the average male wage would be 5% higher. Again, the observed wage gap is attributed totally to the discrimination effect, while differences in human capital characteristics tend to decrease the earnings gap between the two genders. To decrease this wage gap, labor standards need to be promoted, especially in the private sector. There is a need for stronger versions of anti-discrimination legislation, such as an equal pay rule and a regulation, which forbids discrimination in job ranks, pay scales and criteria of entrance into the labor market. Actually, article 35 of the unified labor law of 2003 prohibits wage discrimination based on gender, but this law should be enacted.

The main recommendation of this paper is that several costs, which make the employment of females more expensive to the employer, should be decreased in order to give males and females an equal opportunity in the labor market. Given the encouraging environment (e.g. benefits of contracts, paid vacations for child care and sick leave and medical insurance) for women in the government and publicly owned enterprises compared to the private sector and the lower levels of discrimination in that sector, it is expected that the burden of privatization and civil service downsizing may negatively affect the already low levels of participation rates of females, unless effort is made to reduce the gender discrimination in the private sector. At present, changes in wage policy are driven by a philosophy that fits poorly with how labor demand and labor supply are changing. For future policy, the key challenge is to work with institutional arrangements and do the best that is possible to capture the benefits of both coordination and flexibility. This will provide a basis for generating labor market standards appropriate to males and females as well. Finally, there is an essential need for wage policy reform, based on linking wages to productivity.

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