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Department of Economics

Labour Market Outcomes in a Developing Country: Determinants of Wages and Job Satisfaction in Egypt

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This thesis is dedicated to

The loving memory of my father
Ahmed Shemeis

And

My beloved mother
Amira El-Badrawy

For all their unconditional love and support

Abstract

This thesis addresses two major outcomes of work in the Egyptian labour market, namely wages and job satisfaction. We examine the labour's selection into the formal sector and the differences between wage determination in the formal and informal sectors of employment. Additionally, we assess the impact of labour productivity on wages, and we inspect the determinants of job satisfaction, focusing on the contribution of higher wages. We utilise data from the 2012 round of the Egypt Labour Market Panel Survey (ELMPS) to examine these issues in Egypt's private sector and address two methodological issues, sample selection and endogeneity biases.

In addressing the differences between the formal and informal sectors, we find that sector selection is only significant for formal sector wages. Also, we find significant differences between the impact of the wage determinants in each sector in terms of returns to education, gender differentials, and occupational differentials, among others, whether for the complete sample of labour or the male labour sample separately. Once refocusing the analysis on the contribution of productivity to wages, which we proxy for using a health measure since individual labour productivity is unobservable, we find that selection into participation in the labour force is only significant for the male labour sample. Conversely, we find that health has a significant and positive impact on wage levels of the complete and the male labour samples, which is particularly evident after correcting for the endogeneity of health. Finally, we find that higher wages contribute significantly and positively to alleviating levels of all types of job satisfaction for the complete and male labour samples. Furthermore, the impact of higher wages on satisfaction levels is of a bigger magnitude for the male labour sample compared to the complete labour sample.

In summary, this research contributes to the Egyptian and developing countries' literature on labour market outcomes. We used relatively new data that is nationally representative and enables us to study a range of topics, and we addressed the methodological issues of sample selection and endogeneity to obtain unbiased and consistent results.

Declaration of Original Authorship

I confirm that this is my own work and the use of all material from other sources has been properly and fully acknowledged.

Acknowledgment of Proofreading Services

I acknowledge the use of a professional third party proofreading service. I have also reviewed any suggested corrections to ensure my authorship was not compromised and that no distortions of intended meaning resulted.

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Chapter I
Introduction and Outline of Thesis

1.1 Introductory Note

Egypt belongs to the Arab world[1], and particularly the Middle East and North Africa (MENA)[2] region. Also, the United Nations (UN) identifies it as a developing country and reported its 2014 Human Development Index (HDI), which has been increasing over the years but at a declining rate, at 0.69, ranking Egypt in the 108th place among 190 countries (United Nations Development Programme [UNDP], 2015). Similarly, the World Bank (WB) identifies Egypt as a 'lower middle income'[3] country (World Bank [WB], 2016a), and the latest Gross Domestic Product (GDP) per capita figure ranks Egypt in the 125th place among the world economies (Central Intelligence Agency [CIA], 2016). Furthermore, Egypt's GDP and GDP per capita growth rates went down from 7.1% and 5.3%, respectively, in 2007 to 4.2% and 2.0% in 2015 (World Bank [WB], 2016b). Worse still, GDP per capita in 2011 and 2013 experienced growth rates of -0.3% and -0.2%, respectively (WB, 2016b). In addition, 28% of the Egyptian population were reported as living under the poverty line in 2015 (WB, 2016a).

Of more relevance to this thesis and similar to many developing countries, Egypt is often described as suffering from numerous labour market inefficiencies, such as low wages, productivity, and female participation rates, high unemployment and informality, as well as difficulty in job creation (Kandil, 2012; Radwan, 2002; El-Megharbel, 2007; Fawzy, 2002). All of these challenges have negatively impacted the Egyptian population's labour market outcomes and well being as well as posed numerous obstacles to the stability, development, and growth of the economy. Accordingly, the Egyptian labour market has

[1] Includes: Algeria, Bahrain, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Palestine, Oman, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, United Arab Emirates, and Yemen (United Nations Development Programme [UNDP], 2015).
[2] Includes: Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates, West Bank and Gaza, and Yemen (World Bank [WB], 2016b).
[3] Includes: Armenia, Bangladesh, Bhutan, Bolivia, Cabo Verde, Cambodia, Cameroon, Congo, Cote D'Ivoire, Djibouti, Egypt, El Salvador, Ghana, Guatemala, Honduras, India, Indonesia, Kenya, Kiribati, Kosovo, Kyrgyz, Lao, Lesotho, Mauritania, Micronesia, Moldova, Mongolia, Morocco, Myanmar, Nicaragua, Nigeria, Pakistan, Papua New Guinea, Philippines, Samoa, Sao Tome and Principe, Solomon Islands, Sri Lanka, Sudan, Swaziland, Syria, Tajikistan, Timor-Leste, Tonga, Tunisia, Ukraine, Uzbekistan, Vanuatu, Vietnam, West Bank and Gaza, Yemen, and Zambia (WB, 2016b).

attracted a considerable amount of attention, as evidenced by the abundance of literature addressing the various issues that characterise this market. Despite this abundance of literature and the numerous structural reforms applied in the two decades before the 2011 revolution, Assaad and Krafft (2013b) argued that the state of the labour market in early 2012 was much worse than in 2006 based on the recorded decline in employment and female labour force participation rates as well as the slight increase in unemployment and the rather significant increase in under-employment. This implies that the requirement for appropriate and effective labour market reforms has become even more substantial (Abdelgouad, 2014; Subrahmanyam & Castel, 2014). It is worth noting that the Egyptian government devised a medium-term plan in 2015 to address some of the main economic challenges, including some of the labour market inefficiencies, which were particularly highlighted by the 2011 revolution and its demands.

Still, economic issues in Egypt extend far beyond the labour market inefficiencies, and these equally affect the labour market and the population's well being. For instance, Egypt's high inflation rates have raised many concerns over the years, where inflation rates exceeded 10% in 2007, reaching as high as 19.5% in 2012 (WB, 2016b). Although rates declined to 9-11.5% between 2013 and 2015 (WB, 2016b), inflation is still an issue that attracts a lot of attention, especially given the low wage levels. In addition, Egypt has faced problems in currency markets, with the country running low on its foreign currency reserves in 2016, and the US dollar trading at a 75% premium to the official rates on the black market (Sfakianakis, 2016). This was followed by a devaluation of the Egyptian pound (EGP) by 50%, after the EGP was allowed to float in late 2016 (Holodny, 2016). Inequality is another significant issue in Egypt, with Egypt's Gini coefficient estimated in 2014 at 30.8 and the quintile ratio[4] at 4.4 (UNDP, 2015). Furthermore, Egypt's 2014 Gender Inequality Index (GII)[5] of 0.573 (UNDP, 2015) was below the Arab and 'medium development'[6] countries' averages and ranks Egypt in the 131st place among the world.

[4] The quintile ratio represents the ratio of the average income of the richest 20% in the country to that of the poorest 20% (UNDP, 2015).
[5] The GII accounts for gender differentials regarding maternal mortality rate, adolescent birth rate, the share of seats in parliament, population with at least a secondary education, and labour force participation rates (UNDP, 2015).
[6] Includes: Botswana, Moldova, Egypt, Turkmenistan, Gabon, Indonesia, Paraguay, Palestine, Uzbekistan, Philippines, El Salvador, South Africa, Vietnam, Bolivia, Kyrgyzstan, Iraq, Cabo Verde, Micronesia, Guyana, Nicaragua, Morocco, Namibia, Guatemala, Tajikistan, India, Honduras, Bhutan, Timor-Leste, Syria, Vanuatu, Congo, Kiribati, Equatorial Guinea, Zambia, Ghana, Lao People's Democratic Republic, Bangladesh, Cambodia, and Sao Tome and Principe (UNDP, 2015).

1.2 Main Objectives

Decent wage levels are a crucial aspect of labour markets. Individuals work primarily to earn income that would allow them to support themselves and their dependents. In Egypt's context, low wages have become especially problematic as evidenced by the consistent deterioration of the population's standard of living, the demands of the 2011 revolution, and the increased discussions of minimum wages that particularly followed the revolution (Kandil & Helmy, 2012). Furthermore, Morsy et al. (2015) explained that the share of wages in GDP declined over the years, worsening further the state of the Egyptian labour.

Labour productivity is also central in these discussions, and boosting labour productivity levels is fundamental in all economies. Higher labour productivity may increase workers' wages as well as reduce employers' costs and increase their profits. On a more aggregate level, higher productivity is essential for economic growth. In Egypt, the concentration of labour in low-productivity industries has intensified Egypt's slow rate of growth of labour productivity (Morsy et al., 2015), leading to numerous economic problems, such as weak economic competitiveness (El-Araby, 2009).

In addition, and similar to various developing economies, the Egyptian labour market is segmented into a formal sector, which includes jobs that promote job security and are usually associated with higher pay, and an informal sector, involving poorly regulated and poorly paid jobs. Gatti (2011) explained that individuals tend to turn to the low-pay/low-productivity informal jobs to escape unemployment, and that informal employment has been the driving force behind job creation in Egypt in most recent years. In fact, Egypt's informal employment was estimated at 51.2% of employed labour in 2009 (International Labour Organisation [ILO], 2015) and is considered the main refuge for unemployed individuals (El-Megharbel, 2007), although some individuals are eventually able to move from informal to formal employment.

Accordingly, this thesis, focusing on the private sector, addresses two labour market outcomes related to labour productivity in Egypt, which are wages and job satisfaction. In chapter IV, we investigate the determinants of an individual's selection into the formal sector and the differences between the wage determinants' impact on the formal and informal wages. In chapter V, we are concerned with the extent to which labour productivity, which we proxy for using health, determines wages. Finally, in chapter VI, we examine the factors that influence job satisfaction, focusing on the role of wages.

1.3 Significance and Motivation

This thesis makes a number of contributions to the literature. First, we address the Egyptian labour market that is relatively larger than that of similar developing countries and has faced numerous obstacles over the years, which hindered the country's process of economic development (Springsborg, 2017). In particular, job creation and unemployment have long been significant problems in Egypt (Fawzy, 2002; El-Agrody et al., 2010; Hassan & Sassanpour, 2008), and labour productivity has remained low even when economic growth has been high (Morsy et al., 2015). It has often been argued that there is a fundamental mismatch between education levels of the labour force and the needs of the labour market (Galal, 2002). In addition, the country has not been able to generate sufficient investment in labour-intensive sectors (Fawzy, 2002; El-Agrody et al., 2010). In this context, El-Megharbel (2007) had highlighted how policies applied in Egypt in the past, while successful at first, had failed to sustain their long-term contribution to the improvement of Egypt's economic performance. It is also likely that the deficiency of effective systems of follow-through and updating the policies to coordinate with the changing economic environment of Egypt may have contributed to the failure of policies on the long run.

Second, our analysis makes methodological contributions to the literature. Throughout the thesis, we have attempted to correct for two possible biases simultaneously, including sample selection and endogeneity. Sample selection may arise in wage determination estimations, as we do not observe the wages of individuals out of work. If unemployment is purely random, this would not be a problem, however, this is unlikely to be the case. In fact, unobservable factors, such as ability, which influence selection into the labour force may also affect the wages individuals receive. Consequently, our estimates would be biased if we were to ignore this sample selection. Endogeneity on the other hand, arises technically since the error terms of our main equation of interest may be independent of some of our explanatory variables, which could arise because of reverse causality or omitted variables. One example of this reverse causality that we address in this thesis is with regards to the effect of health on wages. Better health is likely to improve workers' performance, and hence earn more. Still, individuals who earn more are likely to be capable of maintaining better states of health. Thus, both variables simultaneously affect one another, and ignoring this interrelationship may bias our estimates.

Given the range of models we estimate, including linear as well as non-linear models, correcting for endogeneity is not always straightforward. Furthermore, simultaneously addressing sample selection adds to the challenge of obtaining reliable estimates. We use a range of methods that utilise multi-equation simultaneous systems to address both issues, including Two-Stage Least Squares and Maximum Likelihood Estimations. One of the main challenges with multi-equation models is finding accurate identifiers for each equation, which should be significantly correlated with the variables they are identifying, but not related to the dependent variables of interest. In this thesis, we utilise unemployment rates stratified by educational attainment levels, which we will hereafter refer to as 'educational unemployment', to identify selection in the various chapters. Additionally, we instrument health in wage determination by incidences of dead siblings and work injuries as well as mothers' employment status when respondent was 15 years old (see chapter V), and we instrument wages in the estimation of job satisfaction by the private sector's average weekly wages stratified by gender and industry, as well as occupations, tenure, and tenure squared (see chapter VI).

On a final note, we address the Egyptian labour market at a significant period of transition, which followed the 2011 revolution (International Monetary Fund, 2014; Ghanem, 2014; Springborg, 2017), utilising the most recent nationally representative data available. We aim to provide accurate casual estimates of the determinants of labour market outcomes in Egypt, and our findings should help inform labour market policies in Egypt.

1.4 Outline of Thesis

This thesis comprises six chapters besides the introduction chapter herein. Chapter II provides a review of the main characteristics of the Egyptian labour market and some of its central issues. In this context, we review some significant statistical data covering the labour force, employment, unemployment, and wages, and we link these statistics to the literature's findings and conclusions. Also, we briefly review some of Egypt's recent economic reforms and highlight their relevance to the labour market.

As this thesis addresses Egypt's labour market through an empirical approach, secondary data is used, which is examined in chapter III. We begin by introducing the main dataset utilised in our analyses, the Egypt Labour Market Panel Survey (ELMPS), along with any other sources of data used. Thereafter, we illustrate the structure of the specific sample of

interest that is extracted from the 2012 round of the ELMPS and constitutes the private sector workers. In addition, we review the descriptive statistics of the principle variables utilised in our analyses.

The next three chapters represent the central ones of this thesis. Chapter IV addresses the differences between formal and informal labour in Egypt. Specifically, we inspect factors that affect the probability of selection into formal employment. In addition, we examine the differences between the various determinants of wages in each sector of employment, and we address and correct for the selection bias likely to prevail due to the proportion of the sample whose wages are unobservable in the estimation of the sectoral wage equations. Since the female sample is a very small one, the results for the complete labour sample's models and those of the male labour sample are not very different. Conversely, there are numerous significant differences between the formal and informal sectors' wage determination. Our findings show that the impact of age, tenure, parent's education, educational attainment levels, occupations, job stability, and size of firm all affect wages differently in each sector of employment. Still, we confirm the value of education in increasing the probability of formal sector employment as well as wages in both sectors of employment, although men's returns to education are lower than those of the complete labour sample. On a final note, we surprisingly find that unemployment is insignificant for sector selection in Egypt.

Chapter V focuses on the impact of labour productivity on wages in Egypt, and we use a measure of health to proxy for the unobserved individual labour productivity levels. This choice of proxy rests on the assumption that individuals who experience better health are likely to work harder and increase their productivity (Grossman, 1972; Grossman & Benham, 1974; Luft, 1975; Berkowitz et al., 1983; Bloom & Canning, 2000). In this chapter, we address reverse causality as well as sample selection. Particularly, we expect better health to increase productivity, and hence wages received, but also higher wages may allow individuals to maintain better health states. Consequently, health may be endogenous to wages, and thus we instrument health by factors that are likely to affect health, but not wages. Also, we correct for sample selection, which is likely to result from the unaccounted sample whose health states may be severely bad that they opt out of the labour force completely, and thus their wages are unobservable. After correcting for both biases, we find that participation into the labour force imposes a selection bias to the wage estimates of men, but not those of the complete labour sample. More importantly, we find

that health, and thus productivity, has a significant and positive impact on private sector wages of both samples. Relative to our other control factors, the reported coefficient of health is quite high for the complete labour sample, and it is even higher for the male labour sample. This implies potential productivity increases by improving the health of individuals in Egypt, which would in turn improve the individuals' wages.

The final analytical chapter, chapter VI, focuses on job satisfaction, which is another significant outcome of work. We address the impact of various labour characteristics on job satisfaction in Egypt, and particularly focus on the contribution of wages. Note that we address two measures of job satisfaction, the 'overall job satisfaction' and the 'components of job satisfaction'. The former determines individuals' satisfaction levels with their overall job, while the latter determines individuals' satisfaction levels with specific job aspects, including job security, type of work, working hours, working schedule, working conditions, commuting to work, and matching between qualifications and job. Again, we address reverse causality as well as sample selection in this chapter. Reverse causality, which results in the endogeneity of wages in job satisfaction estimations, is likely to arise due to higher wages enhancing workers' job satisfaction, whilst satisfied workers are expected to work harder and enhance their productivity, which should feed back into wages earned. Additionally, we expect our results to suffer from a sample selection bias due to the unaccounted proportion of the sample, which may opt out of the labour force completely due to being extremely dissatisfied with the labour market conditions. Our findings again confirm a sample selection bias only for the male labour sample's models. Furthermore, they confirm that overlooking endogeneity imposes a downward bias to the estimations. Particularly, we find that all methods report the significance of wages for both job satisfaction measures addressed, whether for the complete labour sample or the male labour sample. Yet, the coefficients are much larger after correcting for the endogeneity of wages. Also, the male labour sample's wage coefficients are bigger than the complete labour sample's coefficients, which is plausible since men in the Egyptian context are usually the main providers and financial supporters of their households, thus they are likely to place more emphasis on their wages. Generally, our findings substantiate the value of wages to Egyptian labour, and the potentiality of improving labour market outcomes by dealing with issues of low wages.

Finally, chapter VII concludes the thesis by summarising the objectives and main findings of our research.

Chapter II
The Egyptian Labour Market: A Review

2.1 Introduction

The objective of this chapter is to describe the general framework of the Egyptian labour market by highlighting some of its main elements. In order to do this, we review some of Egypt's statistical labour data, trace trends over time, and compare Egypt to a range of other countries. In addition, we draw links and connections between the statistics and some of Egypt's labour market literature's findings. While chapters IV, V, and VI of this thesis rely on individual-level labour market data from the Egypt Labour Market Panel Survey (ELMPS), we concentrate on broad macro patterns in this chapter. Therefore, we use data from a range of macroeconomic sources, including the 'Statistical Year Book' and the 'Egypt in Figures' publications of the Central Agency for Public Mobilisation and Statistics (CAPMAS), the World Bank's (WB) data bank, and the United Nations Development Program's (UNDP) 2014 Human Development Report.

This chapter will proceed with sections **(2.2)**, **(2.3)**, and **(2.4)** that respectively review labour force, employment, and unemployment data, and highlight Egypt's major labour market issues with respect to these factors. Thereafter, section **(2.5)** provides a review of wage data and wage determination in Egypt, which brings forward the historical role of the public sector and the 'Employment Guarantee Scheme' in shaping the Egyptian labour market. Finally, section **(2.6)** highlights some of the major economic reforms applied in Egypt and their relation to the labour market, while section **(2.7)** concludes the chapter.

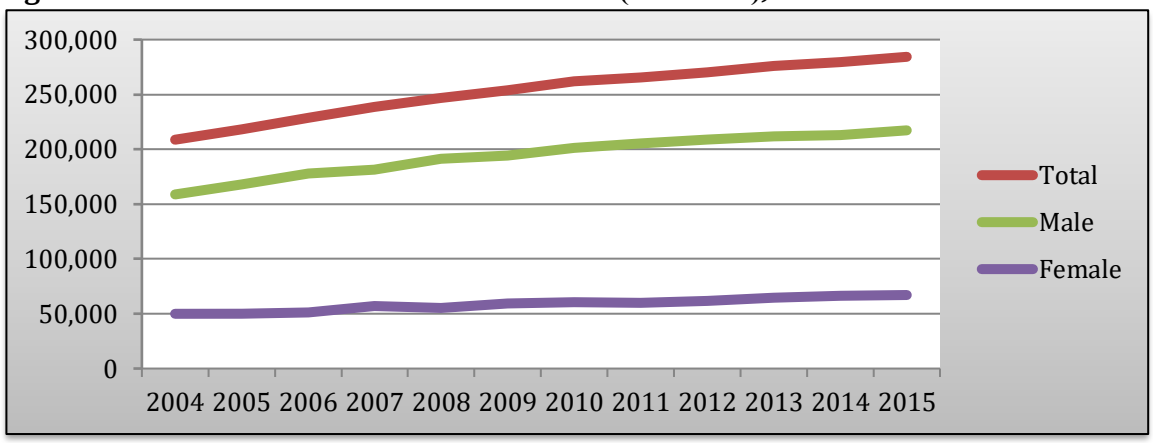
2.2 The Labour Force

CAPMAS, representing the main Egyptian governmental institution responsible for the major data collection efforts, identifies the labour force as, "All individuals which their ages range from 15 years old (the minimum age of employment according to the Egyptian labour law) to 65 years old (the retirement age) whether they are actually taking part by their physical or mental efforts in an activity related to the production of commodities and services" (Central Agency for Public Mobilisation and Statistics [CAPMAS], 2016a).

In 2015, Egypt's labour force was ranked the 20th biggest in the world (CIA, 2016). CAPMAS estimated the labour force at 28.4308 million in 2015, constituting 32.22% of

the population (CAPMAS, 2016a). Also, Egypt's labour force has increased annually by 2-3% between 2008 and 2014 (see table 2.1). This growth has owed more to the growth in the male labour force rather than the female labour force (see figure 2.1).

Figure 2.1: Total/Male/Female Labour Force (Unit: '00), 2004-2015 Estimates:



Source: based on data extracted from Egypt's Statistical Year Book (CAPMAS, 2016a)

Egypt's labour force in 2014 was 20.58% of MENA's labour force (WB, 2016b), highlighting the significant factor of production available to Egypt compared to other similar economies. Also, Egypt's labour force growth rates between 2008 and 2014 have mostly followed the same trends as the MENA region's averages, though were slightly lower (see table 2.1, columns 1 and 2). Conversely, Egypt's figures exceeded the more variable averages of 'lower middle income' countries (see table 2.1, columns 1 and 3).

Table 2.1: Labour Force Growth Rates (%) – Egypt vs. MENA and Lower Middle Income Countries, 2008-2014 Estimates:

Year	*(1)* Egypt	*(2)* MENA	*(3)* Lower Middle Income
2008	2.8	2.2	2.0
2009	2.5	3.0	2.1
2010	2.6	3.1	1.4
2011	2.5	2.8	1.6
2012	2.2	2.8	1.2
2013	1.9	2.7	1.3
2014	2.2	2.3	1.3

Source: WB (2016b)

2.2.1 Age Structure of the Labour Force

The Egyptian population is quite large and is continuously growing. Given the youthfulness of the population in 2016 (see table 2.2), it is not surprising that Egypt's high dependency ratio of 61.8% in 2016, owed largely to the youth dependency ratio of 52.6%

(CIA, 2016). The 2016 population statistics (see table 2.2, column 1) show that 31% of the population were in the 0-14 age group, and approximately 20% of the population were in the 15-24 age group, which are considered in their early stages in the labour market. Analysing a similar population composition at the beginning of the 2000s, Assaad (2007) argued that it had created a pressure on job creation, though this pressure had eased off as the youth bulge made its way into the labour market. Assaad and Krafft (2013b) see a return of this pattern in the 2012 ELMPS data. This emphasises the importance of addressing youth labour, since they represent a large proportion of the population, an important factor of production, and are likely to be dynamic and risk-taking.

Table 2.2: Total/Male/Female Population[7] and Sex Ratios[8] - by Age, 2016 Estimates:

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Age Group	**% Of Population**	**Total**	**Male**	**Female**	**Sex Ratio**
0-14	31.3	28,455	14,724.4	13,731.2	107.2
15-24	19.9	18,159	9,299	8,859.2	105
25-35	17.4	15,864	8,057.6	7,806.4	103.2
35-49	16.6	15,068	7,609.1	7,459.2	102
50-64	10.5	9,564	4,793	4,770.9	100.5
65+	4.3	3,913	1,930.9	1,982.1	97.4
Total	**100.00**	**91,023**	**46,414**	**44,609**	**104**

Source: Central Agency for Public Mobilisation and Statistics [CAPMAS] (2016b)

More specific to Egypt's labour force estimates of 2013 (WB, 2016b), data shows that almost half of the population above 15 years old participated in the labour market. Conversely, only 34.5% of the population between the ages of 15 and 24 had participated in the labour market.

2.2.2 Gender Differentials

In terms of gender differentials, the WB estimated that women were only 23.1% of the total labour force in 2016, which has been roughly consistent since early 2000s (WB, 2016b). Relative to similar economies, this figure is only marginally higher than MENA's average of 21.1% but significantly lower than the 'lower middle income' countries' average of 32% (WB, 2016b).

Gender distributions of the labour force further illustrate the significant difference between the male and female labour force participation rates (see table 2.3). Specifically, the

[7] Unit: '000.
[8] Sex ratio calculated as males per 100 females.

participation rate of the 15+ years old male labour force was almost three times that of females. Similarly, almost half of the male population between ages 15-24 participated in the labour market as opposed to only 18% of the female population in the same age group (for a discussion of these patterns, see Assaad, 2007; Assaad & Krafft, 2013b). In this context, Assaad (2007) had highlighted that the low level of female participation in the labour market was a by-product of the decline in the women's preferred public sector employment. More recently, Assaad and Krafft (2013b) had added that a massive decline in the labour force participation rates of youth females has contributed to the reported low overall levels of female labour force participation.

Table 2.3: Male/Female Labour Force Participation Rates – by Age, 2013 Estimates:

Category	Participation Rate (%)
Age 15-24:	
Male (% of Male Population Ages 15-24)	48.2
Female (% of Female Population Ages 15-24)	18.0
Age 15+:	
Male (% of Male Population Ages 15+)	73.4
Female (% of Female Population Ages 15+)	22.9

Source: WB (2016b)

2.2.3 Educational Distribution of the Labour Force

Finally, we find that the highest labour force participation rates are among the individuals who have finished their secondary education followed by tertiary education (see table 2.4), where we report that 38% of the male labour force had secondary education and 16% had tertiary education in 2013, while the equivalent figures for women were 36% and 29%. A much smaller percentage (less than 6%) of the labour force had finished only primary level education. This verifies the often-cited association of education with labour activities in Egypt (Assaad, 1997).

Table 2.4: Total/Male/Female Labour Force Participation Rates – by Education, 2013 Estimates:

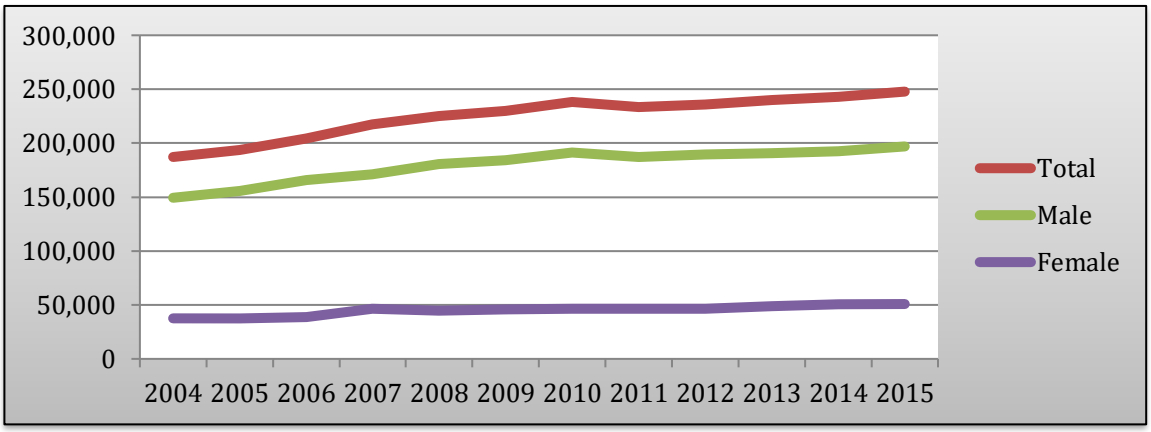
Category	Participation Rate (%)
Primary Education:	
Total (% of Total Labour Force)	4.9
Male (% of Male Labour)	5.8
Female (% of Female Labour)	2.1
Secondary Education:	
Total (% of Total Labour Force)	37.5
Male (% of Male Labour)	38.1
Female (% of Female Labour)	35.6
Tertiary Education:	
Total (% of Total Labour Force)	18.7
Male (% of Male Labour)	15.7
Female (% of Female Labour)	28.6

Source: WB (2016b)

2.3 Employment Levels

CAPMAS estimated that the majority of the labour force, approximately 25 million workers, was employed in 2015 (CAPMAS, 2016a). Employment levels (see figure 2.2) have experienced similar trends to that of the total labour force (see figure 2.1). Total employment was on the rise between the years 2004 and 2015, with a slight dip in 2011 (see figure 2.2).

Figure 2.2: Total/Male/Female Employed Labour (Unit: '00), 2004-2015 Estimates:



Source: based on data extracted from Egypt's Statistical Year Book (CAPMAS, 2016a)

2.3.1 Gender and Age Distributions

Similar to the gender differentials of the labour force, male labour employment levels, which surpassed that of females over the years, have been consistently increasing, except in 2011 (see figure 2.2). Conversely, female employment rose sharply in 2007 and has

grown hardly at all since then (see figure 2.2). The general drop in figures in 2011 may owe to the political instabilities during that year.

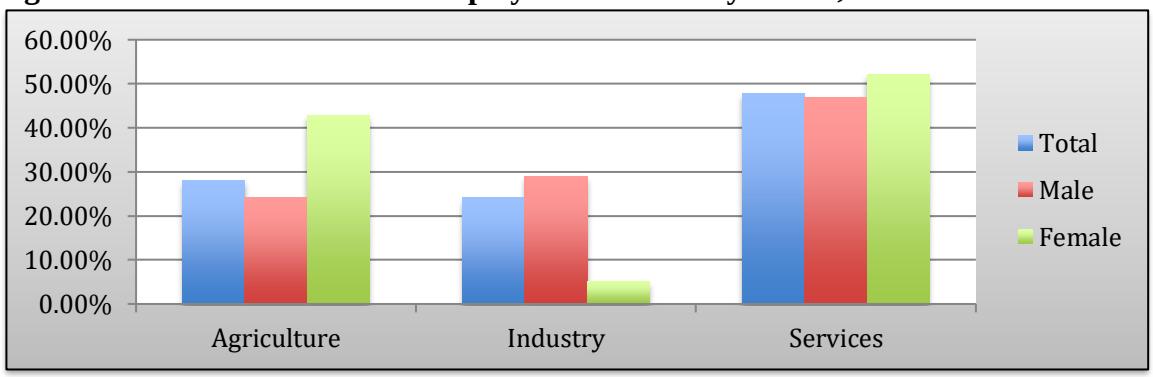
Employment to population ratios stratified by gender further illustrates the low employment levels of women compared to men, which may have resulted in the previously discussed low female participation rates in Egypt. The WB estimated that employed women (15+ years old) were only 17.4% of the female population in 2013 as opposed to the employed men's share of 66.2% of the male population in the same age bracket (WB, 2016b). Similarly, employed women (15-24 years old) were only 8.6% of the female population in 2013, while employed men in the same age bracket constituted 34.3% of the male population (WB, 2016b).

On a final note, the age distribution shows that employment levels are higher among the older individuals. While the total employed labour between 15 and 24 years old constituted 22.7% of the Egyptian population in 2013, this figure was estimated at 42.1% of the total population for individuals older than 15 years old (WB, 2016b).

2.3.2 Distribution of Employment: Sector-Level

In 2013, employment levels were highest in the services sector, whether in total or by gender (see figure 2.3). This distribution of employment with respect to the services sector matched the sectors' value added distribution (see figure 2.4), where the highest value-added was also contributed by the services sector.

Figure 2.3: Total/Male/Female Employed Labour[9] - by Sector, 2013 Estimates:

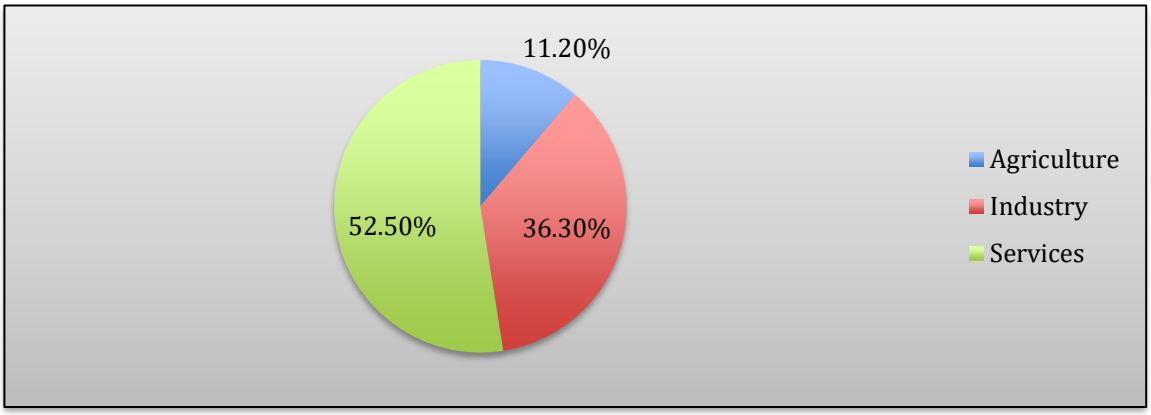


Source: based on data extracted from the World Bank's databank (WB, 2016b)

[9] Percentage of total/male/female employed labour.

Conversely, total employment in the agricultural sector exceeded that of the industrial sector (see figure 2.3), contradicting the structure of value-added contributions (see figure 2.4) and implying that labour productivity is lower in the agricultural sector than in the industrial one.

Figure 2.4: Sectors' Contributions to Value Added[10], 2015 Estimates:



Source: based on data extracted from the World Bank's databank (WB, 2016b)

2.3.3 Distribution of Employment: Industry-Level

CAPMAS's data allows us to have a more disaggregated view of employment in terms of industries and gender (see table 2.5). While the manufacturing, construction, and whole and retail sectors employ approximately 3 million workers each, mining and quarrying, real estate, insurance and financial, and information and telecommunication industries are all significantly smaller, employing less than 400,000 workers each. Note that the largest number of workers is employed in the agricultural/hunting/forestry/cutting trees category (see table 2.5, column 1), highlighting the importance of this sector in the Egyptian context.

In terms of gender differences, women constitute a much smaller proportion of employment in most industries (see table 2.5, column 3). The only exceptions are with respect to the health and social work as well as the education industries, in which women are 61% and 48% of the total labour employed, respectively. This is not surprising since these are traditionally seen as female intensive industries across the world.

[10] Percentage of GDP.

Table 2.5: Total Employed Labour and Gender Distribution - by Industry, 2015 Estimates:

Industry	*(1)* Total[11]	*(2)* Male % of Total	*(3)* Female % of Total
A: Agriculture, Hunting, Forestry & Cutting Trees	64,026	71.12	28.88
B: Mining & Quarrying	388	96.13	3.87
C: Manufactures	27,810	91.46	8.54
D: Electric, Gas, Steam, Air Condition Supplies	2,039	93.92	6.08
E: Water Support, Drain, Recycling	1,867	91.38	8.62
F: Construction & Building	30,049	99.33	0.67
G: Whole & Retail Sale Vehicles, Motorcycle Repair	29,355	84.92	15.08
H: Transportation & Storage	19,027	98.35	1.65
I: Food, Residence Services	6,476	96.22	3.78
J: Information, Telecommunications	2,063	81.39	18.61
K: Insurance & Financial Intermediation	1,596	76.13	23.87
L: Real Estate, Renting	379	91.82	8.18
M: Specialised Technical, Scientific Activities	4,085	82.96	17.04
N: Administrative Activities & Support Services	1,864	87.77	12.23
O: Public Administration, Defence, Social Solidarity	17,908	77.00	23.00
P: Education	22,164	51.72	48.28
Q: Health & Social Work	7,466	39.34	60.66
R: Amusement & Creation & Arts Activities	1,154	81.98	18.02
S: Other Services Activities	5,905	94.48	5.52
T: Services of Home Service for Private Households	2,137	58.07	41.93
U: International & Regional Agencies & Organisations	31	93.55	6.45

Source: CAPMAS (2016a)

2.4 Unemployment

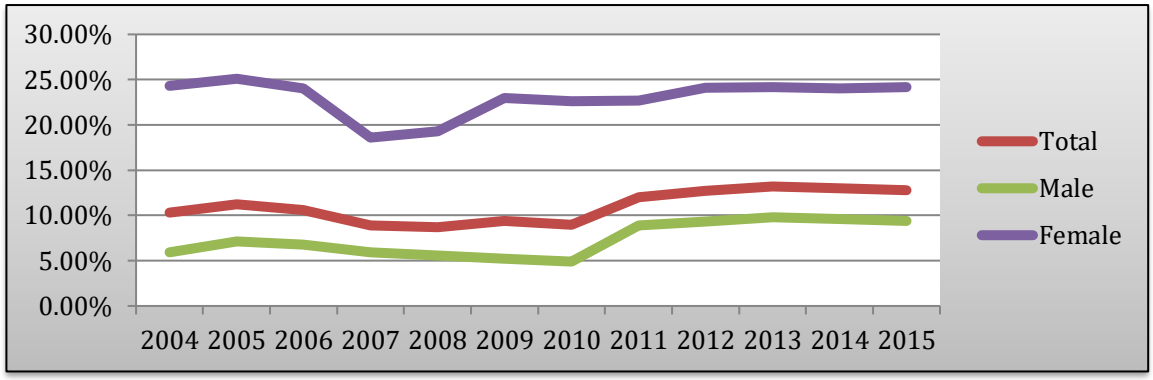
Unemployment has been a serious problem in the Egyptian labour market for a long period of time. Despite all the attention that numerous scholars and policy-makers have afforded this issue and the efforts expanded to deal with it over the years, high unemployment rates still persist in the Egyptian economy.

We can see in figure 2.5 that unemployment rates in Egypt have generally increased in the first half of the 2010s. Assaad and Krafft (2013b) had verified that this increase in unemployment levels is evident regardless of the definition of unemployment used. In terms of gender, male unemployment rates declined until 2010, after which they increased

[11] Unit: ’00.

to approximately 10%. Conversely, female unemployment rates remained above 10% except for four years, between 2006 and 2010, when they dipped slightly below 10%.

Figure 2.5: Total/Male/Female Unemployment Rates, 2004-2015 Estimates:



Source: based on data extracted from Egypt's Statistical Year Book (CAPMAS, 2016a)

On another note, the UN estimated Egypt's youth unemployment in 2014 at 34.3% of total youth labour force (UNDP, 2015). Thus, more than 1 in 3 in the 15-24 age group were unemployed, reflecting a significant waste of human capital in the Egyptian economy. Worse still, this figure is much higher than that of Arab and 'medium development' countries (see table 2.6). Still, Assaad and Krafft (2013b) mentioned that the slowing down of the growth of the youth population over the years had contributed to decreasing the pressure on the labour market as well as on youth labour supply and youth unemployment rates.

Table 2.6: Youth[12] Unemployment Rates – Egypt vs. Arab and Medium Development Countries, 2014 Estimates:

Country	Youth Unemployment (%)
Egypt	34.3
Arab Countries	29.0
'Medium Development' Countries	15.1

Source: UNDP (2015)

Relative to MENA and 'lower middle income countries' (see table 2.7), Egypt reported above-average unemployment rates in 2013. Moreover, Egypt's steadily-increasing unemployment rates after 2011 furthered the gap between Egypt's rates and other countries'.

[12] Age group 15-24 years old.

Table 2.7: Unemployment Rates (%)– Egypt vs. MENA and Lower Middle Income Countries, 2010-2013 Estimates:

Year	Egypt	MENA	Lower Middle Income
2010	9.0	10.9	5.8
2011	12.0	10.1	…….
2012	12.7	…….	4.9
2013	13.2	10.5	5.4

Source: WB (2016b)

Worse still, a significant proportion of Egypt's labour has experienced long-term unemployment[13]. In 2013, 88.5% of total unemployed labour experienced long-term unemployment, which is only a minor reduction from 2012's figure of 88.7% (WB, 2016b) and similar to figures reported before 2011. This is further exacerbating the status of the labour market and implies the hardships that unemployed workers may face.

2.4.1 Regional Unemployment

Inspecting unemployment in a more disaggregated form, we find that regional unemployment[14] rates, stratified by the Egyptian governorates, have experienced significant variation over the first half of the 2010s (see table 2.8). Expectedly, unemployment rates in most areas rose sharply in 2011 (see table 2.8, column 2), corresponding with the political upheaval of that year. Notable are the unemployment rates recorded between 2010 and 2015 in Port-Said and Suez, which are the highest amongst the governorates. This may be mirroring the effect of the political instabilities on the Suez Canal area. Also, two of the most populated regions, Cairo and Alexandria, recorded similar and relatively high unemployment rates over the period 2010-2015, with Alexandria's rates consistently exceeding Cairo's. Additionally, Aswan, which is an area highly dependent on tourism, has experienced an upsurge in its unemployment rates in 2015 (see table 2.8, column 6), surpassing all its previous unemployment rates. Besides the above, the gap between the Egyptian governorates' unemployment rates has narrowed between 2010 and 2015, which remained between 8.5-15.2% in 2015 (see table 2.8, column 6). Note that Assaad and Krafft (2013b) stated that regional unemployment could be explained by the urban/rural disparities, where unemployment decreased in urban areas and increased in rural ones.

[13] Long-term unemployment constitutes labour with continuous periods of unemployment that last for a year or longer (WB, 2016b).

[14] We exclude from our review any governorates that are not present in the ELMPS sample, including Red Sea, El Wadi El Gidid, Matrouh, North Sinai, and South Sinai.

Table 2.8: Regional Unemployment Rates (%) - by Governorate, 2010-2015 Estimates:

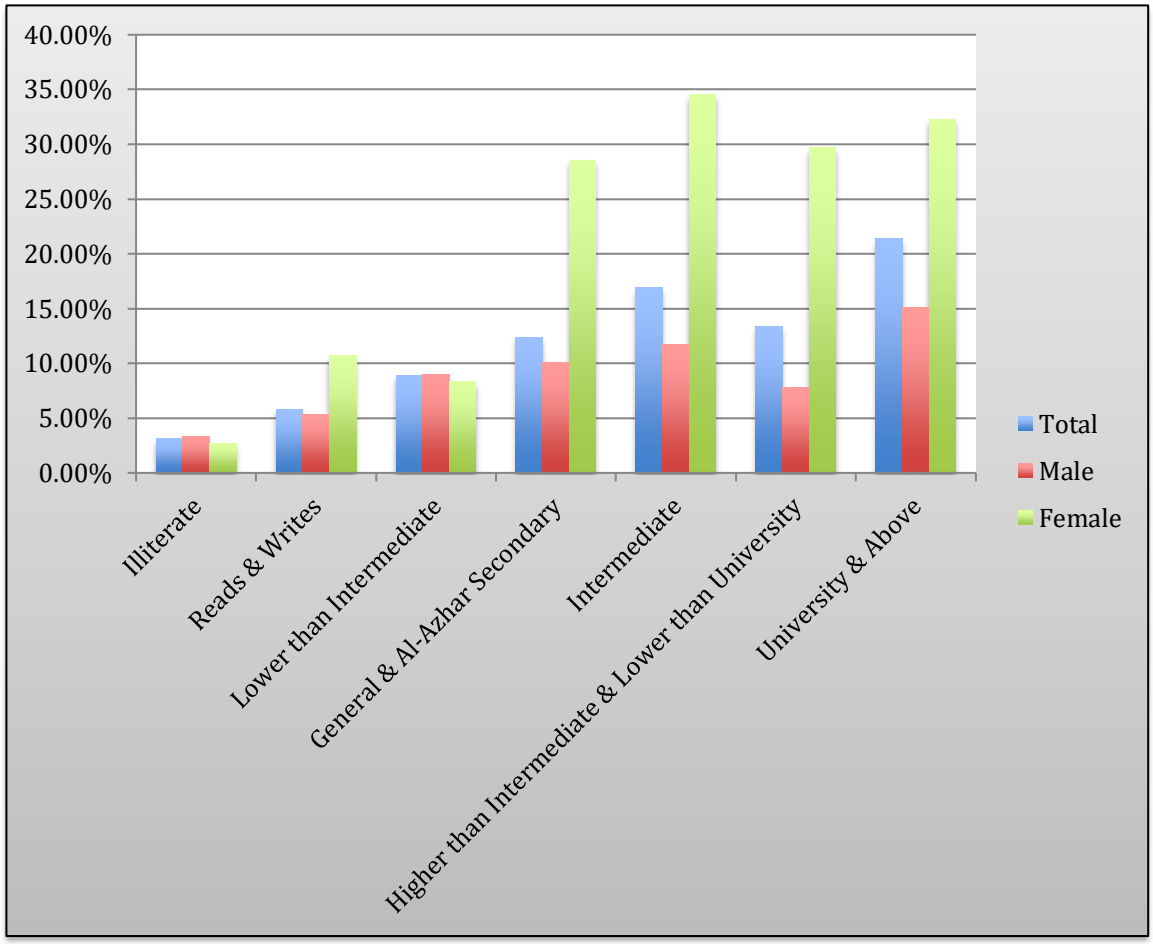
Governorate	*(1)* 2010	*(2)* 2011	*(3)* 2012	*(4)* 2013	*(5)* 2014	*(6)* 2015
Cairo	12.7	17.0	17.3	17.7	16.0	14.6
Alexandria	12.1	19.7	17.3	18.9	18.4	16.1
Port-Said	25.9	26.7	26.5	23.3	25.9	24.2
Suez	10.7	14.2	16.5	24.0	17.7	22.5
Damietta	7.5	16.9	11.8	12.9	10.6	14.9
Dakahlia	9.4	12.9	14.1	12.7	11.8	13.3
Sharkia	9.0	10.2	14.0	13.7	13.8	15.2
Kalyoubia	7.5	11.0	12.7	14.1	13.7	13.2
Kafr El-Sheikh	7.0	14.9	13.6	12.4	11.7	12.2
Gharbia	13.0	16.7	16.3	15.1	15.5	14.7
Menoufia	4.1	8.4	7.7	9.1	11.1	10.0
Behera	6.0	6.4	7.4	8.4	8.2	9.7
Ismailia	10.5	11.7	14.6	13.9	13.1	13.7
Giza	13.6	12.3	12.3	13.0	12.7	13.1
Beni-Suef	4.3	3.9	5.6	7.7	10.9	9.1
Fayoum	6.9	11.3	11.6	9.5	12.2	10.9
Menia	4.2	6.9	8.9	11.2	12.5	9.2
Asyout	9.5	10.6	11.4	13.6	12.8	12.5
Suhag	7.7	10.3	11.3	13.7	13.1	11.1
Qena	9.7	8.7	10.9	10.0	9.3	11.7
Aswan	15.9	17.7	16.1	15.9	15.3	18.9
Luxor	10.1	11.8	12.8	13.7	12.5	8.5

Source: CAPMAS (2016a)

2.4.2 Educational Unemployment

Educational unemployment rates, which are stratified according to the individuals' highest level of educational attainment, are a significant issue in the Egyptian context. This is due to the often-raised argument that Egyptians with higher educational attainment experience higher unemployment levels (Assaad, 1997). This is confirmed by inspecting unemployment levels across the different educational degrees (see figure 2.6), where we find that the highest unemployment rates for men are experienced at the 'university and above' level, while the highest unemployment rates for women are experienced at the 'intermediate' educational level. This implies that men with a university degree or higher or women with an intermediate degree find it more difficult to find employment than their counterparts with other degrees. Still, the rate of female unemployment among the 'university and above' level is quite high (see figure 2.6). Assaad and Krafft (2013b) verified Egypt's high educational unemployment rates in 2012 by stating that three quarters of unemployed men and 90% of unemployed women were educated.

Figure 2.6: Total/Male/Female Unemployment Rates – by Education, 2015 Estimates:



Source: based on data extracted from Egypt's Statistical Year Book (CAPMAS, 2016a)

2.5 Wages

Since wages represent the main and common theme across the analyses in this thesis, waged workers represent the main sample of interest, and these represent a significant proportion of the employed labour in Egypt. The WB estimated that 62.5% of Egypt's employed labour in 2015 was waged and salaried workers (WB, 2016b). In terms of gender differentials, 65.3% of total men employed were waged and salaried workers as opposed to 51.6% of total women employed in 2015 (WB, 2016b).

We begin this section by illustrating the average weekly wage figures for men and women in the public and private sectors (see section 2.5.1), which we link to findings of Egypt's wage determination literature. Thereafter, we review Egypt's 'Employment Guarantee Scheme' and its significant impact on the Egyptian labour market (see section 2.5.2).

2.5.1 Wages in the Public and Private Sectors

Table 2.9 demonstrates the male and female average weekly wages in the public and private sectors, which only account for the basic monetary wage and excludes any additional benefits or payments.

Table 2.9: Public and Private Sectors' Average Weekly Wages - by Gender, 2009-2015 Estimates:

Year	*(1)* Public Sector Wages (in EGP) Male	*(2)* Public Sector Wages (in EGP) Female	*(3)* Private Sector Wages (in EGP) Male	*(4)* Private Sector Wages (in EGP) Female
2009	449	500	309	241
2010	530	630	314	242
2011	649	715	420	289
2012	834	927	407	336
2013	951	1,065	456	364
2014	1,008	1,161	529	419
2015	1,042	1,220	510	615

Source: CAPMAS (2016a)

Average weekly wages have been increasing in both sectors since 2009. In the public sector, men's wages increased from 449 EGP in 2009 to 1,042 EGP in 2015, while women's wages rose from 500 EGP to 1,220 EGP over the same period (see table 2.9, columns 1 and 2). Men's private sector wages rose much slower from 309 EGP to 510 EGP for men, while women's wages rose from 241 EGP to 615 EGP (see table 2.9, columns 3 and 4). Thus, a large and increasing gap remains between the sectors' wages.

This gap has widened further for men due to a higher growth rate in their public sector's wages. While men's public sector wages grew by 132.07% over that period, the equivalent growth in the private sector wages was only 65.05%. Conversely, women's wages experienced a flatter growth trend in the public sector relative to the private one, where women's public sector wages grew by only 144% compared to a 155.2% growth in the private sector. Note that women's wages experienced higher rates of growth compared to men in both sectors, implying an improvement in Egyptian women's private sector wages.

El-Ghamrawy and Amer (2011) claimed that it is conceptually puzzling and contradicting to theory that Egypt's public sector, which had historically played more of a social rather than an economic role, to offer higher wages than the private sector (see table 2.9), which is likely to seek high-productivity, highly-educated, and highly-skilled individuals. Still, the authors have stated that there are plenty of differences between the Egyptian worker's

education, occupations, and economic activities in the public and private sectors, which may induce these wage differentials. Another plausible explanation for the higher public sector wages may relate to the usual superiority of public sector employment in the context of developing nations, where only the very dynamic private sector firms might offer higher wages than the private sector, which average figures cannot clarify. Furthermore, the private sector is dominated by informality, and hence more likely to offer lower wages.

Egypt's wage determination literature has also confirmed this public sector pay premium. For instance, Said (2007) argued that the public-private sector wage differentials were higher in 2006 than in 1998, and Assaad (1997) explained that public-private sector wage gaps were due to differences in workers' educational levels in each sector. Conversely, El-Ghamrawy and Amer (2011) have challenged this explanation and argued that the high public sector wages are set as so for political and social considerations. Salehi-Isfahani et al. (2009) provided a similar explanation based on labour market rigidities and their effect on increasing the value and rewards of education.

Note that while there is a consensus towards the public sector pay premium, which the literature[15] as well as the statistical data (see table 2.9) shows, wages still represent a significant problematic issue in the public sector. In particular, Abdelhamid and El Baradei (2010), who had addressed the reformulation of the government's pay system, summarised that the main problems with this system include the low wage levels, the impact of these low levels on motivation and the government's ability of attracting strong calibres with significant skillsets, the vagueness of the allowances system, and the huge financial burdens placed on the government. Accordingly, even Egypt's public sector's higher wages are considered quite low.

On a final note with regards to gender wage differentials in each sector, Said (2015) found that gender wage-differentials in the public sector had been almost eliminated as of 2012, whereas the private sector's wage gap of 40% is quite significant. Furthermore, the author claimed that women's labour conditions in the private sector are worsening and their wages are higher in the public sector. While we still find that women's wages in the public sector exceed those in the private sector (see table 2.9), we have to re-state that women's private sector wages are experiencing a higher rate of growth.

[15] Even El-Ghamrawy and Amer (2011), who argued that the public sector pay premium is characteristic-specific, still did not completely dismiss the idea of a public sector premium.

2.5.2 The 'Employment Guarantee Scheme' in Egypt

In order to better comprehend wage determination in Egypt, which represents the central issue of this thesis, it is worthwhile to discuss the Egyptian government's 'Employment Guarantee Scheme', which coincided with massive nationalisation efforts around the country in the 1960s and has had a drastic impact on Egypt's labour market. Despite decades elapsing since the implementation and abolition of this scheme, its influence on Egypt's labour market is still apparent. In what follows, we discuss the major elements of this scheme and its impact on Egypt's labour market.

2.5.2.1 A Historical Perspective:

In the 1960s, the Egyptian government instituted the 'Employment Guarantee Scheme' with the main purpose of guaranteeing employment for university graduates and later for vocational secondary school and technical institute graduates as well. This scheme was mainly administered by the Ministry of Manpower and Vocational Training, whose responsibility covered receiving the applications from the graduates as well as the governmental institutions' and public enterprises' requests for graduates. This represented a highly centralised system of hiring, which prohibited the involved institutions and agencies from hiring any labour on a permanent basis from outside this system.

Still, this system had problems. Assaad (1997) highlighted that despite each appointee coming with a budgetary allocation, and hence the lack of incentive for the involved institutions to limit their requests for graduates, the graduate applications still exceeded the requests for graduates received. Furthermore, the public enterprises defied the system by hiring labour on a temporary basis until they were allowed to hire labour from outside this system in 1978. This added to the pressures on the governmental institutions of absorbing and hiring the excess supply of labour (Assaad, 1997).

2.5.2.2 Impact on the Labour Market:

The 'Employment Guarantee Scheme' had far-reaching effects on the labour market and the economy in Egypt. First, the demand for education at all levels had significantly increased, which was matched with increasing accessibility to education through the lowering or abolishment of fees altogether, resulting in an excess supply of highly educated labour, since this category of labour was the one guaranteed public sector employment. Assaad (1997) explained that when the scheme was applied, eligible graduates comprised a small proportion of the labour force, but between 1963 and 1983,

the number of eligible graduates grew by 12% a year as opposed to a 2% growth of the whole labour force. This implies the massive burden placed on the government by the higher demand for public sector employment and its obligation to accommodate the individuals covered by the 'Employment Guarantee Scheme'.

Consequently, public sector employment had significantly increased. Assaad (1997) explained that white-collars and women dominated this increased employment. This was particularly due to the higher likelihood of these individuals remaining longer in the queue for public sector jobs. Thus, the private sector's share of this kind of employment had declined (Assaad, 1997). Alongside the increasing public sector employment, unemployment rates also rose sharply, which could owe to the increasing number of graduates queuing for public sector jobs, as they were counted towards the unemployed proportion of the labour force. Worse still, the queuing graduates would not give up their places in the queue even if they landed a private sector job, and when the government established a system of dropping individuals who attain formal private employment, there was an incident of mass resignations (Assaad, 1997). This could have contributed further to alleviating the recorded unemployment levels (see section 2.4). Expectedly, graduates experienced the highest unemployment rates, and Assaad (1997) explained that this situation was exacerbated further as a result of the government's reduction of graduates' hiring. This trend is, in fact, still evident until present day, where unemployment rates are highest among those with higher educational attainment (see figure 2.6).

With ever-increasing pressure on the government, real public sector wages were reduced to make public sector jobs less attractive. Still, the dominance of the public sector in the labour market implied that its wage-setting policies, which were historically determined according to non-market characteristics, especially education (Assaad, 1997), and the 'Employment Guarantee Scheme' influenced wages in the private sector. In particular, there were two main effects (Assaad, 1997). First, a wage floor for the private sector was set for those who were covered by the 'Employment Guarantee Scheme', since these individuals had an expected public sector wage that usually exceeded private sector wages. Second, the excess supply of graduates pushed down the market-clearing private sector wage for these individuals. Accordingly, we expect that private sector wage levels, although to some extent determined according to market-factors, to still be influenced by the public sector ones.

2.6 Economic Reforms

Numerous economic reforms were applied in Egypt over the years, which impacted the functioning and efficiency of its labour market. In the beginning of the 1990s, Egypt's government implemented the Economic Reform and Structural Adjustment Programme (ERSAP) and followed this by a continuation set of reforms in 2004. Generally, the two sets of reforms addressed investment, trade, privatisation, and price liberalisation, which were expected to enhance the economic environment, the labour market, and the population's well-being. Among some of the consequences of these policies were the decreased inflation rates, removal of subsidies, privatisation of many low-performing state-run businesses and banks, as well as joining the World Trade Organisation and tariff reductions (Sesay & Hove, 1999; Alissa, 2007). Still, Fawzy (2002) explained that the reforms' purpose of strengthening the role of the private sector to take over some of the government's role in the economy had fallen short, and the private sector's involvement in solving problems of low investments and low employment levels remained limited.

Another significant effort by the government was the passing of the Unified Labour Law (No.12) of 2003. The objective of this law, which came into action after the government's abandonment of its 'Employment Guarantee scheme', was to improve employer-employee relations, and as El-Megharbel (2007) mentioned, to encourage the private sector to fill the gap in job opportunities. The law addressed social security, minimum wages, working hours, overtime pay, the hiring and firing process, and the right to strike. The idea was to balance the rights and benefits of each party involved in order to improve the labour market's functioning and outcomes. In fact, Wahba and Assaad (2015), who addressed the effect of this law on the prevalence of formal job contracts, concluded that the flexibility of hiring and firing introduced by this law had indeed promoted formal employment in Egypt.

Most recently, the Egyptian government has devised and began the implementation of another reform plan to attract international investments to enhance Egypt's economic growth. The three main pillars to this plan include growth policies, financial consolidation, and improvement of the well-being and human capital of the population (Salsecci et al., 2015). Of most relevance to this thesis is the third pillar, for which the government is addressing issues of illiteracy, the lack of healthcare services and institutions, improving social security coverage, as well as developing slum areas and low- and middle-income housing units (Salsecci et al., 2015). Wages were also addressed, and monthly wages were set at a minimum of 1,200 EGP and capped at a maximum of 42,000 EGP.

2.7 Concluding Remarks

To sum up, the Egyptian economy has faced numerous challenges that hindered its processes of development and economic growth, which has persisted for a long period of time and worsened with the significant period of instability post-2011. Despite the image of increased stability, the economic measures have not yet reflected the intended improvements.

More specific to this research, numerous problematic issues characterise the Egyptian labour market, including high unemployment and low female participation rates, wages, and productivity. There is also a large degree of informality, whose discussion is retained to chapter IV, since it represents one of the main issues we address in this thesis. Researchers have recently come to emphasise the particular importance of dealing with Egypt's low wages and labour productivity, identifying these as solutions to the more conventional problems that have existed for long periods of time. Moreover, Egyptian women in particular suffer from a much more disadvantaged status in the labour market, which was illustrated by the gender differentials with respect to labour force participation, employment, and unemployment. This requires policy-makers to devise policies that are particularly helpful in improving women's labour market conditions and outcomes.

On a final note, economic reforms implemented in Egypt over time have consistently kept the labour market in the centre of attention, yet the policies applied have not fulfilled their purpose. Thus, it is not sufficient to draft and implement policies and regulations, but the government is also required to put in place effective monitoring and follow-through systems and techniques to ensure that the policies are succeeding in their intended purposes and updated according to needs. In addition, a key aspect of these reforms should be to better reflect the structure of the economy and account for the particular economic, political, and societal contexts of Egypt.

Accordingly, empirical research should allow us to better understand the Egyptian economy and the labour market forces in play that affect outcomes. This should also aid in drafting more specific and effective plans and policies to ensure the achievement of goals outlined in reform plans.

Chapter III
Dataset, Sample, and Descriptive Statistics

3.1 Introduction

In this thesis, we use data from the 2012 round of the Egypt Labour Market Panel Survey (ELMPS), which we will discuss in this chapter. The ELMPS, which is nationally representative, provides us with various variables that we utilise in our analyses. This chapter begins by presenting the ELMPS's rounds, samples, and scope of variables along with any other data sources we utilise in section **(3.2)**. This is followed by section **(3.3)**, which illustrates the specific sample of interest, section **(3.4)**, which provides a statistical review of the main variables of interest, and the chapter's conclusion in section **(3.5)**.

3.2 Dataset: The Egypt Labour Market Panel Survey (ELMPS)

The Egypt Labour Market Panel Survey (ELMPS), our main source of data, is administered and maintained by the Economic Research Forum (ERF) in cooperation with the Central Agency for Public Mobilisation and Statistics (CAPMAS). This survey comprises three waves, namely 1998, 2006, and 2012, and provides labour data on numerous aspects, such as education, employment, unemployment, and earnings.

This dataset provides the first and most recent individual-level data for a nationally representative sample of the Egyptian labour market (Assaad & Krafft, 2013a). Also, along with the survey's expansion of observations over the different rounds (see table 3.1), the same individuals were followed and re-interviewed over time. The 1998 round began with a sample of 4,816 households, which was expanded in the 2006 round to include 3,685 households from the original sample, 2,168 splits from the original households, and a refresher sample of 2,498 households. This sample further expanded in 2012 to include all observations in the 1998 and 2006 rounds, the split households that emerged, and a refresher sample of 2,000 households, making this round the largest to date.

Table 3.1: ELMPS Samples' Sizes - by Round:

	Round 1998	Round 2006	Round 2012
Households	4,816	8,351	12,060
Individuals	23,997	37,140	49,186

Source: based on data extracted from the ELMPS (Economic Research Forum [ERF] & Central Agency for Public Mobilisation and Statistics [CAPMAS], 2013)

In terms of data collection, the questionnaires used to collect data in each round are very similar (Assaad & Krafft, 2013a). Still, our main variables of interest in chapters V and VI, health and job satisfaction, respectively, appear only in the 2012 round. Therefore, our analyses in these two chapters are confined to this round of data. To facilitate comparisons across the chapters, we also confine ourselves to the 2012 round in chapter IV.

In order to determine the representativeness of the ELMPS sample, Assaad and Krafft (2013a) have compared the ELMPS to other sources of data, including the 1996 and 2006 population censuses as well as the 2010 and 2011 labour force surveys (LFS). The authors mainly focused on demographic and labour market characteristics and found various similarities between the samples across the different surveys. Theses similarities are especially beneficial for our analyses, since in addition to the ELMPS, we extract data from the 'labour' section of CAPMAS's Statistical Year Book, whose sample is based on the censuses and LFS of various years. In particular, we extract sector- and industry-level information from the Statistical Year Book to use as instruments in our analyses. This includes data on unemployment stratified by educational attainment and the private sector's average weekly wages stratified by gender and industry. All these classifications are also evident and similar to those in the ELMPS, allowing us to supplement the individual-level ELMPS data with sector aggregates for some of the analyses. Still, it should be noted that while both sources use the same international definition of unemployment, there are some divergences between the unemployment rates reported in the Statistical Year Book and those in the ELMPS, which are traced to differences between the data collection methods of each survey (Assaad & Krafft, 2013a).

3.3 Sample

As previously mentioned, we are particularly interested in the ELMPS2012 sample. The sample of interest is that of working age, which is 15 to 65 years old, based on the definition provided by CAPMAS of the legal and official working age (CAPMAS, 2016a). Accordingly, individuals under 15 and over 65 years old were dropped, as they are not counted towards the official Egyptian labour force. After applying this restriction, the sample drops to 30,399 individuals. Using the standard market definition to identify the labour force, we find that only 29,834 observations have successfully provided information about their labour force status (see table 3.2).

Table 3.2: Labour Force Status – Total/Male/Female Sample Distribution:

Labour Force Status	Males	Females	Total
Employed	11,456	2,691	14,147
Unemployed	423	859	1,282
Out of the Labour Force	2,807	11,598	14,405
Total	**14,686**	**15,148**	**29,834**

Source: based on data extracted from the ELMPS2012 (ERF & CAPMAS, 2013)

The similarities between the Statistical Year Book's data and that of the ELMPS explained by Assaad and Krafft (2013a) are further confirmed by the labour force sample distribution of the ELMPS. Specifically, the much lower female participation rate (see figure 2.1) and the much higher female unemployment compared to males (see figure 2.5) are both reflected in our ELMPS sample (see table 3.2).

Looking at the employed sample, we find that only 14,147 individuals successfully provided information regarding their employment status at the time of data collection. Table 3.3 shows the distribution of the employed observations.

Table 3.3: Employment Status - Sample Distribution:

Employment Status	Frequency	Percentage	Cumulative
Waged Workers	10,185	71.99	71.99
Employers	1,507	10.65	82.65
Self-Employed not Employing Others	1,381	9.76	92.41
Unpaid Family Workers	1,013	7.16	99.57
Unpaid Workers for Others	61	0.43	100.00
Total	**14,147**	**100.00**	

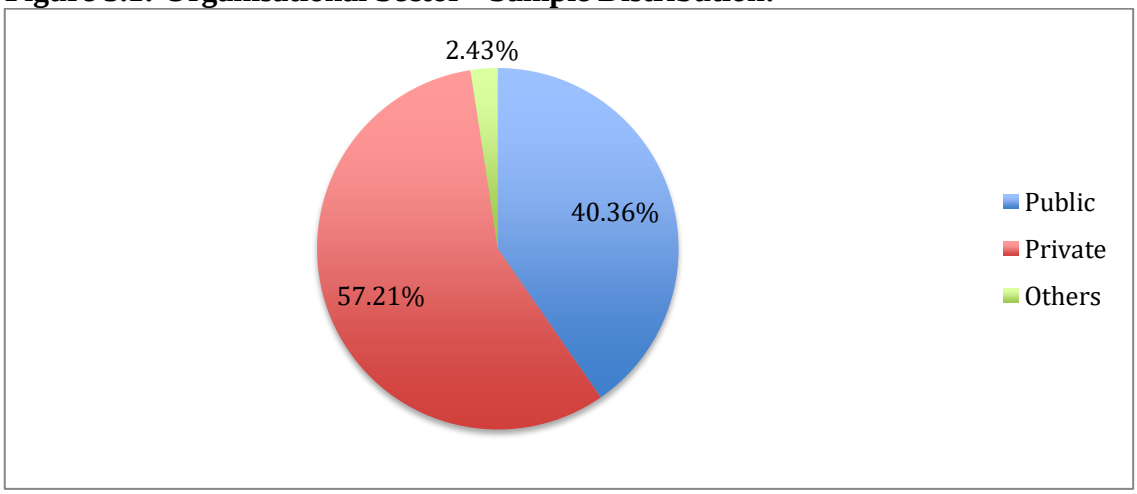
Source: based on data extracted from the ELMPS2012 (ERF & CAPMAS, 2013)

Since we are mainly concerned with wages in this thesis, we focus on the waged workers, which represents 72% of the whole employed sample (see table 3.3), and we drop the employers, self-employed not employing others, unpaid family workers, and unpaid workers for others from our sample, since they do not provide information concerning wages. This leaves a sample of 10,181 waged workers who have provided information regarding their wages.

As noted in chapter II, there are significant differences in the wage-setting behaviour of the public and private sectors (see section 2.5). Therefore, we concentrate specifically on private sector workers, whose wages are set in the market. We will consider the sample's public-private sectors differences in a little more detail below.

The ELMPS includes workers in six sectors, governmental, public, private, investment, international, and others. We modify this distribution into three subsamples (see figure 3.1). One subsample combines the governmental and public sectors, which we refer to as 'public', another subsample comprises the private sector workers, and the final subsample, which we refer to as 'others', is a miscellaneous category, which includes the investment, international, and other sectors. The majority of the ELMPS sample, comprising 57.21%, is employed in the private sector, with 40.36% employed in the public sector (see figure 3.1). Thus, while our sample includes the majority of the workers, by excluding the public sector, we are leaving out two-fifths of the sample. Still, with the wage-setting rules and norms being so different in the two sectors, it was not possible to include them both in the same analysis.

Figure 3.1: Organisational Sector - Sample Distribution:



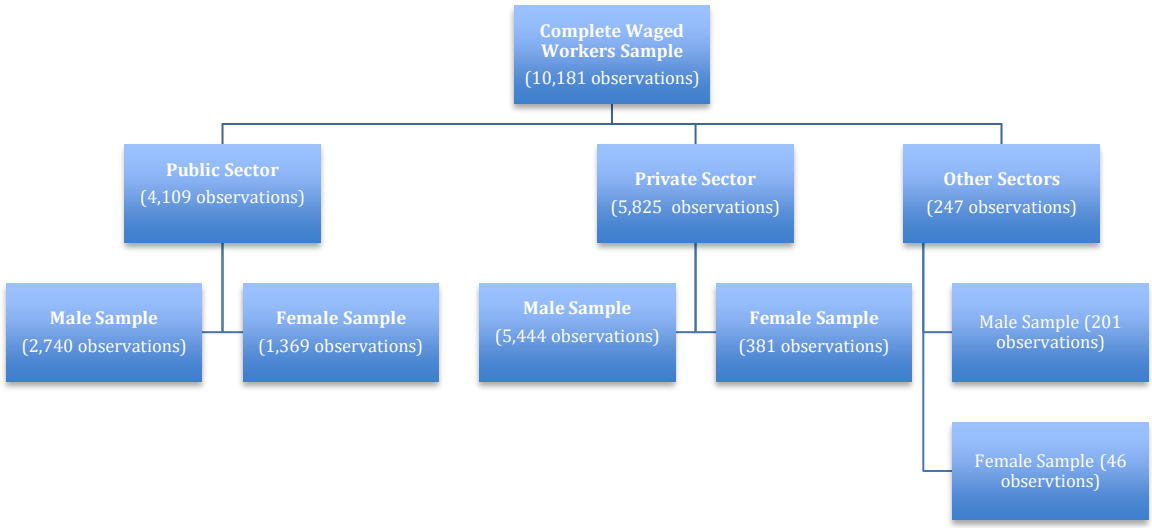
Source: based on data extracted from the ELMPS2012 (ERF & CAPMAS, 2013)

Additionally, following on from chapter II, where we indicated that female labour force participation was low in Egypt, we find that women form a very small proportion of our sample too. Again, in order to keep the analysis simple and because the female sample is so small that many of our models would not converge, we restricted ourselves to the complete sample (including both males and females) and the male sample separately. Thus, we model the male sample utilising the same model as the complete sample to promote consistency and provide comparable results.

While men and women are equally represented in the ELMPS sample and sample distributions are similar to other sources of data (Assaad & Krafft, 2013a), men represent 82.36% of the employed waged workers sample. Furthermore, men represent the majority of the private sector workers (5,444 men as opposed to 381 women), while the majority of

the employed women are in the public sector (see figure 3.2), which is characterised by more stable and secure jobs. This is not surprising, given women's preference for public sector employment (see section 2.5.2.2). Furthermore, the lower female labour force participation rates (see tables 2.3; 3.2) and the higher female unemployment rates (see figure 2.5; table 3.2) are likely to affect the employed female sample size as a result of the difficulty Egyptian women face in finding jobs.

Figure 3.2: Sample Size – by Gender and Organisational Sector:



Source: based on data extracted from the ELMPS2012 (ERF & CAPMAS, 2013)

3.4 Descriptive Statistics

This section presents some statistical data for our four main variables of interest, wages, sector of employment, health, and job satisfaction, in addition to some labour characteristics, which are commonly utilised in wage and job satisfaction studies. All our following statistics focus on our main sample of interest of the private sector workers.

3.4.1 Wages

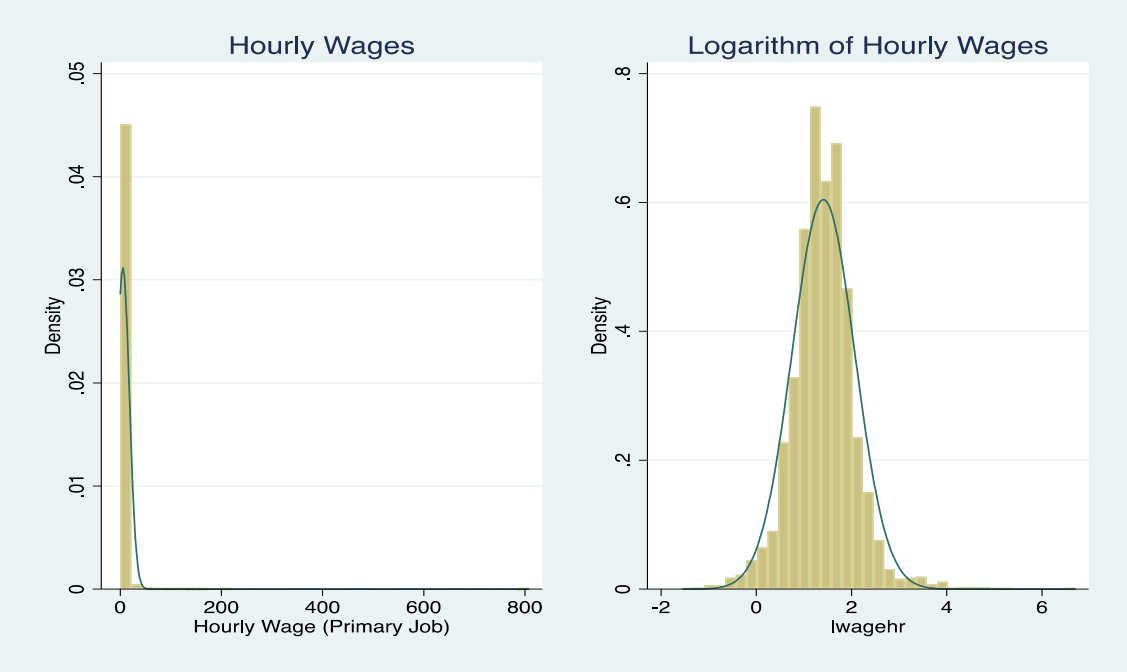
Wages represent the primary variable of interest in this thesis. Therefore, we begin by inspecting the nature and structure of wages[16] in the sample in study. To begin with, we

[16] Although the ELMPS provides hourly wage figures, it is specified that these measures are derived values, which are computed by dividing total monthly wages for the previous three months on the usual number of hours spent on market work over the same period (ERF & CAPMAS, 2013).

find that average hourly wages of the public sector (7.38 EGP) are higher than the private sector's average (5.46 EGP) in our sample. This matches our previous review of average weekly wages, which showed that average weekly wages are higher in the public sector than the private sector (see table 2.9). Having said this, the maximum wages observed for the public sector are 230.77 EGP as opposed to 807.69 EGP for the private sector sample, showing that private sector workers may potentially reach higher wage levels.

In wage studies, the logarithm of hourly wages is the preferred measure to use, in order to minimise the impact of wage outliers on the results. By inspecting the private sector sample's distribution, we find that the logarithm of hourly wages is more normally distributed compared to hourly wages (see figure 3.3). Furthermore, we find that the majority of the sample reported the lower end of the hourly wage range.

Figure 3.3: Hourly Wages vs. Logarithm of Hourly Wages – Private Sector Sample Distribution:



Source: based on data extracted from the ELMPS2012 (ERF & CAPMAS, 2013)

3.4.2 Sector of Employment

In the ELMPS, the individuals' sector of employment is determined according to the answers they provide to two questions, whether they hold a formal job contract and whether they contribute to social security. If individuals answer yes to either question, then they are identified as formal sector employees. Thus, there are three possible definitions for formality, and according to all definitions, the majority of the private sector workers are informally employed (see table 3.4). This distribution follows El-Ghamrawy and

Amer's (2011) claims about the private sector's significantly large share in informal employment. This may be one reason why the public sector wages are higher than the public sector wages (see section 3.4.1), as public sector employees are largely formal and the private sector is mostly informal.

Table 3.4: Sector of Employment (Different Definitions) – Private Sector Sample Distribution:

	Formal Contract	Social Security	Formal Contract &/or Social Security
Formal	878	1,061	1,241
Informal	4,947	4,764	4,584
Total	**5,825**	**5,825**	**5,825**

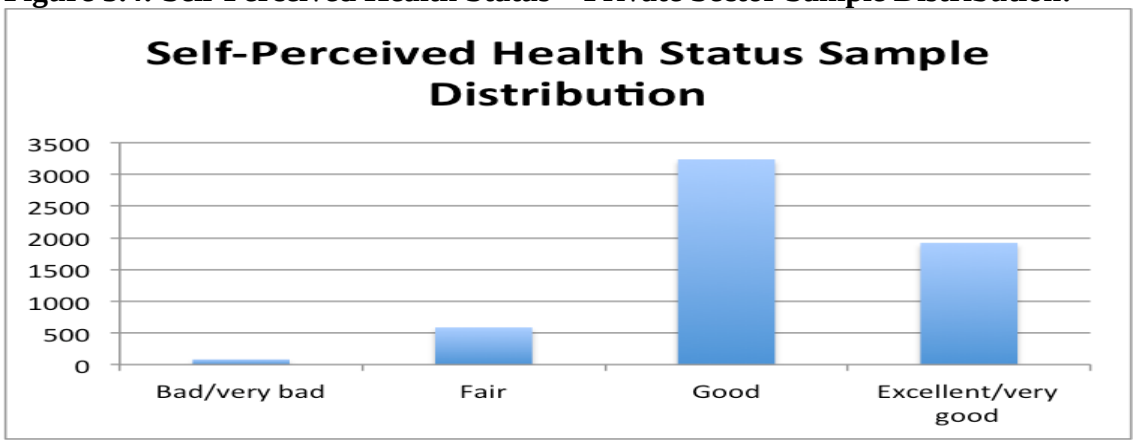
Source: based on data extracted from the ELMPS2012 (ERF & CAPMAS, 2013)

In terms of wages, the formal sector's average hourly wages are higher than those of the informal sector according to all definitions of formality. When classified according to whether workers have a formal job contract, contribute to the social security system, or both, which is the definition we use to identify formal employment in this thesis, the average hourly wages in the private formal sector are 7.63 EGP as opposed to 4.88 EGP for the private informal sector sample.

3.4.3 Health

Another important factor in this thesis is health. Information on health is only provided in the 2012 round of the survey based on a number of questions. Individuals are asked about their general state of health, using a scale of 1-5 to rank it, with '1' representing 'excellent/very good health' and '5' representing 'very bad health'. We will refer to this measure as 'self-perceived health' in this thesis. Note that we modify the scale ranking by combining 'bad' and 'very bad' health states in a single category, since we find that the number of individuals in both categories is relatively small and these individuals are likely to be suffering from serious and similar health issues. Thus, we end up with a 4-point scale only (see figure 3.4), and we reverse the ranking, where '1' refers to 'very bad/bad' health and '4' refers to 'excellent/very good' health. According to the statistics (see figure 3.4), the majority of the private sector sample has reported 'good' health ranked '3'.

Figure 3.4: Self-Perceived Health Status – Private Sector Sample Distribution:



Source: based on data extracted from the ELMPS2012 (ERF & CAPMAS, 2013)

In addition, respondents are asked whether health issues have limited their activities, whether they suffer from any longstanding or chronic illnesses, or have any mental or physical disabilities. Since we use health to proxy for productivity in chapter V, it is general health that is of interest and not a particular case, hence our use of the self-perceived health measure.

Generally, measures represented by scale rankings are met with scepticism in the literature, since they are regarded as subjective and likely to suffer from measurement error due to differences in respondents' understanding of the scale. One way to evaluate the accuracy of this measure is to inspect correlations between it and actual health measures (see table 3.5). We find a significant correlation between the variables, with a higher correlation between self-perceived health and longstanding/chronic diseases compared to limitations in daily activities due to health issues or disabilities (see table 3.5). It should be noted that disabled individuals are likely to compare themselves to others with disabilities as well. Thus, while they may perceive their health to be worse in general, their perception of their specific level of health may be better compared to others with worse disabilities.

Table 3.5: Self-Perceived Health vs. Actual Health Variables - Correlation Coefficients:

	Limited in Daily Activities due to Health	Longstanding Illness/Chronic Diseases	Disability
Self-Perceived Health	-0.358*	-0.433*	-0.133*

** $p<0.05$*

Source: based on data extracted from the ELMPS2012 (ERF & CAPMAS, 2013)

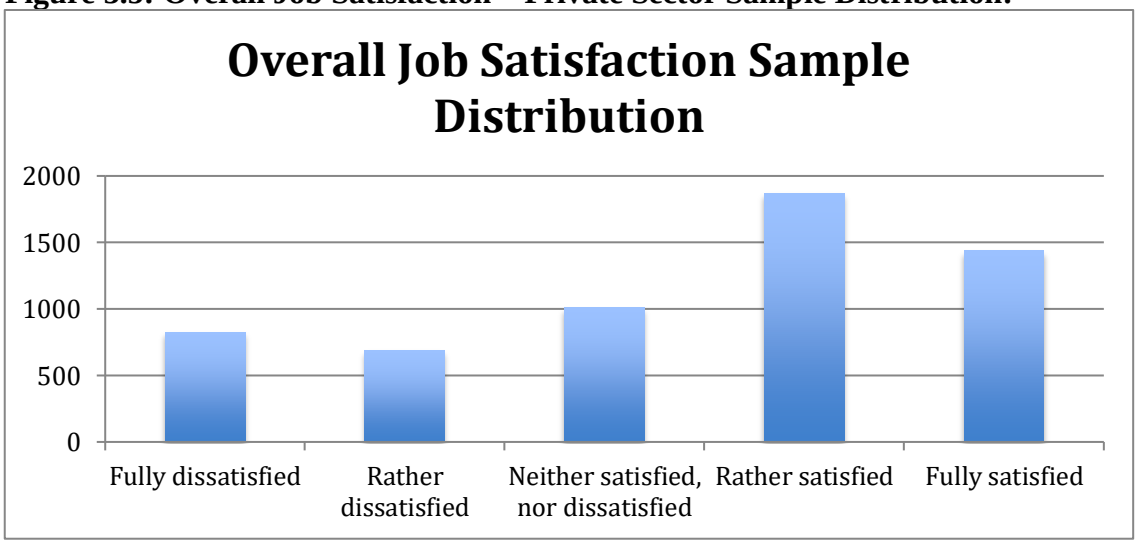
We also expect older individuals to experience and perceive their health states worse than younger ones. Indeed, we find a significant correlation coefficient of -0.263 between self-perceived health and age, confirming our expectation that older individuals are more likely to rank their health states as worse.

Finally, since views about health states may change over time, panel data would have been helpful in our analysis. As previously stated, however, the ELMPS provides health measures only in the 2012 round, thus no inferences can be drawn in this respect.

3.4.4 Job Satisfaction

Job satisfaction represents the fourth main variable of interest and the one we address in chapter VI. One of the job satisfaction variables provided by the ELMPS determines the individuals' overall job satisfaction level, where individuals are asked to rank their overall satisfaction with their current jobs on a scale of 1-5, with '1' representing the 'fully dissatisfied' and '5' representing the 'fully satisfied'. Similar to the sample distribution of health (see figure 3.4), the majority of the private sector sample reported the highest levels of satisfaction (see figure 3.5).

Figure 3.5: Overall Job Satisfaction – Private Sector Sample Distribution:



Source: based on data extracted from the ELMPS2012 (ERF & CAPMAS, 2013)

The ELMPS provides eight other satisfaction variables that address certain aspects of the individuals' jobs, which we will herein refer to as 'components of job satisfaction' measures. These include satisfaction with job security, satisfaction with wages, satisfaction with type of work, satisfaction with working hours, satisfaction with working schedule, satisfaction with working conditions/environment, satisfaction with distance to

work/commuting, and satisfaction with matching between qualifications and job. Respondents ranked their satisfaction with these aspects on a scale that resembles that of the overall job satisfaction discussed above with an additional category '6' that represents 'not applicable' (see figure 3.6).

Figure 3.6: Components of Job Satisfaction Variables – Private Sector Sample Distribution:

Source: based on data extracted from the ELMPS2012 (ERF & CAPMAS, 2013)

If the sixth category of 'not applicable' is disregarded, as it does not inform us much about satisfaction levels, we find a similar trend in the frequency of observations over the different components of job satisfaction levels (see figure 3.6) to that of the overall job satisfaction levels (see figure 3.5). Most of the observations are clustered around the two highest levels of satisfaction (see figure 3.6), indicating that for the sample in study, most of the respondents have reported being satisfied with the different aspects of their jobs. Still, among the eight components of job satisfaction variables, the largest proportion of the sample that reported 'fully dissatisfied' is with respect to satisfaction with job security, which is not surprising for the private sector sample whose majority is employed informally, and thus less secure. Similarly, a large proportion of the sample has reported being 'fully dissatisfied' with wages (see figure 3.6). This indicates issues with wage levels in Egypt's private sector. Conversely, figures generally imply that there are fewer

problematic issues with satisfaction with the type of work, working hours, working schedule, working conditions, commuting, and matching.

These eight satisfaction variables could also be viewed as constituents of overall job satisfaction and a way of breaking down overall job satisfaction to its components. In order to understand the contribution of each aspect to the individual's overall job satisfaction level, we inspect the correlation coefficients between overall job satisfaction and these components of job satisfaction variables. Table 3.6 shows that each component of job satisfaction is significantly correlated with overall job satisfaction. The largest correlation for the private sector sample is with 'type of work' followed by 'wages', highlighting the value of wages in the overall job satisfaction of private sector workers.

Table 3.6: Overall Job Satisfaction vs. Components of Job Satisfaction – Correlation Coefficients:

Job Aspect's Satisfaction Variables	Correlation Coefficients
Satisfaction with Job Security	0.563*
Satisfaction with Wages	0.600*
Satisfaction with Type of Work	0.673*
Satisfaction with Working Hours	0.535*
Satisfaction with Working Schedule	0.504*
Satisfaction with Working Conditions	0.582*
Satisfaction with Commute to Work	0.424*
Satisfaction with Matching Between Qualifications and Job	0.495*

** $p<0.05$*

Source: based on data extracted from the ELMPS2012 (ERF & CAPMAS, 2013)

Similar to the health measure previously discussed, job satisfaction is another factor that is likely to be affected by 'time'. As more experiences are accumulated in the labour market, individuals' perceptions of their jobs and in comparison to others may change as well, which makes panel data superior in capturing this effect. Still, job satisfaction data are only available in the 2012 round of the ELMPS, prohibiting us from gaining more insights into this issue at this point.

3.4.5 Other Labour Characteristics

A variety of individual, human capital, and job factors relevant to the analyses in the following chapters are discussed below, in order to describe our Egyptian private secor labour sample.

3.4.5.1 Individual Characteristics:

Our sample constitutes individuals between 15 and 65 years old. While there are differences between the age distribution in the ELMPS sample and that of the 2006 census and the 2010 LFS, differences are particularly relevant to younger age groups who are not involved with the labour market, and these differences are smaller between the 2012 round and other data sources compared to earlier ELMPS rounds, which could be the result of the larger sample size (Assaad & Krafft, 2013a). We continue our following discussion concentrating on data from the ELMPS's 2012 round.

The complete sample is divided into six regions[17], including Greater Cairo[18], Alexandria and Suez Canal[19], Urban Lower Egypt[20], Urban Upper Egypt[21], Rural Lower Egypt[22], and Rural Upper Egypt[23] (ERF & CAPMAS, 2013). The largest proportion of the sample resides in the two rural areas (55.54%), and the smallest resides in Alexandria and Suez Canal (8.43%). Note that Greater Cairo and Alexandria/Suez Canal are counted towards the urban areas, thus combining these two regions along with the urban upper and urban lower regions represents 44.46% of the sample, illustrating that the sample is distributed almost evenly between the rural and urban areas.

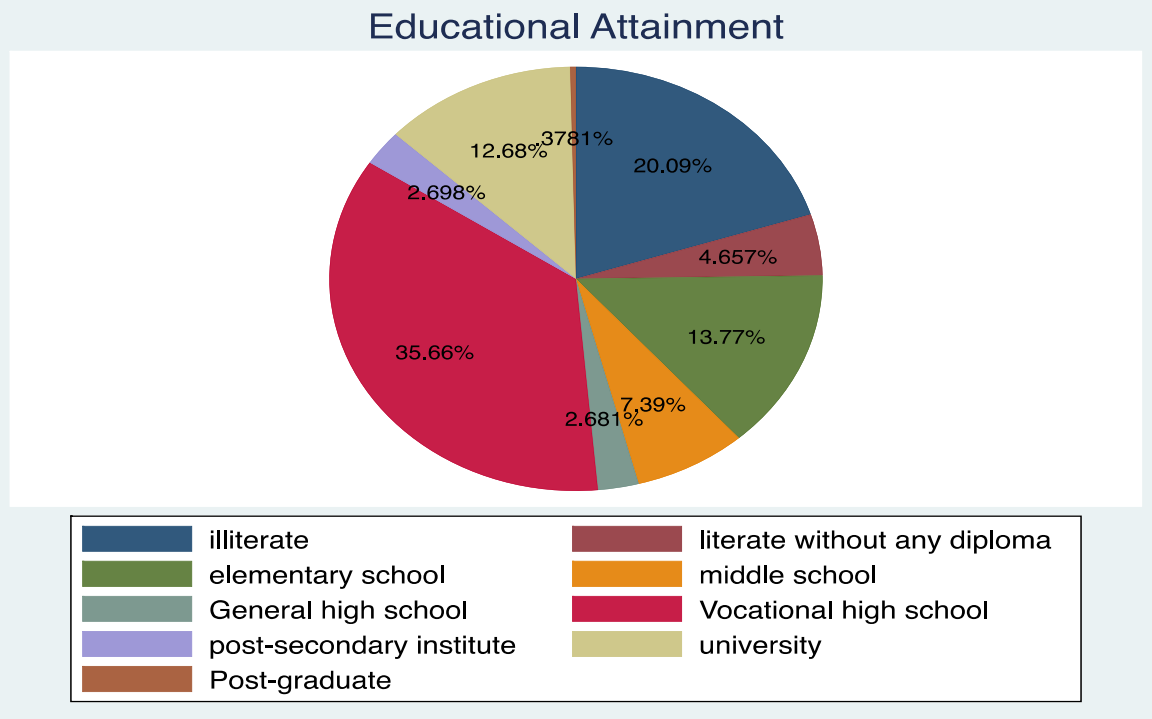
3.4.5.2 Human Capital Characteristics:

The complete sample of interest covers nine levels of educational attainment, including illiterate, literate with no diploma, elementary school degree, middle school degree, general high school degree, vocational high school degree, post-secondary degree, university degree, and post-graduate degree (see figure 3.7). The majority of our sample, representing roughly 36% of the private sector sample, has attained a vocational secondary degree, as opposed to the general high school and post-secondary degree holders, who each

[17] See figure 3.9 in appendix 3, for a map of Egypt, which clarifies the geographical distribution of the major cities.
[18] Includes: Cairo, parts of Giza, and parts of Kalyoubia (ERF & CAPMAS, 2013).
[19] Includes: urban areas in Alexandria, Ismalia, Port-Said, and Suez (ERF & CAPMAS, 2013).
[20] Includes: urban areas in Behera, Dakahlia, Damietta, Gharbeya, Kafr El-Sheikh, Menoufia, Sharkia, and remainder of urban Kalyoubia (ERF & CAPMAS, 2013).
[21] Includes: urban areas in Aswan, Asyout, Beni-Suef, Fayoum, Luxor, Menya, Qena, Suhag, and remainder of urban Giza (ERF & CAPMAS, 2013).
[22] Includes: rural areas in Behera, Dakahlia, Damietta, Gharbia, Kafr El-Sheikh, Menoufia, Sharkia, remainder of rural Kalyoubia, and remainder of rural Ismalia (ERF & CAPMAS, 2013).
[23] Includes: rural areas in Aswan, Asyout, Beni-Suef, Fayoum, Luxor, Menia, Qena, Suhag, and remainder of rural Giza (ERF & CAPMAS, 2013).

represents only 3% of the sample (see figure 3.7). Also, we find that a relatively larger proportion of the sample, 14% and 13%, has attained an elementary school and a university degree, respectively (see figure 3.7). Still, illiterates constitute a significant proportion of the sample, about 20% (see figure 3.7). Note that we are only analysing the employed waged private sector sample in this discussion, but Assaad and Krafft (2013a) compared the ELMPS2012 complete sample's educational distributions with the 2010 LFS and concluded that the general educational distributions are quite similar.

Figure 3.7: Educational Attainment – Private Sector Sample Distribution:



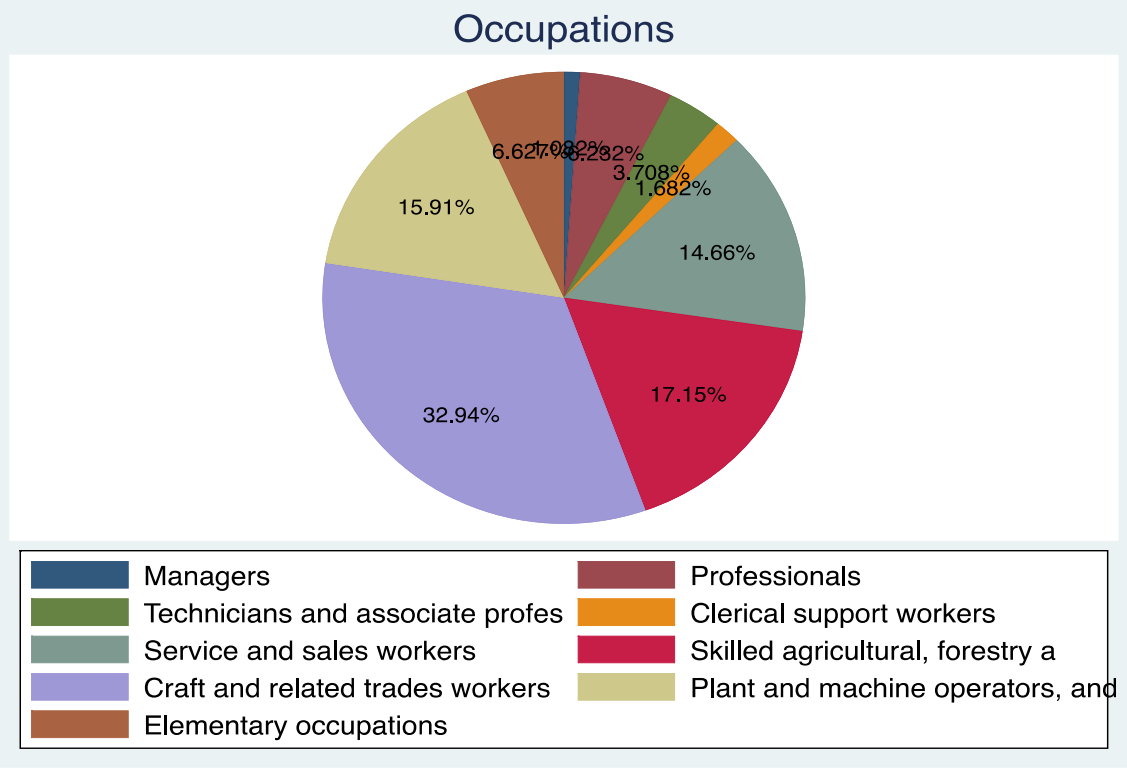
Source: based on data extracted from the ELMPS2012 (ERF & CAPMAS, 2013)

We also find that the average work experience within the private sector in our sample is 14 years, with a minimum of 0 and a maximum of 58 years (ERF & CAPMAS, 2013), highlighting how the sample covers a wide range of labour market experiences. Note, however, that the figures might be inaccurate, as work experience is a derived variable (ERF & CAPMAS, 2013), which is calculated by deducting the respondents' year of acquiring the first job from the year of data accumulation (2012). It may therefore fail to account for intermittent labour force participation through spells of unemployment, training, education, ill-health, or maternity. Accordingly, work experience might be highly correlated with age, and indeed we report a significant correlation coefficient between these two variables of 0.835. Consequently, in the analyses in the following chapters, we use age and drop work experience to avoid multicollinearity.

3.4.5.3 Job Characteristics:

In this section, we will consider two job characteristics, the occupational distribution of the sample and the stability of the job. To begin with, our sample is distributed across nine occupations, including managers, professionals, technicians/associate professionals, clerical support workers, service/sales workers, skilled agricultural/forestry/fishery workers, craft/trade workers, plant/machine operators, and elementary occupations. There is much variability with regards to sample sizes of the different occupations (see figure 3.8). The biggest category of the private sector constitutes the craft/trade workers, representing roughly 33% of our sample. The agricultural/forestry/fishery workers, the plant/machine operators, and the service/sales workers follow, each representing between 15 and 17% of the sample (see figure 3.8). The smallest two categories constitutes the managers and the clerical support workers, each representing around 1% of our sample, while the technicians constitute 4% of the sample, and the professionals and elementary occupations each constitute around 6%.

Figure 3.8: Occupations – Private Sector Sample Distribution:



Source: based on data extracted from the ELMPS2012 (ERF & CAPMAS, 2013)

Another factor of interest is the stability of the job, which is usually represented in the literature as either permanent or temporary employment. In the ELMPS, however, job stability includes two additional categories, namely seasonal and casual workers. The majority of the private sector sample is distributed between the permanent and casual

workers (see table 3.7), highlighting the importance of addressing casual workers in the private sector. Conversely, seasonal workers represent only 0.96% of the sample of interest (see table 3.7). Note that seasonal workers may opt for alternative jobs during seasons when their jobs are unavailable and may be either included in other types of employment or unemployed, thus their share of the sample may be dependent on when the data collection occurred, for instance, during periods of low seasonal employment.

Table 3.7: Stability of the Job – Private Sector Sample Distribution:

Stability	Frequency	Percentage	Cumulative
Permanent	2,494	42.82	42.82
Temporary	751	12.89	55.71
Seasonal	56	0.96	56.67
Casual	2,524	43.33	100.00
Total	**5,825**	**100.00**	

Source: based on data extracted from the ELMPS2012 (ERF & CAPMAS, 2013)

3.5 Concluding Remarks

In summary, the ELMPS provides a nationally representative sample of Egyptian labour and allows us to utilise various measures to inspect a number of issues. We use STATA software to conduct our estimations in chapters IV, V, and VI, which enable us to address two significant labour market outcomes, namely wages and job satisfaction. Furthermore, we are able to draw conclusions and inferences regarding labour productivity, which is a critical issue in the Egyptian economy. Thus, our findings may prove useful in better understanding the Egyptian labour market and enhancing policy formulations. Note that the panel feature of the survey would have been beneficial for our analyses, but we remained confined to the 2012 round of the ELMPS because some of our main variables of interest are only available in that round. Finally, in terms of the sample we utilise, we have identified that the number of employed waged men exceeds that of women, and thus our analyses of the female sample separately proved problematic. Since it is not possible to compare the male and female samples, our analyses of the male sample in this thesis is only included to highlight any major differences between the complete labour sample and the male sample.

3.6 Appendix 3

A map of Egypt is demonstrated below to clarify the regional distribution of the ELMPS.

Figure 3.9: Map of Egypt:

Source: CIA (2016)

Chapter IV
Wage Determination and Sector of Employment Selection: Differences between the Formal and Informal Labour Markets

4.1 Introduction

In this chapter, we analyse the differences in the factors that influence wages in the formal and the informal sectors in Egypt. Our interest is not so much on whether there is a difference in wages between these two sectors, but in whether the factors determining wages are different in the informal sector relative to the formal sector. We therefore address two research questions in this chapter, utilising data from the 2012 round of the Egypt Labour Market Panel Survey (ELMPS). The first question relates to the labour characteristics that influence selection into the formal sector in Egypt. The second question relates to the determinants of wages in the two sectors, and therefore requires us to estimate a wage model for each sector taking into account the probability of selection.

Despite Egypt's large informal sector, which employs approximately 51.2% of Egyptian labour (ILO, 2015), various authors highlighted the lack of studies addressing informality in Egypt. For instance, Wahba (2009) stated, "Overall, the limited literature on the informal sector in Egypt has focused on measuring the size of the informal sector and trying to understand its characteristics" (p.2). While Egypt's informal labour market literature has expanded to some extent since Wahba's (2009) research, Elsayed and Wahba (2016) still specified that, "There are a few studies on informality in Egypt" (p.3). Also, most of the recent studies have focused on the probabilities and determinants of transition from informal to formal employment (Wahba, 2009; Tansel & Ozdemir, 2014; Wahba & Assaad, 2015; Elsayed & Wahba, 2016) and on wage gaps between the two sectors (Tansel et al., 2015; Elsayed & Wahba, 2016). Few researchers have explicitly considered the differences of the effect of labour characteristics on the estimates of wages in each sector. Thus, this chapter concentrates on the determinants of wages in Egypt's informal sector, and in doing so, it highlights how the factors influencing wages differ between the formal and informal sectors in Egypt. Starting from the literature's findings of a wage gap between the formal and informal sectors in Egypt (Tansel et al., 2015; Elsayed & Wahba, 2016), we aim to analyse why wages differ in the two sectors. What factors make formal sector wages higher than those in the informal sector? We are able to correct for selection bias, as do Tansel et al. (2015) in their analysis of the wage gap between the sectors, however, we go beyond their analysis in estimating separate wage models for each sector.

It is worth noting that a methodological challenge arises in estimating the sectoral wage equations. Due to the exclusion of observations for which wages are unobservable, resulting in a non-random subsample (Tansel et al., 2015), we might expect a bias in the sectoral wage equations' estimates. Specifically, there might be systematic factors that lead to selection into a specific sector, which might also influence wages, biasing our estimates. We correct for this sample selection bias by taking selection into account in our estimation procedure.

This chapter continues with a brief discussion of the definitions of informality as well as the different views of informality and the theoretical background of wage studies in section **(4.2)**. This is followed by a review of the informal labour market literature in section **(4.3)**. This section is divided into two parts. The first part discusses literature that addressed differences in wage determination between the formal and informal sectors in economies worldwide, while the second focuses explicitly on studies that addressed informal labour in Egypt. Section **(4.4)** then discusses the econometric model, while section **(4.5)** explains the selection bias issue and illustrates the methods used for conducting the estimations. Data utilised in the estimations are illustrated in section **(4.6)**, while the results and their analysis are discussed in section **(4.7)**. Finally, section **(4.8)** summarises the findings and concludes the chapter.

4.2 Defining Informality and Theoretical Background

To begin with, the different definitions of the informal sector and informal employment are reviewed. This is followed by a more specific discussion of some significant aspects of informality in the Egyptian context. This section concludes with a discussion of the different views proposed as to the existence of informal labour markets and the human capital theory, which represents the basis of wage determination studies.

4.2.1 Defining Informality

For a clearer understanding of the quantification of informal labour, it is important to begin by illustrating the diverse definitions of the informal sector and informal labour.

4.2.1.1 The Informal Sector:

One of the earliest to coin the term 'informal sector' is Hart (1973). The ILO also popularised this term while addressing informality in a number of developing countries.

According to Lubell (1991), the ILO's 1972 mission to Kenya instituted that informality revolved around characteristics such as smaller firms, family-owned businesses, lack of regulation, and ease of entry, among others (as cited in Pradhan & Van Soest, 1995). Castells and Portes (1989) later summarised a more general statement to capture the essence of informality, albeit vaguely, by stating, "It is unregulated by the institutions of society, in a legal and social environment in which similar activities are regulated" (p.12). Still, Portes (1994) pointed out that noncompliance with legal regulations is of more significance than noncompliance with social regulations (as cited in Tansel, 1999). Pradhan and Van Soest (1995) elaborated on the differences between the formal and informal sectors, in which they explained the formal sector's subjection to regulations, payment of taxes, and the prevalence of explicit contracts between employers and employees as opposed to the informal sector that is dominated by smaller firms and self-employment.

4.2.1.2 Informal Employment:

While attempts to clarify the definition of informality have continued, the definitions of informal employment increased in number and in diversity. For instance, Mezzera (1990) utilised firms' sizes to define informal employment, while Roberts (1990) focused solely on the waged workers, identifying formal workers as those covered by social security, whereas informal workers lack this kind of coverage (as cited in Marcouiller et al., 1997). Other authors, such as Magnac (1991), differentiated between waged workers and self-employed workers, considering the former as formal and the latter as informal. Pradhan and Van Soest (1995) used two definitions to identify informal labour, although they found both definitions leading to the same classification for the majority of the sample. The first definition resembled Magnac's (1991), differentiating explicitly between waged and self-employed workers. The second definition depended on firms' sizes, specifying firms with less than six employees as informal, while larger firms and independent professionals, such as lawyers and doctors, as formal. It is worth noting that the differences in defining informal employment have complicated the accurate quantification of informal labour, and as Carneiro and Henley (2001) pointed out, estimates of informal employment often vary due to disagreements on what constitutes such employment.

4.2.2 Informality in Egypt

In the following discussion, we highlight the particular definition of informal labour utilised in our analysis and explain the main elements of the social security system in

Egypt. Additionally, we explain the role of the public sector in relation to informality in the Egyptian context, in order to justify our focus on the private sector.

4.2.2.1 Informal Labour and the Social Security System in Egypt:

In our research, we identify informal labour as those uncovered by the social security system and have no formal labour contract with their employers (see section 3.4.2). This measure corresponds to the definition of informality in much of the Egyptian informal labour market literature (Wahba, 2009; Nazier & Ramadan, 2015; Tansel & Ozdemir, 2014; Tansel et al., 2015) and to one of the measures of informal employment in the ELMPS (see section 3.4.2). For a better understanding of what social security coverage entails for Egyptian labour, we will briefly review the main elements of this system.

According to Egyptian law, every employed person aged 18 years old (or 16 years old for government employees) and above should be covered by social security. Still, as our data shows, this is not necessarily the case. Various laws, governing the different types of workers covered, complicate this social security system. The 79/1975 law governs civil servants, public, and private workers, the 108/1976 law governs employers and self-employed individuals, the 50/1978 law governs migrant workers, and the 112/1980 law governs seasonal workers (Selwaness, 2015). The contributions to social security are shared among workers, employers, and the government, and there are numerous benefits to redeem, such as old age pensions, disability pensions, survivor benefits, death grants, and funeral grants (Social Security Administration [SSA], 2011). Also, the 1975 social security law provides workers with additional benefits relevant to sickness, maternity, work injury, and unemployment (SSA, 2011). Nevertheless, contributions to these additional benefits are rare, employers carry the whole financial burden, and the self-employed remain uncovered across these benefits.

Despite such an elaborate system, it still suffers from numerous drawbacks. Most importantly, the informal sector still falls between the gaps of all these laws, and informal workers remain uncovered and unable to benefit of all this system's returns. Worse still, Loewe (2000) mentioned that the informal labour constituted 44.5% of the total labour force between the years 2000 and 2007. Later, Selwaness (2015) mentioned that only 53% of the employed labour is actually covered, implying the growth of the informal sector and the inadequacy of social security coverage in Egypt. Furthermore, this system's deficiencies extend to the workers that are actually covered, due to the variety of social

insurance schemes and their inequality in terms of benefits, the lack of protection against serious risks, low coverage in reality, inadequate benefit levels, and low returns to contributions (Loewe, 2000).

4.2.2.2 The Public Sector and Informality in Egypt:

An important labour characteristic in wage studies is the organisational sector of employment, which according to the ELMPS identifies whether the individual works for the governmental, public, private, investment, international, or other sectors. Since the wage-setting processes in the public and private sectors are very different (see section 2.5), most studies analyse the two sectors separately (Assaad, 1997; El-Ghamrawy & Amer, 2011; Tansel et al., 2015; Elsayed & Wahba, 2016; Nazier & Ramadan, 2015). This distinction is especially magnified when we consider the differences between formal and informal labour, since employment in the governmental and public sectors is required by law to be formal. Thus, we expect public sector workers to be hired through the correct and formal channels, and that most individuals should be formally employed. Based on our data and according to the definition of informality we utilise, we indeed find that only 2% of the public sector sample, which combines governmental and public sector labour, is employed in the informal sector.

Accordingly, if we were to combine the samples, our wage estimates would be inaccurate as the different labour characteristics are likely to have a distinct impact on wages in each of the public and private sectors. Furthermore, our formal sector wage results would be largely affected by the public sector, while there would be little or no impact on the informal sector wages. Consequently, we focus solely on the private sector workers in our analysis and eliminate all other types of workers. Note that while we drop the governmental and public sectors for the above reasons, we also drop investment, international, and other sectors, since it is unclear under which category these would fall.

4.2.3 Theoretical Basis

The following discussion of theory is divided into two parts. Firstly, we address the different views that explain why or how informal labour exists in the overall framework of labour markets. Secondly, we discuss the human capital theory, upon which wage determination studies are based.

4.2.3.1 Views about Informal Labour Markets:

There are three different views as to the prevalence of informal employment in labour markets. The traditional view regards informal labour as a disadvantaged group in the labour market, whose potential productivity is likely to be equal to their counterparts in the formal sector, but still enjoy lower job security, benefits, and earnings. Thus, informality is viewed as a buffer, intermediary zone, or a refuge for those escaping unemployment. According to Dickens and Lang (1985), the informal sector is related to the dual labour market theory, which postulates the existence of two different wage-setting mechanisms in each sector and a queue for formal jobs. Another explanation is that informal sectors develop during restructuring and recession periods, which are characterised by large numbers of layoffs in the formal sector (Portes & Schauffler, 1993).

Traditional development theorists (Lewis, 1954) have hypothesised that as economies develop, the informal sector would cease to exist. In reality, however, the informal sector has in many developing countries continued to thrive and grow. Accordingly, scholars began to examine the informal sector as an equally competitive sector to the formal one rather than an inferior last option to formality. This led to some researchers (Marcouiller et al., 1997; Maloney, 1999; Arias & Khamis, 2008) finding that the informal sector, mostly in Latin American economies, may be preferred in some instances rather than a last resort, which for example, may be due to the ineffectiveness of protection granted by the formal sector.

Still, scholars could not agree that either view applies to all informal labour markets, which gave rise to a view relating to the heterogeneity of the informal sector employees. Fields (1990), who was among the pioneers of this idea, explained that the informal sector could be divided into two groups, the ‘easy-entry informal sector’ and the ‘upper-tier informal sector’. The former is characterised by easy-entry, low wages, and a preference for formal employment, while the latter is characterised by limited-entry, high wages, and the undesirability of formal employment. This implies that the ‘easy-entry informal sector’ represents a refuge from unemployment and is worse off than formal employment, while the ‘upper-tier informal sector’ is superior to formal employment. This view of the heterogeneity of informal labour is backed by many studies, such as Fields (1990), Tannuri-Pianto and Pianto (2002), Günther and Launov (2006), and Botelho and Ponczek (2011).

In Egypt's context, there is significant research confirming the superiority of the formal sector (Wahba, 2009; Nazier & Ramadan, 2014; Tansel et al., 2015; Elsayed & Wahba, 2016). Therefore, we do not dwell on this any further in this chapter. Instead, we turn to the differences between the labour characteristics' impact on selection into the formal sector and on wages earned in each sector.

4.2.3.2 The Human Capital Theory:

The human capital theory, which is the basis for wage studies, is quite significant in Egypt's context due to the perceived role of human capital in achieving sustainable economic growth (Schultz, 1961), which is one of the ultimate goals of this struggling economy. Jacob Mincer, one of the pioneers in the area of human capital theory, developed a model to analyse the impact of human capital on wages (Mincer, 1958). This immensely popular model, which came to be known as the Mincer wage equation, is perhaps one of the most widely used models in empirical researches of labour economics. Specifically, Mincer's (1974) model represented wages or earnings as a function of years of schooling and work experience. Over time, the basic Mincer equation was extended to include many other potential determinants of wages, including age, gender, marital status, occupations, job formality, and others.

4.3 Literature Review

Our analysis touches upon two main issues in the labour market, selection into sector of employment and wage determination in these sectors. These two issues usually overlap, since selection is likely to have an effect on the earnings a worker can make. The below discussion begins by a review of the international literature that addressed the differences between the formal and informal wage determination and corrected for sample selection. This is followed by a review of literature that specifically addressed Egypt's informal labour market. This review highlights how our research aims to fill a gap and contributes to Egypt's labour market literature.

4.3.1 Wages and Sector of Employment Selection

Two main research questions were of interest in the relevant literature. First, how do the different labour characteristics affect the probability of being selected into a specific sector? And second, how do the determinants of wages in each sector differ after accounting for selection? Numerous authors addressed these two issues in various

economies around the world (Marcouiller et al., 1997; Pradhan & Van Soest, 1995; Funkhouser, 1996; Tansel, 1999; Carneiro & Henley, 2001), and some authors extended their research to examine wage differentials between the two sectors (Marcouiller et al., 1997; Pradhan & Van Soest, 1995; Tansel, 1999). These wage differentials were calculated pre- and post-selection correction, and authors addressed whether selection is likely to affect these differentials. Authors who found significant wage differentials in favour of formal jobholders (Marcouiller et al., 1997; Tansel, 1999) have argued that such results confirm the traditional view of informality being inferior or a refuge for those who cannot find a formal job.

More recently and after the continuous growth of informal sectors around the world, contradicting the postulations of Classical Economic theory of the disappearance of the informal sector as economies continue to develop, authors turned their attention to the examination of transition trends between the sectors. In this category of the literature, the two sectors were treated as equally competitive, where individuals may rationally choose an informal job rather than a formal one. Maloney (1999), among the earlier and popular studies that examined this newer view of informality, addressed worker mobility across sectors of employment in Mexico and found evidence that informal employment is a choice workers make rather than a refuge from unemployment. Marcouiller et al. (1997) have found the same evidence for Mexico, but they found the opposite for El Salvador and Peru. Conversely, Gong and Van Soest (2002), focusing on urban Mexico, concluded that formal jobs remain superior to informal ones. Thus, whether informality is an inferior option and a limitation or is equally competitive to formality remains questionable, with varying results across the economies.

In estimating selection, methods utilised were dependent on the choice of employment statuses accounted for in the respective analyses. Some authors, similar to our study, considered only two states of employment (Funkhouser, 1996; Carneiro & Henley, 2001), and thus utilised a Probit model to analyse selection. Other authors considered additional states, such as unemployment, self-employed, etc., and for this purpose, a Multinomial Logit model was used (Tansel, 1999). A special case is Pradhan and Van Soest (1995), who utilised both a Multinomial Logit model and an Ordered Probit model. The authors explained that the Multinomial Logit model does not pose any ranking on the categories of employment, while the Ordered Probit model assumes a ranking of employment states, with non-participation as the lowest followed by informal employment and then formal

employment as the highest. The authors found that the difference between the models is insignificant for males, but that for females, the Multinomial Logit model was preferred.

For the estimation of wages taking selection into account, authors essentially utilised a two-step approach, which began by estimating a selection equation. This estimation provided a selection correction term, which was then included in the second stage estimation of wages for each sector of employment. This was usually the Heckman Selection model (Tansel, 1999). Still, Carneiro and Henley (2001) utilised a three-step approach, following a model by Lee (1978), to extend their research to examine the impact of the sectoral wage differentials on sector choice. The first two stages of this model are similar to two-step approaches. In the third stage, a Probit model of the structural selection equation was estimated, which included a predicted earnings differential attained from the earnings functions in the second stage.

The challenge with such multiple-stage models is to find the appropriate identifiers for the selection equation, as is the case with all methods that use instruments. These identifiers need to be significant in the estimation of selection, while irrelevant to the estimation of wages. Household characteristics are among the most popular identifiers of selection in the literature. Pradhan and Van Soest (1995) used variables relevant to family composition and other family income to identify selection. Similarly, Carneiro and Henley (2001) identified selection by including whether the individual is head of household, a spouse of head of household, and the prevalence of other household income. In addition, they included the size of employer, payment method, type of contract, and holding other jobs as identifiers, however, we remain sceptical about these latter identifiers as they may also affect wages. Marcouiller et al. (1997) also included similar identifiers, such as number of babies, number of inactive people in household, other labour income, and whether the individual is head of household.

The findings of the literature have been relatively consistent. Generally, authors found age, household factors, and education to determine selection into sector of employment. Specifically, informal jobholders were found to be the youngest and the oldest, while higher educational attainment was found to increase the probability of formal employment (Marcouiller et al., 1997; Funkhouser, 1996; Tansel, 1999; Tansel et al., 2015). Note that while household factors were found to significantly impact selection, Funkhouser (1996) concluded that these were more significant for females than males.

In terms of wage determination, returns to schooling have been found to be higher for formal jobholders than informal ones (Pradhan & Van Soest, 1995; Marcouiller et al., 1997; Funkhouser, 1996). Furthermore, sectoral wage gaps in favour of formal jobholders have been largely confirmed by the literature (Pradhan & Van Soest, 1995), and Marcouiller et al. (1997) added that these gaps are reinforced after selection correction. Similarly, selection correction has increased the gender wage gap (Tansel, 1999), however, whether informal employment is a choice or a limitation remains debatable due to mixed findings (Marcouiller et al., 1997; Tansel, 1999; Maloney, 1999; Carneiro & Henley, 2001).

4.3.2 Egypt's Informal Labour Market Literature

Most authors who addressed the informal labour market in Egypt were consistent in their identification of informal workers. Many authors (Wahba, 2009; Nazier & Ramadan, 2015; Tansel & Ozdemir, 2014; Tansel et al., 2015) identified informal labour as those uncovered by the social security system and have no formal job contract, similar to our research. Still, some authors focused on the lack of a job contract only to identify informal labour (Wahba & Assaad, 2015; Elsayed & Wahba, 2016). This choice depended on the particular research question and interest of each study.

Wahba (2009) addressed two research questions. First, whether individuals move from informal to formal employment. Second, what the determinants of making this transition were. The main objective of the study was to examine whether informality is a stepping-stone or a dead end in the Egyptian labour market. The author reviewed informality trends, the characteristics of the movers, as well as constructed transitional matrices between the two sectors of employment between 1998 and 2006. She also estimated Probit models to examine the probability of moving out of informality. Wahba (2009) found that results differ with regards to education and gender, with informal employment being a stepping stone for highly educated men but a dead end for the uneducated and women.

Tansel and Ozdemir (2014) also examined labour transitions across the sectors of employment in Egypt. They utilised panel data and identified a number of labour market states, including formal private wage work, informal private regular wage work, irregular wage work, government employment, agriculture self-employment, non-agriculture self-employment, unemployment, and out of labour force. They utilised Markov transition process probabilities to consider the transition across the different states of employment,

and they estimated Multinomial Logit models by maximum likelihood to address the determinants of moving out of each labour market state. The authors concluded that the governmental workers and those out of the labour force are the most static labour in Egypt, while the informal private wage workers and the unemployed were the most mobile. They explained that the desirability of government employment is the reason behind the low mobility of government workers, while individuals out of labour force form the largest proportion of the sample, and therefore transitioning from this state is harder. This also holds for women because of their low labour force participation rates.

Similarly, Elsayed and Wahba (2016) used panel data to investigate the dynamics of informality in Egypt as well as the value of holding a formal job contract. The authors estimated a Multinomial Logit model to address labour transitions from private formal or informal employment to other states of employment. They also estimated various wage equations to address wage gaps and the gains or losses from moving to formal employment. The authors found that the prevalence of working without a contract has increased over the last two decades. Also, they concluded that working without a contract (i.e. informally) is associated with a pay penalty, which has increased over time, and they added that moving from informal to formal employment is associated with a substantial wage premium.

Other recent studies include Wahba and Assaad (2015), who addressed the flexibility of labour market regulations on the prevalence of formal job contracts. They focused on the years 1998 to 2008 to examine the impact of changes applied to the labour law in 2004, which introduced more flexibility to the processes of hiring and firing workers. The authors restricted their sample to the private non-agricultural workers, since they argued that changes in the law were mainly applicable to that group. The authors estimated the probability of acquiring new jobs with contracts as well as the probabilities of having a formal contract before and after the labour law modifications. They also used a Difference-in-Differences approach to investigate whether the changes in law have increased the prevalence of job contracts. Their findings confirm that flexibility had promoted formal employment in Egypt.

Another issue addressed by Nazier and Ramadan (2015) was the link between informality and poverty. The authors assumed that a case of reverse causality arises in estimating the likelihoods of informality or falling into poverty, and thus estimated Maximum Likelihood

Probit models for each equation, utilising instrumental variables to correct for this endogeneity. The authors instrumented informality by firm size, which is unlikely to affect poverty, though it would be a determinant of wages (as in our estimations). The authors found that informal employment is likely to increase poverty, however, they found that poverty is insignificant for the probability of informality, which they argued is a reason to believe that workers may choose informality rather than be forced into it to escape poverty.

Conversely, Tansel et al. (2015) analysed the informal employment's wage penalties, focusing on the private sector wage earners. They estimated a variety of wage equations to determine whether a wage penalty or premium exists for informal labour as well as employed panel data in their estimations and utilised a variety of methods, including Ordinary Least Squares (OLS) and Fixed Effects (FE). They also used Quantile Regression (QR) techniques to address differences across different points of the wage distribution. The authors concluded that the informal sector suffers from a wage penalty and this penalty is largest at the top of the wage distribution. Similar to Elsayed and Wahba (2016), the authors also identified that the wage penalty of informal employment has increased over time. Therefore, Tansel et al. (2015) argued that their findings propose that informal employment is not a choice in Egypt, but rather a constraint faced by Egyptian labour from entering the formal sector.

On a final note, authors addressing wage determination often correct for the sample selection bias likely to arise due to participation in the labour force. Specifically, unobservable factors that influence individuals' participation into the labour force may also impact how much pay these individuals get. Yet, we do not observe the wages of individuals out of the labour force, and thus our wage equations' results may be biased. In Egypt's context, this issue is of less significance, since labour force participation is more of a problem for women rather than men, whilst the majority of the labour force and the employed labour comprises men (see table 3.2). Accordingly, we do not address selection into participation in this chapter, similar to the literature's (Tansel et al., 2015; Elsayed & Wahba, 2016) approach, but still address the sample selection bias likely to arise from sector selection.

Our above review of the Egyptian informal labour market literature indicates that the informal sector is less attractive as an employment option than the formal sector. Few of these studies, however, considered how the wage determination process differs between

the two sectors of employment. This is our objective in this chapter. We aim to add to the literature an understanding of the specific factors that are likely to be better rewarded in each sector and how workers may improve their labour market outcomes in each sector of employment.

4.4 Econometric Framework

In this section, the selection equation and the sectoral wage equations, which are used to answer the relevant research questions, are demonstrated.

4.4.1 Selection Equation

To begin with, we estimate a selection equation to determine the impact of some labour characteristics on the probability of formal employment. This equation is based on the concept of utility achieved from employment in a specific sector. The model starts by classifying individuals into formal sector labour, which is identified by the superscript 'F', and informal sector labour, identified by the superscript 'I'. A rational individual is assumed to choose the sector that provides them with the highest utility, which is dependent on the workers' characteristics. Thus, the model is identified as follows,

$$\mathbf{Pr}\left(\boldsymbol{U_i^F - U_i^I \geq 0}\right) = \mathbf{Pr}[\boldsymbol{a + \delta(Z_i) + \gamma_i \geq 0}]$$

Where,

U_i^F - Utility derived by individual *i* from formal employment (F)

U_i^I - Utility derived by individual *i* from informal employment (I)

Z_i - Explanatory variables of individual *i*

δ - Coefficients

a - Constant term

γ - Error terms

The above shows that the probability of the difference between an individual's utility of formal employment (U_i^F) and utility of informal employment (U_i^I) equalling to 0 or higher is a function of the probability of a set of variables equalling to or exceeding 0.

Based on the above utility function, the selection equation of interest is demonstrated as,

$$\mathbf{Pr}(\boldsymbol{y_i = 1}|\boldsymbol{x_i}) = \mathbf{Pr}[\boldsymbol{a + \beta_1(X_i) + \beta_2(C_i) + \beta_3(J_i) + \beta_4(L_i) + \gamma_i}] \qquad \textbf{(EQ.I)}$$

Where,

$y_i = 1$ – Selection into formal employment for individual *i*

X_i - Individual characteristics of individual *i*

C_i - Human capital characteristics of individual *i*

J_i - Job characteristics of individual *i*

L_i – Selection-Specific characteristics of individual *i*

β – Coefficients

a - Constant term

γ - Error terms

In EQ.I, the probability of being formally employed *(y = 1)*, represented by the binary variable of whether the individual is employed formally (F) or otherwise, is regressed on four categories of variables, including individual *(X)*, human capital *(C)*, job *(J)*, and selection-specific *(L)* characteristics. Note that the selection-specific characteristics *(L)* are used to identify the selection equation, thus these factors should significantly affect selection into sectors of employment, but have no direct effect on wages.

4.4.2 Wage Equations

For wage determination, we utilise the extended form of a Mincer-type wage equation, where the logarithm of hourly wages is regressed on factors that are expected to affect wages. Since we are interested in understanding how the effect of the determinants of wages differs between the two sectors of employment, we estimate two wage equations, each utilising a separate subsample, the formal labour (F) and the informal labour (I), respectively. The estimated coefficients show the significance, direction, and magnitude of the effect of each wage determinant. The sectoral wage equations of interest are identified as follows,

Formal Sector Wage Equation:

$$\boldsymbol{Log(w_i^F) = a + \beta_1(X_i^F) + \beta_2(C_i^F) + \beta_3(J_i^F) + \mu_i^F} \quad \textbf{(EQ.II)}$$

Informal Sector Wage Equation:

$$\boldsymbol{Log(w_i^I) = a + \beta_1(X_i^I) + \beta_2(C_i^I) + \beta_3(J_i^I) + \mu_i^I} \quad \textbf{(EQ.III)}$$

Where,

$Log(w_i)$ – Logarithm of hourly wages of individual *i*

X_i - Individual characteristics of individual *i*

C_i - Human capital characteristics of individual *i*

J_i - Job characteristics of individual *i*

β – Coefficients

a - Constant term

μ - Error terms

As shown in EQ.II and EQ.III, the logarithms of hourly wages [*Log (w)*] are regressed on individual *(X)*, human capital *(C)*, and job *(J)* characteristics. The variables included under each category are chosen based on their significance in the Egyptian labour market's context and availability in datasets.

4.5 Methodology

This section illustrates the methods employed to conduct our estimations and discusses the selection problem we encounter in estimating the sectoral wage equations.

4.5.1 Selection Equation Estimation Method

Our first research question requires the estimation of a selection equation (EQ.I). Our dependent variable of interest, the probability of formal employment, is of a binary nature, thus we utilise a Probit model. Since this equation also represents the first-stage of the Heckman Selection Two-Step wage equations' estimation method, which we utilise to correct for selection, we must include variables that are likely to affect selection, but unlikely to have any direct effect on wages, in order to properly identify the selection equation. For this purpose, we include the selection-specific variables, which consist of the unemployment rates stratified by educational attainment level and whether respondents' fathers were working in the public or private sectors when respondents were 15 years old.

4.5.2 Sample Selection Bias

As previously stated, it is expected that individuals with particular characteristics be selected into specific sectors, which implies that the factors that determined selection, but are unobservable in the estimation of the sectoral wage equations, are also likely to affect wages earned. Due to this likely selection bias, the sectoral wage equations are no longer appropriately estimated by the commonly used OLS method. Thus, in the estimation of EQ.II and EQ.III, we should correct for selection, which requires computing a selection correction term that is incorporated in the estimation of the sectoral wage equations. The magnitude and significance of this selection correction term provide an idea of how important selection is in influencing wage determination in each sector.

4.5.3 Wage Equation Estimation Methods

In order to demonstrate how selection affects estimates, two distinct estimation methods are utilised for the estimation of the sectoral wage equations. One method, namely the Ordinary Least Squares (OLS) method, overlooks selection, while the other, the Heckman Two-Step Selection method (Heckman, 1979), corrects for selection.

In the first stage of Heckman Two-Step Selection method, we estimate a selection equation (EQ.I). For simplification purposes, this equation is identified as,

$$\mathbf{Pr}(\boldsymbol{y_i = 1|x_i}) = \boldsymbol{\Phi[\Upsilon(Z_i)]} \qquad \textbf{(EQ.IV)}$$

Based on the estimation of EQ.IV, we are able to compute the selection correction term, known as the Inverse Mills Ratio or the IMILLS Ratio *(IMR)*, as follows,

$$\boldsymbol{IMR_i = \phi(\widehat{\Upsilon} Z_i)/\Phi[\widehat{\Upsilon}(Z_i)]} \qquad \textbf{(EQ.V)}$$

Where,

IMR_i - Selection correction term (Inverse Mills Ratio)

Note that the above *IMR* is specific to the formal sector wage equation. In order to account for selection in the informal sector wage equation, we estimate the probability of informality and compute the *IMR* by repeating the estimation of EQ.V.

In the second stage, we insert each *IMR* into the relevant structural wage equation as additional explanatory variables. The significance of the *IMR* in the second stage would

imply a selection bias in OLS estimates. The second stage estimations are identified as follows,

Formal Sector Wage Equation with Selection:

$$\boldsymbol{Log(w_i^F) = a + \beta_1(X_i^F) + \beta_2(C_i^F) + \beta_3(J_i^F) + \beta_4(IMR_i^F) + \mu_i^F} \qquad \textbf{(EQ.VI)}$$

Informal Sector Wage Equation with Selection:

$$\boldsymbol{Log(w_i^I) = a + \beta_1(X_i^I) + \beta_2(C_i^I) + \beta_3(J_i^I) + \beta_4(IMR_i^I) + \mu_i^I} \qquad \textbf{(EQ.VII)}$$

4.6 Data

This section begins by highlighting again the restrictions placed on the sample and any information relevant to the formal/informal divide, which is the focal point of this chapter. Thereafter, the variables utilised in each equation's estimation and their descriptive statistics are discussed, focusing on the particular sample utilised in our models.

4.6.1 Sample

Only the employed non-agricultural private sector waged workers, which are particularly between the ages of 15 and 65 years old, are included in the analysis in this chapter. We concentrate on the private sector workers because there is very little informality in the public sector (see section 4.2.2.2) and because there is a significant difference in wage determination between the public and private sectors (see section 2.5). Additionally, the exclusion of the agricultural workers is based on the ILO's definition of informal labour, which is quantified according to work associated with informal enterprises excluding those whose activities are usually associated with agriculture (International Labour Office [ILO], 2013). Furthermore, we drop any observations with missing variables. This gives us a sample of 4,676 observations. In our analysis, this sample is divided between the formal and informal sectors.

4.6.2 Variables

While certain variables are common between the selection and wage equations estimated, at least one factor should be specific to each equation to adhere to the exclusion restrictions. Table 4.1 below summarises all variables utilised in the estimation of each equation of interest.

Table 4.1: Variables - by Equation:

	Selection Equation (EQ.I)	Wage Equations (EQ.II/EQ.III)
Dependent Variables		
	Probability of Formal Employment	Logarithm of Hourly Wages
Explanatory Variables		
Individual Characteristics	Age	Age
	Age squared	Age squared
	Gender*	Gender*
	Marital Status*	Marital Status*
	Region*	Region*
	Parents' Education*	Parents' Education*
Human Capital Characteristics	Education*	Education*
	Training Received*	Training Received*
Job Characteristics	Occupations*	Occupations*
	…….	Tenure
	…….	Tenure Squared
	…….	Stability of Job*
	…….	Union Membership*
	…….	Supervisory Roles*
	…….	Night Work*
	…….	Firm Size*
Instrumental Variables		
Selection-Specific Characteristics	Educational Unemployment Rates[24]	…….
	Fathers' Public/Private Sector of Employment when respondent was 15 years old*	…….

**Indicates the use of dummy variables*

4.6.2.1 Dependent Variables:

For the selection equation, the dependent variable is a binary variable, representing whether the respondent is employed in the formal or informal sector, which is determined according to the primary job of the respondents. Formal jobholders are identified as those who have a formal job contract or are covered by social security as opposed to informal jobholders who have neither. For our sample of 4,676 observations and based on the definition of informality we utilise in this thesis, we have 3,475 individuals in the informal sector as opposed to only 1,201 individuals in the formal sector (see table 4.2). This is expected given that our sample comprises the private sector only, where informality is highly prevalent.

[24] Data extracted from CAPMAS's Statistical Year Book (Central Agency for Public Mobilisation and Statistics [CAPMAS], 2012).

The dependent variable for the wage equations is the logarithm of hourly wages of individuals, and according to the descriptive statistics (see table 4.2), the formal sample's average logarithm of hourly wages is higher than that of the informal sample.

Table 4.2: Dependent Variables - Descriptions and Statistics:

Variables	Description	Statistics[25]	
		Formal	Informal
LOG (WAGES/HR)	**Logarithm of hourly wages**	1.597 *(0.752)*	1.359 *(0.655)*
FORMAL	**A dummy variable for formality of job,** 1 if job is formal, 0 otherwise	1,201	
Reference	***Omitted: informal workers***	**3,475**	

Testing for the significance of the difference between the average logarithms of hourly wages in each sector (see table 4.3) confirms that average logarithm of hourly wages in the formal sector is significantly higher than those in the informal sector. Measuring this sectoral wage gap has been the focus of many studies to date (Heckman & Hotz, 1986; El Badaoui et al., 2008; Arias & Khamis, 2008; Tansel et al., 2015).

Table 4.3: T-test for Formal/Informal Means of the Logarithm of Hourly Wages:

	Observations	Means	St. Error	T-Statistic
Formal	1,201	1.597	0.022	10.435
Informal	3,475	1.359	0.011	
Difference		**0.238**	**0.023**	

4.6.2.2 Explanatory Variables:

We turn our attention herein to the descriptive statistics of the explanatory variables (individual, human capital, and job characteristics) utilised in the selection and wage equations, in order to illustrate the sample of interest, and we divide our sample according to the sector of employment, whether formal or informal (see table 4.4).

[25] Means and standard deviations (in brackets) provided for [LOG (WAGES/HR)], while frequency of observations provided for (FORMAL).

Table 4.4: Individual, Human Capital, and Job Characteristics - Descriptions and Statistics:

(1) **Variables**	*(2)* **Description**	*(3)* **Statistics[26]** **Formal**	*(4)* **Informal**
	Individual Characteristics		
AGE	**Age of respondents in years**	34.04 *(9.42)*	30.55 *(9.38)*
Gender:	**A dummy variable for gender,**		
MALE	1 if male, 0 otherwise	1,074	3,281
Reference	***Omitted: females***	**127**	**194**
*Marital Status*Gender:*	**An interaction variable for marital status*gender,**		
MARRIED*MALE	1 if male and married, 0 otherwise	837	2,043
Reference	***Omitted: females of all marital statuses and males less than minimum age, single, contractually married, divorced, or widowed(er)***	**364**	**1,432**
MARRIED*FEMALE	1 if female and married, 0 otherwise	45	73
Reference	***Omitted: males of all marital statuses and females less than minimum age, single, contractually married, divorced, or widowed(er)***	**1,156**	**3,402**
Region:	**A categorical variable for region of residence,**		
RURAL LOWER	1 if rural lower area, 0 otherwise	301	940
URBAN UPPER	1 if urban upper area, 0 otherwise	120	501
URBAN LOWER	1 if urban lower area, 0 otherwise	142	449
ALEX/SUEZ CAN	1 if Alexandria or Suez canal, 0 otherwise	174	295
GREATER CAIRO	1 if Greater Cairo, 0 otherwise	335	387
Reference	***Omitted: rural upper region***	**129**	**903**
Parents' Education:	**A dummy variable for parents' education,**		
FATHER EDUC	1 if father has some degree, 0 otherwise	530	810
Reference	***Omitted: uneducated fathers***	**671**	**2,665**
MOTHER EDUC	1 if mother has some degree, 0 otherwise	321	416
Reference	***Omitted: uneducated mothers***	**880**	**3,059**
	Human Capital Characteristics		
Education:	**A categorical variable for educational attainment level of respondent,**		
LIT/NO DIP	1 if literate with no diploma, 0 otherwise	39	173
ELEMENTARY	1 if elementary degree, 0 otherwise	105	532
MIDDLE SCHOOL	1 if middle school degree, 0 otherwise	57	298
GENERAL HIGH	1 if general high school degree, 0 otherwise	31	100
VOCATIONAL	1 if vocational high school degree, 0 otherwise	410	1,300
POST-SEC	1 if post-secondary degree, 0 otherwise	54	96
UNIVERSITY	1 if university degree, 0 otherwise	396	306
POST-GRAD	1 if post-graduate degree, 0 otherwise	14	8
Reference	***Omitted: illiterates***	**95**	**662**

[26] Means and standard deviations (in brackets) provided for continuous variables, while frequency of observations provided for categorical and dummy variables.

Table 4.4 (Continued):

(1)	*(2)*	*(3)*	*(4)*
TRAINING	**A dummy variable for whether respondent received training other than formal education,**		
	1 if received training, 0 otherwise	140	68
Reference	***Omitted: no training received***	**1,061**	**3,407**
	Job Characteristics		
Occupation:	**A categorical variable for occupation of respondents,**		
PROFESSIONAL	1 if professional, 0 otherwise	246	108
TECHNICIAN	1 if technicians/associate professionals, 0 otherwise	131	76
CLERICAL	1 if clerical support worker, 0 otherwise	49	48
SERVICE/SALES	1 if service/sales worker, 0 otherwise	152	684
CRAFT/TRADE	1 if craft and related trades worker, 0 otherwise	112	1,753
MACHINE OP	1 if plant/machine operator, 0 otherwise	371	513
ELEMENTARY OC	1 if elementary occupation, 0 otherwise	92	280
Reference	***Omitted: managers***	**48**	**13**
TENURE	**The length of employment at current job in years**	9.48 *(8.44)*	9.43 *(8.51)*
Stability:	**A categorical variable for stability of job,**		
TEMPORARY	1 if temporary worker, 0 otherwise	183	505
SEASONAL	1 if seasonal worker, 0 otherwise	1	25
CASUAL	1 if casual worker, 0 otherwise	92	1,614
Reference	***Omitted: permanent workers***	**925**	**1,331**
UNION	**A dummy variable for union membership,**		
	1 if member in union, 0 otherwise	366	114
Reference	***Omitted: non-union members***	**835**	**3,361**
SUPERVISOR	**A dummy variable for supervisory roles,**		
	1 if respondent is a supervisor, 0 otherwise	248	215
Reference	***Omitted: non-supervisors***	**953**	**3,260**
NIGHT	**A dummy variable for working night (after 7 p.m.),**		
	1 if works nights, 0 otherwise	653	1,756
Reference	***Omitted: no night work***	**548**	**1,719**
Firm Size:	**A categorical variable for size of firm,**		
MEDIUM	1 if firm with 50-99 workers, 0 otherwise	117	68
LARGE	1 if firm with 100+ workers, 0 otherwise	474	155
UNKNOWN	1 if size of firm unknown, 0 otherwise	72	103
Reference	***Omitted: firms with less than 50 workers***	**507**	**3,001**

To begin with, we find that the formal sample's average age of individuals is higher than the informal sector's sample (see table 4.4), implying older individuals' transition to or preference for formal jobs. Also, gender may be very influential in both sector choice and wages due to the differences in the Egyptian society's views regarding men and women in the labour market. Thus, we control for gender, but females constitute only 6.86% of our sample, and we find that 75.34% and 60.44% of men and women, respectively, are informally employed (see table 4.4). Thus, it is difficult to draw any conclusions with regards to gender based on the statistics.

Since the effect of marriage on choices of men and women in the labour market may differ, we construct an interaction variable between marriage and gender, where we find that a significant proportion of married men are employed in either sector, while the opposite is true for women (see table 4.4). The region of residence is also quite important in our research. Individuals residing in urban areas may have access to better job opportunities and labour market outcomes. We find that out of our rural upper and rural lower regions' samples, 87.5% and 75.7%, respectively, are employed in the informal sector, which are highest among the regions (see table 4.4). Additionally, drawing on Goldsmith et al.'s (2000) arguments, the home environment individuals are brought up in is likely to influence their values, beliefs, and perceptions, as well as affect their choices in the labour market. Accordingly, we control for respondents' parents' educational attainment in both equations, and we find that the majority of individuals with uneducated parents are informally employed.

In terms of human capital (see table 4.4), we find that the majority of most degree-holders are informally employed, except for university and post-graduate degrees. Also, the majority of individuals with training are formally employed, although these are only 4.5% of our sample.

Additionally, we control for a number of job characteristics. Occupations are the only job characteristic included in our selection equation (see table 4.1). Occupations may affect selection, since some occupations are likely to be operating in a larger informal framework than others. Indeed, we find that the proportion of managers, professionals, and technicians in the formal sector exceeds that in the informal one, while we find the opposite for service/sales and craft/trade workers (see table 4.4). Since occupations are also likely to affect wages, we control for this variable in the wage equations. Other job factors

controlled for in the wage equations include tenure and tenure squared, and we find that average tenure (i.e. the length of time the individual has been at current job) is slightly higher among the formal sector sample (see table 4.4). Similarly, we find that the majority of union members and those working in larger firms are in the formal sector (see table 4.4).

Note that we omit some wage determinants from our analysis for methodological purposes. First, we do not control for the industrial classifications of individuals' jobs, which are correlated with our control variable of occupations, in order to avoid multicollinearity. Second, we do not control for whether individuals work secondary jobs or their health states, since there is a potential endogeneity that might arise from including either variable. Specifically, individuals working a secondary job may earn less because they are rationing their labour time and effort between two jobs, but these individuals may have opted to take up a secondary job in the first place due to their primary jobs' low wages. Similarly, healthier individuals may be capable of exerting more effort on the job and as a result earn more, whilst those who earn more may have the resources for maintaining a better state of health. Thus, secondary jobs and health are omitted to avoid biased results, and we introduce the health factor and deal with its endogeneity in the wage model in chapter V.

4.6.2.3 Instrumental Variables:

The selection-specific characteristics (see table 4.1), which include unemployment rates stratified by educational attainment level and whether respondents' fathers were working in the public or private sector when respondent was 15 years old, are included only in the selection equation for its identification. In order to adhere to the exclusion restrictions, these two variables need to not have a direct impact on wages, as we explain below.

Traditional views of informality and Classical Microeconomic theory dictate that higher unemployment rates would increase the likelihood of informal employment, where individuals would seek informal jobs to escape unemployment. On the other hand, the only impact unemployment may have on wages is through its impact on selection. Specifically, if unemployment rates were high, then there would be an excess supply of labour looking for formal employment and a lower probability of individuals being selected in the formal sector, which would push wages down. In addition, we have discussed in chapter II (see section 2.5) how wages in the Egyptian private sector are to a certain extent influenced by the public sector wage-setting policies, which are unlikely to react to unemployment levels. Surprisingly, we find that average unemployment is higher among the formal

sample (see table 4.5), which requires regression results that controls for other factors that affect selection to confirm or refute this.

Table 4.5: Selection-Specific Characteristics - Descriptions and Statistics:

Variables	Description	Statistics[27]	
		Formal	Informal
UNEMP (EDUC)	**Unemployment rates stratified by educational level**	30.10 *(16.58)*	24.77 *(19.56)*
FSEC	**A dummy variable for the organisational sector of respondents' fathers, when respondents were 15 years old,**		
	1 if in private/investment/foreign/non-profit non-governmental/others/unknown/not working, 0 otherwise	621	2,505
Reference	***Omitted: fathers working in governmental/public sectors***	**580**	**970**

The other selection identifier relates to the respondents' family and household aspects, specifically the respondents' fathers' sector of employment, whether public or private, when respondent was 15 years old. Individuals' choices in the labour market are likely to be affected by their fathers' experiences. This is especially the case with our sample given that the majority of our sample is men, and hence they are likely to look up to their fathers with respect to their labour market decisions. Also, their fathers are likely to provide the support and network required to obtain jobs in the sectors they already work in. Thus, we expect individuals whose fathers were working in more formal settings, such as the governmental and public sectors, to be steered more towards formality. Still, father's sector of employment is unlikely to have any direct effect on an individual's wages, since individuals are rewarded for their own characteristics and not their fathers' characteristics. For this variable, we divide our sample into two. One subset includes individuals whose fathers were working in the governmental or public sectors, while the other includes those who were working in any other sector, including private, investment, foreign, non-profit non-governmental, others, unknown, or not working at all. Statistics show that a much bigger proportion of the sample whose fathers were working in the governmental or public sectors are formally-employed (see table 4.5), while the opposite is true for the sample whose fathers were working in the rest of the sectors or not working at all.

[27] Means and standard deviations (in brackets) provided for [UNEMP (EDUC)], while frequency of observations provided for (FSEC).

4.7 Results and Analysis

In this section, the results of the selection equation for the complete labour sample and the male labour sample are presented and discussed. This is followed by the discussion of the sectoral wage equations' results for the complete labour sample then those for the male labour sample.

4.7.1 Probability of Formal Employment

The first two columns in table 4.6 present the selection results for the complete labour sample, while the last two columns present the results for the male labour sample separately. Since coefficients reported by the Probit models are useful mainly for showing the significance and direction of the relationship, but not the magnitude, average marginal effects are computed to show the effect of a change in the explanatory variables on the probability of formal employment. The complete labour sample constitutes 4,676 observations, while the male labour sample constitutes 4,355 observations (see table 4.6), confirming the small female labour sample.

Perhaps, the most important results to begin our discussion with are the selection identifiers. Surprisingly, we find that unemployment is insignificant for selection into the sector of employment for both samples (see table 4.6), implying that this factor cannot be used to identify selection into the formal or informal sector of employment. Despite this, we retain this variable in our model, which has no effect on our model or the other coefficients, to confirm that unemployment has no effect on informality. Conversely, we find that fathers' public/private sector of employment when respondent was 15 years old is highly significant for selection into sector of employment for both samples (see table 4.6). This implies that respondents' fathers' characteristics are likely to have future effects on the respondents' choice of employment sector, whether formal or informal. Furthermore, we find that the respondents whose fathers worked in any sector other than the governmental/public sectors or not worked at all have a lower probability of being formally-employed (see table 4.6), as expected. Note that one of the selection identifiers is highly significant for selection for both samples, thus we can conclude that selection is properly identified.

Table 4.6: Selection Equation Results (Complete/Male Labour Samples):

Variables	(1)	(2)	(3)	(4)
	DEPENDENT VARIABLE: Pr (FORMAL)			
	COMPLETE SAMPLE		MALE SAMPLE	
	PROBIT MODEL	AVERAGE MARGINAL EFFECTS	PROBIT MODEL	AVERAGE MARGINAL EFFECTS
Selection-Specific Characteristics				
UNEMP (EDUC)	-0.012 *(0.010)*	-0.003 *(0.002)*	-0.016 *(0.011)*	-0.004 *(0.002)*
FSEC	-0.181*** *(0.052)*	-0.042*** *(0.012)*	-0.207*** *(0.055)*	-0.047*** *(0.013)*
Individual Characteristics				
AGE	0.075*** *(0.017)*	0.017*** *(0.004)*	0.076*** *(0.018)*	0.017*** *(0.004)*
AGE SQUARED	-0.001*** *(0.0002)*	-0.0002*** *(0.0001)*	-0.001*** *(0.0002)*	-0.0002*** *(0.0001)*
MALE	0.028 *(0.114)*	0.006 *(0.026)*	…….	…….
*Marital Status*Gender:*				
MARRIED*MALE	0.290*** *(0.066)*	0.066*** *(0.015)*	0.270*** *(0.068)*	0.060*** *(0.015)*
MARRIED*FEMALE	-0.104 *(0.167)*	-0.024 *(0.038)*	…….	…….
Region:				
RURAL LOWER	0.224*** *(0.074)*	0.050*** *(0.016)*	0.249*** *(0.075)*	0.054*** *(0.016)*
URBAN UPPER	0.082 *(0.090)*	0.018 *(0.019)*	0.079 *(0.092)*	0.016 *(0.019)*
URBAN LOWER	0.133 *(0.089)*	0.029 *(0.019)*	0.182** *(0.091)*	0.039** *(0.020)*
ALEX/SUEZ CAN	0.370*** *(0.092)*	0.085*** *(0.022)*	0.401*** *(0.096)*	0.090*** *(0.022)*
GREATER CAIRO	0.527*** *(0.084)*	0.126*** *(0.020)*	0.500*** *(0.088)*	0.115*** *(0.021)*
Parent's Education:				
FATHER EDUC	0.141** *(0.063)*	0.033** *(0.015)*	0.128* *(0.066)*	0.029* *(0.015)*
MOTHER EDUC	0.109 *(0.073)*	0.025 *(0.017)*	0.046 *(0.079)*	0.010 *(0.018)*
Human Capital Characteristics				
Education:				
LIT/NO DIP	0.154 *(0.129)*	0.028 *(0.025)*	0.150 *(0.133)*	0.025 *(0.023)*
ELEMENTARY	0.204* *(0.111)*	0.038 *(0.019)*	0.193* *(0.116)*	0.033* *(0.018)*
MIDDLE SCHOOL	0.057 *(0.130)*	0.010 *(0.022)*	0.075 *(0.135)*	0.012 *(0.021)*
GENERAL HIGH	0.642 *(0.453)*	0.137 *(0.097)*	0.759 *(0.495)*	0.156 *(0.102)*
VOCATIONAL	0.825* *(0.432)*	0.185* *(0.094)*	0.990** *(0.474)*	0.216** *(0.100)*
POST-SEC	0.433*** *(0.145)*	0.087*** *(0.031)*	0.421*** *(0.153)*	0.078** *(0.030)*
UNIVERSITY	0.907*** *(0.316)*	0.207*** *(0.065)*	0.977*** *(0.345)*	0.213*** *(0.066)*
POST-GRAD	0.664 *(0.425)*	0.143 *(0.095)*	0.629 *(0.471)*	0.124 *(0.098)*
TRAINING	0.590*** *(0.102)*	0.152*** *(0.029)*	0.631*** *(0.111)*	0.161*** *(0.031)*
Job Characteristics				
Occupation:				
PROFESSIONAL	-0.065 *(0.207)*	-0.023 *(0.074)*	-0.069 *(0.212)*	-0.025 *(0.076)*
TECHNICIAN	-0.041 *(0.215)*	-0.015 *(0.077)*	-0.047 *(0.221)*	-0.017 *(0.079)*
CLERICAL	-0.386 *(0.235)*	-0.135 *(0.083)*	-0.384 *(0.246)*	-0.136 *(0.087)*
SERVICE/SALES	-1.049*** *(0.203)*	-0.329*** *(0.072)*	-1.078*** *(0.205)*	-0.342*** *(0.073)*
CRAFT/TRADE	-1.549*** *(0.206)*	-0.424*** *(0.072)*	-1.607*** *(0.208)*	-0.441*** *(0.073)*
MACHINE OP	-0.273 *(0.205)*	-0.097 *(0.073)*	-0.316 *(0.207)*	-0.112 *(0.074)*
ELEMENTARY OC	-0.736*** *(0.212)*	-0.246*** *(0.075)*	-0.755*** *(0.215)*	-0.255*** *(0.076)*
Constant	-2.116*** *(0.393)*	…….	-1.993*** *(0.389)*	…….
N	***4,676***	***4,676***	***4,355***	***4,355***
Pseudo R2	***0.2850***	…….	***0.2860***	…….

Standard errors in brackets
**** p<0.01, ** p<0.05, * p<0.1*

Other results show that a variety of the factors are highly significant for the probability of formal employment, and there are various similarities between the results of the complete labour sample and the male labour sample. For instance, we find that the probability of formal employment increases with age for both samples, however, this situation reverses for older individuals (see table 4.6). Thus, we infer that older individuals tend to find it

easier to obtain formal employment, but they are also likely to reverse back to informality as they progress further in age. This goes in line with literature that found the informal sector to include the youngest and the oldest (Marcouiller et al., 1997; Funkhouser, 1996; Tansel et al., 2015). Also, we find that married men and individuals with educated fathers have a significantly higher probability of formality than their respective categories for both samples (see table 4.6). With regards to the region of residence, our findings largely go in line with Tansel et al.'s (2015), where we find that for both samples, the probability of formal employment is highest in Cairo and lowest in rural upper regions (see table 4.6). While more explicit research would be required to understand the regional distribution of informality in Egypt, we postulate that our findings may be relevant to differences between the areas with respect to the level of development, the level of dependency on elementary industries, or perhaps an increased likelihood of smaller sized firms that usually operate in more informal contexts.

In terms of human capital, we find that superior human capital, including the attainment of vocational, post-secondary, and university degrees as well as receiving training significantly increases the probability of formal employment for both samples (see table 4.6), which matches findings of similar studies (Marcouiller et al., 1997; Pradhan & Van Soest, 1995; Funkhouser, 1996; Tansel, 1999; Saavedra & Chong, 1999; Tansel et al., 2015). Nonetheless, a particular finding is how the differential between illiterates and vocational degree holders exceed the differential between illiterates and post-secondary degree holders (see table 4.6), which implies that vocational degree holders have better chances of finding formal jobs in Egypt's labour market. Additionally, we report wider differentials between the male labour sample's illiterates and vocational or university degree-holders compared with the complete labour sample, while the opposite is true for the post-secondary degree holders (see table 4.6). Similarly, training increases the probability of formal employment by 16.1% for men (see table 4.6, column 4) as opposed to only 15.2% for the complete labour sample (see table 4.6, column 2).

Finally, we find that service/sales, craft/trade, and elementary occupations have a lower probability of formality than managers, and these occupational differentials are wider for the male labour sample compared with the complete labour sample (see table 4.6).

4.7.2 Wage Determination

The following discussion presents the results and analysis of the sectoral wage equations, beginning with models utilising the complete labour sample then the male labour sample's models.

4.7.2.1 Complete Labour Sample:

Our presentation of results (see table 4.7) constitutes two models, the OLS and the Heckman Selection models, each estimated across two samples (formal and informal labour). The OLS results are presented only for comparative purposes, but in what follows we will concentrate on the results of our preferred model, namely the Heckman Selection.

To begin with, the higher R-squared values reported for the formal sample's models compared with the informal ones (see table 4.7) imply that the formal sector's wage model is a better model fit than that of the informal sector. Also, the formal sector's significant Inverse Mills Ratio (IMR) implies the presence of a selection bias (see table 4.7, column 3), and the positive IMR indicates that selection increases wages. In this context, we find some differences between the results of the OLS and Heckman Selection models. Specifically, we find that the formal sample's OLS model has reported the insignificance of married males, Cairo region, university degrees, and all occupations, which are all significant according to the Heckman Selection model, and the OLS model has under-estimated the size of parents' education and training coefficients (see table 4.7, columns 1 and 3). While there are fewer differences between the two informal sample's models, we still find that the informal sample's OLS model has over-estimated the coefficients of gender, married males, and some educational degrees, while under-estimated the regional differentials (see table 4.7, columns 2 and 4). Accordingly, we infer that selection correction is important for our estimations, and we accept and prefer the Heckman selection model results.

Table 4.7: Wage Equation Results (Complete Labour Sample):

	(1)	*(2)*	*(3)*	*(4)*
	DEPENDENT VARIABLE: WAGES			
	OLS		**HECKMAN SELECTION**	
Variables	**Formal**	**Informal**	**Formal**	**Informal**
Individual Characteristics				
AGE	0.010 *(0.018)*	0.021*** *(0.008)*	0.033 *(0.023)*	0.018** *(0.008)*
AGE SQUARED	-0.0001 *(0.0002)*	-0.0002** *(0.0001)*	-0.0003 *(0.0003)*	-0.0002* *(0.0001)*
MALE	0.400*** *(0.091)*	0.359*** *(0.060)*	0.402*** *(0.091)*	0.347*** *(0.060)*
*Marital Status*Gender:*				
MARRIED*MALE	0.057 *(0.058)*	0.124*** *(0.028)*	0.141* *(0.076)*	0.106*** *(0.031)*
MARRIED*FEMALE	0.277** *(0.128)*	-0.014 *(0.090)*	0.259** *(0.128)*	-0.008 *(0.090)*
Region:				
RURAL LOWER	-0.161** *(0.073)*	-0.103*** *(0.029)*	-0.087 *(0.085)*	-0.117*** *(0.031)*
URBAN UPPER	-0.098 *(0.089)*	-0.097*** *(0.034)*	-0.064 *(0.091)*	-0.100*** *(0.034)*
URBAN LOWER	-0.113 *(0.086)*	-0.094** *(0.037)*	-0.068 *(0.090)*	-0.100*** *(0.037)*
ALEX/SUEZ CAN	-0.050 *(0.084)*	-0.028 *(0.044)*	0.067 *(0.108)*	-0.055 *(0.047)*
GREATER CAIRO	0.092 *(0.077)*	0.001 *(0.039)*	0.240** *(0.115)*	-0.040 *(0.047)*
Parents' Education:				
FATHER EDUC	0.119** *(0.051)*	-0.011 *(0.028)*	0.170*** *(0.059)*	-0.026 *(0.029)*
MOTHER EDUC	0.176*** *(0.057)*	0.004 *(0.036)*	0.203*** *(0.059)*	-0.006 *(0.036)*
Human Capital Characteristics				
Education:				
LIT/NO DIP	-0.188 *(0.131)*	0.105** *(0.051)*	-0.133 *(0.134)*	0.096* *(0.052)*
ELEMENTARY	0.039 *(0.098)*	0.035 *(0.036)*	0.094 *(0.103)*	0.028 *(0.036)*
MIDDLE SCHOOL	-0.023 *(0.116)*	-0.026 *(0.043)*	-0.008 *(0.117)*	-0.024 *(0.043)*
GENERAL HIGH	0.161 *(0.150)*	0.146** *(0.066)*	0.233 *(0.155)*	0.143** *(0.066)*
VOCATIONAL	0.026 *(0.085)*	0.075** *(0.031)*	0.136 *(0.107)*	0.056* *(0.033)*
POST-SEC	0.036 *(0.127)*	0.204*** *(0.068)*	0.179 *(0.151)*	0.179** *(0.069)*
UNIVERSITY	0.161 *(0.103)*	0.172*** *(0.051)*	0.338** *(0.145)*	0.128** *(0.058)*
POST-GRAD	0.008 *(0.210)*	0.269 *(0.225)*	0.128 *(0.221)*	0.252 *(0.225)*
TRAINING	0.117* *(0.063)*	0.111 *(0.076)*	0.252** *(0.100)*	0.037 *(0.090)*
Job Characteristics				
Occupation:				
PROFESSIONAL	0.120 *(0.114)*	-0.290 *(0.182)*	0.125 *(0.114)*	-0.268 *(0.183)*
TECHNICIAN	-0.018 *(0.124)*	-0.265 *(0.184)*	0.001 *(0.125)*	-0.244 *(0.184)*
CLERICAL	-0.079 *(0.145)*	-0.290 *(0.191)*	-0.144 *(0.150)*	-0.220 *(0.196)*
SERVICE/SALES	-0.097 *(0.124)*	-0.337* *(0.173)*	-0.364* *(0.198)*	-0.198 *(0.195)*
CRAFT/TRADE	-0.023 *(0.134)*	-0.156 *(0.173)*	-0.466 *(0.290)*	0.011 *(0.203)*
MACHINE OP	0.016 *(0.125)*	-0.245 *(0.174)*	-0.016 *(0.126)*	-0.176 *(0.180)*
ELEMENTARY OC	-0.125 *(0.138)*	-0.393** *(0.176)*	-0.299* *(0.171)*	-0.277 *(0.191)*
TENURE	0.020** *(0.008)*	0.003 *(0.004)*	0.018** *(0.008)*	0.003 *(0.004)*
TENURE SQUARED	-0.0004* *(0.0002)*	-0.00004 *(0.0001)*	-0.0004 *(0.0003)*	-0.00002 *(0.0001)*
Stability:				
TEMPORARY	-.0136** *(0.058)*	-0.099*** *(0.033)*	-0.134** *(0.058)*	-0.096*** *(0.033)*
SEASONAL	0.346 *(0.689)*	0.401*** *(0.121)*	0.233 *(0.691)*	0.402*** *(0.121)*
CASUAL	0.116 *(0.084)*	0.237*** *(0.026)*	0.118 *(0.084)*	0.237*** *(0.026)*
UNION	0.187*** *(0.048)*	0.097 *(0.063)*	0.182*** *(0.048)*	0.090 *(0.064)*
SUPERVISOR	0.216*** *(0.056)*	0.134*** *(0.044)*	0.216*** *(0.056)*	0.134*** *(0.044)*
NIGHT	-0.065 *(0.044)*	-0.056** *(0.022)*	-0.062 *(0.044)*	-0.054** *(0.022)*
Firm Size:				
MEDIUM	0.032 *(0.073)*	0.187** *(0.074)*	0.036 *(0.073)*	0.188** *(0.074)*
LARGE	0.111** *(0.047)*	0.047 *(0.051)*	0.114** *(0.047)*	0.045 *(0.051)*
UNKNOWN	0.066 *(0.089)*	-0.070 *(0.060)*	0.071 *(0.089)*	-0.073 *(0.060)*
IMR	…….	…….	0.436* *(0.253)*	0.207 *(0.132)*
Constant	0.543 *(0.359)*	0.623*** *(0.218)*	-0.538 *(0.722)*	0.551** *(0.223)*
N	***1,201***	***3,475***	***1,201***	***3,475***
R2	***0.2179***	***0.1793***	***0.2199***	***0.1799***

Standard errors in brackets
**** p<0.01, ** p<0.05, * p<0.1*

Comparing the formal and informal sectors' Heckman Selection models, we find numerous differences between wage determination in each sector. We find that age is significant for informal sector wages only, and increases these wages at a decreasing rate (see table 4.7, column 4). Unsurprisingly, we find that living in Cairo is highly significant for formal sector wages (see table 4.7, column 3), which is insignificant for informal sector wages (see table 4.7, column 4), while living in rural lower, urban upper, and urban lower regions are all significant for informal wages (see table 4.7, column 4) but insignificant for formal wages (see table 4.7, column 3). Also, having educated parents is significant for formal sector wages, but not informal ones. The larger coefficient reported for having educated mothers of 20.3% compared to that of having educated fathers of 17% (see table 4.7, column 3) indicates the value and roles of women in socialisation as well as the link between mothers and their children's labour market outcomes.

In terms of human capital, only university education is significant in determining wages in the formal sector, whereas most levels of education, including literacy, general high school, vocational, post-secondary, and university are significant in increasing informal sector wages (see table 4.7, columns 3 and 4). Note that vocational degrees, which increase the likelihood of formality (see table 4.6), are insignificant for formal sector wages (see table 4.7, column 3).

Similarly, a number of job characteristics have exhibited differing roles in wage determination in each sector of employment. While occupations do not influence wages in the informal sector (see table 4.7, column 4), there is a small marginal impact on wages in the service/sales and elementary occupations, within which individuals earn less than managers in the formal sector (see table 4.7, column 3). Similarly, and not surprisingly, tenure, union membership, and large firms are all significant only for formal sector wages, (see table 4.7, column 3). Note that the contribution of unions to wages in Egypt highlights the value of unions in enhancing labour market outcomes, which may be going unnoticed, and may deserve a more thorough analysis and acknowledgment. Also, differences with respect to firm size may be driven by the likelihood that smaller firms are more prevalent in the informal sector, while larger firms may be more prevalent in the formal sector. Similarly, seasonal and casual workers, which reported positive and significant coefficients in the informal sector's wage models, may not necessarily be less educated or employed in lower-status jobs, but their employment statuses are circumstantial to the nature of their sectors, such as the tourism sector. Such individuals usually have to acquire proper

specialised university degrees, but the demand for their services is only required during the seasons these sectors take off.

On a final note, we conducted tests to examine the statistical significance of the differences between the formal and informal sectors' Heckman Selection models' coefficients. While the coefficients reported for the two sectors seem different, such as those of university degrees (see table 4.7), a Hausman-type test can formally confirm or refute the significance of these differences. According to our results of the overall model (see table 4.8), we can reject the null hypothesis and conclude that the differences between coefficients are statistically significant. Also, we tested for the isolated statistical significance of difference between the two sectors' models' coefficients of 'male', 'married males', 'university', 'temporary workers', and 'supervisors', but we found that there are no statistically significant differences between these specific coefficients (see table 4.8).

Table 4.8: Hausman Test Results (Complete Labour Sample):

Hausman Test Results	
OVERALL MODEL	
Chi2 (41) = 111.45	**Prob>Chi2** = 0.0000
MALE	
Chi2 (1) = 0.28	**Prob>Chi2** = 0.5996
MARRIED*MALE	
Chi2 (1) = 0.21	**Prob>Chi2** = 0.6433
UNIVERSITY	
Chi2 (1) = 1.74	**Prob>Chi2** = 0.1869
TEMPORARY	
Chi2 (1) = 0.32	**Prob>Chi2** = 0.5692
SUPERVISOR	
Chi2 (1) = 1.35	**Prob>Chi2** = 0.2452

4.7.2.2 Male Labour Sample:

With respect to the differences between the complete labour sample and the male labour samples' models, the male labour sample is slightly lower, at 4,355 observations, and the IMR is insignificant for wages of both sectors (see table 4.9). This implies the insignificance of selection into sector of employment, and thus OLS results may not be biased. Still, the R-squared remains higher for the formally employed males (see table 4.9), implying a better model fit for the formal sample, similar to the case when the complete labour sample was utilised (see table 4.7).

Table 4.9: Wage Equation Results (Male Labour Sample):

	(1)	*(2)*	*(3)*	*(4)*
	DEPENDENT VARIABLE: WAGES			
	OLS		**HECKMAN SELECTION**	
Variables	**Formal**	**Informal**	**Formal**	**Informal**
Individual Characteristics				
AGE	0.007 *(0.020)*	0.025*** *(0.008)*	0.024 *(0.024)*	0.023*** *(0.008)*
AGE SQUARED	7.30e-06 *(0.0003)*	-0.0002** *(0.0001)*	-0.0002 *(0.0003)*	-0.0002** *(0.0001)*
*Marital Status*Gender:*				
MARRIED*MALE	0.040 *(0.060)*	0.116*** *(0.028)*	0.099 *(0.075)*	0.103*** *(0.031)*
Region:				
RURAL LOWER	-0.148* *(0.075)*	-0.096*** *(0.029)*	-0.087 *(0.089)*	-0.107*** *(0.031)*
URBAN UPPER	-0.094 *(0.093)*	-0.104*** *(0.034)*	-0.070 *(0.094)*	-0.106*** *(0.034)*
URBAN LOWER	-0.104 *(0.089)*	-0.104*** *(0.037)*	-0.061 *(0.095)*	-0.111*** *(0.038)*
ALEX/SUEZ CAN	-0.047 *(0.088)*	-0.037 *(0.045)*	0.048 *(0.114)*	-0.058 *(0.049)*
GREATER CAIRO	0.084 *(0.081)*	-0.025 *(0.040)*	0.191* *(0.115)*	-0.051 *(0.047)*
Parents' Education:				
FATHER EDUC	0.121** *(0.054)*	-0.024 *(0.028)*	0.157** *(0.061)*	-0.035 *(0.030)*
MOTHER EDUC	0.169*** *(0.062)*	0.006 *(0.037)*	0.179*** *(0.063)*	0.002 *(0.037)*
Human Capital Characteristics				
Education:				
LIT/NO DIP	-0.209 *(0.134)*	0.101* *(0.052)*	-0.168 *(0.138)*	0.095* *(0.052)*
ELEMENTARY	0.013 *(0.102)*	0.018 *(0.036)*	0.048 *(0.105)*	0.015 *(0.036)*
MIDDLE SCHOOL	-0.045 *(0.120)*	-0.020 *(0.043)*	-0.036 *(0.120)*	-0.019 *(0.043)*
GENERAL HIGH	0.058 *(0.159)*	0.132* *(0.068)*	0.101 *(0.162)*	0.133** *(0.068)*
VOCATIONAL	-0.002 *(0.089)*	0.077** *(0.031)*	0.077 *(0.107)*	0.064* *(0.033)*
POST-SEC	-0.044 *(0.134)*	0.233*** *(0.070)*	0.055 *(0.154)*	0.215*** *(0.072)*
UNIVERSITY	0.020 *(0.110)*	0.133** *(0.052)*	0.142 *(0.144)*	0.104* *(0.058)*
POST-GRAD	-0.239 *(0.242)*	0.155 *(0.238)*	-0.184 *(0.246)*	0.163 *(0.238)*
TRAINING	0.167** *(0.068)*	0.092 *(0.082)*	0.273** *(0.106)*	0.034 *(0.096)*
Job Characteristics				
Occupation:				
PROFESSIONAL	0.175 *(0.120)*	-0.208 *(0.184)*	0.174 *(0.120)*	-0.194 *(0.185)*
TECHNICIAN	-0.088 *(0.131)*	-0.190 *(0.186)*	-0.075 *(0.131)*	-0.177 *(0.186)*
CLERICAL	-0.137 *(0.156)*	-0.338* *(0.194)*	-0.186 *(0.161)*	-0.286 *(0.199)*
SERVICE/SALES	-0.130 *(0.129)*	-0.344** *(0.171)*	-0.334* *(0.202)*	-0.240 *(0.194)*
CRAFT/TRADE	-0.071 *(0.138)*	-0.161 *(0.171)*	-0.412 *(0.296)*	-0.035 *(0.203)*
MACHINE OP	-0.042 *(0.130)*	-0.245 *(0.172)*	-0.074 *(0.132)*	-0.191 *(0.179)*
ELEMENTARY OC	-0.165 *(0.143)*	-0.437** *(0.174)*	-0.298* *(0.175)*	-0.350* *(0.190)*
TENURE	0.017* *(0.009)*	0.001 *(0.004)*	0.016* *(0.009)*	0.001 *(0.004)*
TENURE SQUARED	-0.0004 *(0.0003)*	3.73e-07 *(0.0001)*	-0.0004 *(0.0003)*	0.00001 *(0.0001)*
Stability:				
TEMPORARY	-0.103 *(0.063)*	-0.086** *(0.034)*	-0.103 *(0.063)*	-0.085** *(0.034)*
SEASONAL	0.316 *(0.696)*	0.351*** *(0.121)*	0.231 *(0.698)*	0.352*** *(0.121)*
CASUAL	0.114 *(0.085)*	0.226*** *(0.026)*	0.116 *(0.085)*	.0225*** *(0.026)*
UNION	0.207*** *(0.051)*	0.053 *(0.066)*	0.202*** *(0.051)*	0.046 *(0.066)*
SUPERVISOR	0.284*** *(0.061)*	0.153*** *(0.045)*	0.285*** *(0.061)*	0.153*** *(0.045)*
NIGHT	-0.068 *(0.045)*	-0.056** *(0.022)*	-0.066 *(0.045)*	-0.054** *(0.022)*
Firm Size:				
MEDIUM	0.020 *(0.082)*	0.208*** *(0.076)*	0.025 *(0.082)*	0.209*** *(0.076)*
LARGE	0.099* *(0.051)*	0.054 *(0.053)*	0.102** *(0.051)*	0.053 *(0.053)*
UNKNOWN	0.083 *(0.095)*	-0.082 *(0.060)*	0.086 *(0.095)*	-0.084 *(0.060)*
IMR	…….	…….	0.324 *(0.248)*	0.151 *(0.132)*
Constant	1.092*** *(0.379)*	0.953*** *(0.208)*	0.299 *(0.716)*	0.885*** *(0.216)*
N	***1,074***	***3,281***	***1,074***	***3,281***
R2	***0.2151***	***0.1466***	***0.2164***	***0.1470***

Standard errors in brackets

**** p<0.01, ** p<0.05, * p<0.1*

In terms of differences between the complete labour and male labour samples' models, we find that male union-members earn 20.2% more than non-members, and male supervisors earn 28.5% more than non-supervisors (see table 4.9, column 3), which are higher than the complete labour sample's results of 18.2% and 21.6%, respectively (see table 4.7, column 3). Furthermore, we find differences with respect to returns to education and occupations. First, we find that education is insignificant for men's formal sector wages (see table 4.9, column 3), which were all significant for formal sector wages of the complete labour sample (see table 4.7, column 3). Second, we report narrower wage differentials in the informal sector between illiterate males and male general high school or university degree holders compared to those of the complete labour sample, while the opposite is true for vocational and post-secondary degree holders (see table 4.9, column 4; table 4.7, column). Third, we report the significance of elementary occupations for the male labour sample (see table 4.9, column 4), a category that reported insignificant results for the complete labour sample's informal wages (see table 4.7, column 4). This implies that men experience distinct educational and occupational effects with respect to their labour market outcomes. Still, the overall differences between the results of the complete labour and male labour samples are minimal, which is sensible given that the complete labour sample's majority comprises men.

Similar to the complete labour sample's models (see table 4.8), we find that the Hausman test reports the significance of the differences between the overall sectoral models' coefficients (see table 4.10). Furthermore, we find that while the coefficient of 'supervisors' is significant in both the male labour sample's formal sector and informal sector models, the coefficients reported are statistically significantly different from each other (see table 4.10).

Table 4.10: Hausman Test Results (Male Labour Sample):

Hausman Test Results	
OVERALL MODEL	
Chi2 (39) = 92.21	**Prob>Chi2** = 0.0000
ELEMENTARY OC	
Chi2 (1) = 0.04	**Prob>Chi2** = 0.8329
SUPERVISOR	
Chi2 (1) = 2.99	**Prob>Chi2** = 0.0838

4.8 Concluding Remarks

To sum up, the formal/informal divide of employment is an important element in the Egyptian labour market. We know from previous research that it is likely to significantly affect wages an individual earns, especially in the formal sector of employment. Furthermore, our research results show that wage determination varies to some extent between the sectors of employment, and that some factors may be significant for one sector, but no so for the other. In addition, once the sample is restricted to males, some divergences have been identified that are worth acknowledging for achieving superior labour market outcomes.

In terms of selection into formality, we found that respondents' fathers' sector of employment is significant for the individuals' own selection into formality/informality. Furthermore, our results confirmed that higher educational attainment is significant for increasing the probability of formal employment. This emphasises the importance of enhancing Egyptian labour's human capital to facilitate their achievement of formal jobs.

When it comes to wages, we found that overlooking selection does bias the results obtained, particularly for the formal private sector workers, and therefore correcting for selection is important to obtain valid results. We also found that the impact of the various wage determinants differ to some extent between the two sectors of employment. For instance, rural lower, urban upper, and urban lower regions all significantly decrease informal sector wages, while Cairo region increases formal sector wages. Similarly, various educational degrees relative to illiteracy increase informal sector wages, whereas only university education increases formal sector wages. Differences between the wage determinants also extend to occupations, job stability, firm size, parent's education, age, tenure, and union membership. Moreover, gender wage differentials in favour of men are evident in both sectors, and the reported coefficients are quite high. This adds to the importance of addressing female labour issues in the Egyptian labour market and emphasises the requirement of gender-specific policies to more effectively deal with labour market issues. Similarly, returns to superior human capital are further reinforced by the wage equations' results. Still, men's returns to specific educational degrees are distinct from the complete labour sample, implying that men should be motivated to pursue specific degrees to enhance their labour market outcomes.

Chapter V
Wage Determination in the Private Sector

5.1 Introduction

This chapter extends our analysis in Chapter IV by concentrating on the impact that productivity has on wages in Egypt's private sector. Labour productivity, however, is not observable, and we therefore use a measure of health to proxy for it. Health is likely to impact productivity levels, since healthier individuals are expected to exert more effort and be more productive in the labour market. In fact, a wide range of studies (Grossman, 1972; Grossman & Benham, 1974; Bloom & Canning, 2000; Cole & Neumayer, 2006; Glick & Sahn, 1998) found that health contributes to earnings through its impact on enhancing labour productivity levels. To analyse this issue, we utilise data from the 2012 round of the Egypt Labour Market Panel Survey (ELMPS) to estimate a wage equation, controlling for various labour factors, which allows us to trace the effect of health on wages and permit us to draw inferences regarding labour productivity.

There are two potential problems with analysing this relationship, reverse causality and sample selection. The first problem, reverse causality from wages to health, leads to an endogeneity bias. More specifically, better health may allow individuals to earn more by improving performance and productivity levels. Simultaneously, higher income should make it possible to invest more in healthcare and maintain a better state of health, feeding back into productivity and wages. In order to eliminate this bias and avoid inconsistent results, we utilise a simultaneous system of estimation techniques, namely Two-Stage Least Squares (2SLS) and Maximum Likelihood Estimations (MLE). The second problem relates to the potential selection bias in the estimation of wages. Since individuals who experience extreme bad health states are likely to opt out of the labour force altogether, leading to a non-random sample, the estimated coefficients may be biased due to the impact of the unobserved factors that have led to participation in the first place. Thus, we conduct our analysis taking both endogeneity and sample selection into consideration.

Wage determination is important in Egypt for numerous reasons. Besides the obvious reason of earnings being the workers' primary purpose of working, wage levels have often been raised as a problematic issue in the Egyptian economy (Kandil & Helmy, 2012), which negatively affects the population's well-being. Furthermore, the majority of employment in Egypt (62.5% in the year 2015) comprises the waged and salaried workers

(WB, 2016b), thus this issue influences a large share of the employed labour. Similarly, since the majority of the employed labour is working in the private sector (see figure 3.1), and the Egyptian government is consistently applying reforms to strengthen the role and employment share of the private sector in the economy, as already-discussed (see section 2.6), then understanding the factors that contribute to wages in the Egyptian labour market, and particularly in Egypt's private sector, is of even more significance. Our particular focus on labour productivity is also important, since this measure has seldom been addressed in the wage determination literature. Despite Egypt's large body of wage determination literature (Assaad, 1997; El-Ghamrawy & Amer, 2011; Said, 2007; 2015), little attention has been paid to the explicit analysis of the contribution of enhanced labour productivity levels to wages. This might be because there is no available individual-level data on individual labour productivity that is nationally-representative of the labour market. To get around this problem, we use the health measure to proxy for the unobserved individual labour productivity levels, which may also provide insights into potential channels for improving Egypt's low labour productivity levels that weakened Egypt's economic performance over the years (Radwan, 2002) and acted as a significant detriment to the growth of the economy.

The rest of this chapter is organised as follows, section **(5.2)** introduces the theoretical postulations concerning the relationship between wages and productivity as well as the measure of health utilised in this analysis and the rationale behind this choice. Section **(5.3)** reviews some of the wage determination literature that addressed health, highlighting how our research fits in and fills the gap of this overall strand of literature. Section **(5.4)** illustrates the econometric model, while section **(5.5)** highlights the methodological issues with respect to our estimations and the methods used. Section **(5.6)** discusses the data utilised in the estimations, section **(5.7)** presents and discusses the results of the estimations, which represents the core of this chapter, and section **(5.8)** summarises and concludes this chapter.

5.2 Wages, Productivity, and Health

To start with, we discuss the theoretical relationship between wages and productivity. This is followed by a brief discussion of the relationship between health and productivity, which justifies our use of the health measure, as well as a discussion of health issues in Egypt and the specific health measure utilised in our analysis.

5.2.1 Wages and Productivity

While higher productivity can improve wages, it is also likely that higher wages can lead to an increase in productivity. In reality, these opposing forces work simultaneously.

5.2.1.1 Classical Microeconomic Theory:

Classical Microeconomic theory [28] argues that wages are determined by labour productivity. This theory posits that firms should employ workers up to the point where the marginal benefit (i.e. labour productivity) of employing an additional unit of labour equals the marginal cost (i.e. wage rate) of employing that additional labour. Thus, Riveros and Bouton (1994) explained that a firm's optimal decision is to equate marginal productivity with the given wage rate. However, this marginal rule is based on the assumptions of free markets and complete information, both of which are questionable. In reality, it is often the case that wages paid exceed marginal productivity of labour, which gave rise to new theories of the relationship between wages and labour productivity, such as Efficiency wages (Marshall, 1920; Leibenstein, 1957; Stiglitz, 1974; Shapiro & Stiglitz, 1984; Weiss, 1980; Solow, 1979).

5.2.1.2 Efficiency Wages Theory:

History of the Efficiency Wages theory dates back to Alfred Marshall's writings in the 1920s. Marshall (1920) instituted the term 'efficiency-wages' or 'efficiency-earnings' to explain the idea of labour being paid according to the level of effort required from them. Also, in doing so, he contrasted efficiency earnings with 'time-earnings', dependent on the time-spent working and 'piece-work earnings', dependent on the amount of output produced. This represented the initial, yet brief, introduction of the concept that later developed into a vast array of models.

Later on, Leibenstein (1957) revived the concept of efficiency wages in the development literature. The author posited that rather than wages rising or falling according to rises or falls in productivity levels, wages could be used as a tool to affect productivity (i.e. employers should offer higher wages to their employees to receive higher productivity levels). Decades later, the Efficiency Wages theory increased in popularity with several writings of Stiglitz (1984), Akerlof (1984), Katz (1986), and Yellen (1995), leading to the division of this theory into five distinct sub-models. Each sub-model differed in the

[28] Review of microeconomic theory is available in any standard textbook, examples: Perloff (2012, chapter 4).

channel it used to link wages to productivity. These channels include better nutrition (Leibenstein, 1957), lower labour turnover (Stiglitz, 1974), less shirking (Shapiro & Stiglitz, 1984), attracting more productive workers (Weiss, 1980), and boosting morale among the employees (Solow, 1979).

Accordingly, the main distinction between Classical Microeconomic theory and Efficiency Wages theory is in how the latter challenges the notion of the exogeneity of productivity increases (Meager & Speckesser, 2011).

5.2.2 Health and Productivity

As previously mentioned, individual labour productivity measures are difficult to acquire. Accordingly, a potential method to inspect productivity is to use a proxy for it, similar to the approach used by some scholars (Goldsmith et al., 2000) when dealing with measures that are difficult to quantify, such as productivity or effort. Thus, we use a self-perceived health measure to proxy for labour productivity based on the theoretical relationship between health and labour productivity, as we discuss below.

5.2.2.1 Theoretical Basis:

Theory postulates a direct link between health and productivity. Grossman (1972) explained that health capital could be considered as both a consumption and an investment good. Health capital is a consumption good as it affects an individual's utility directly, while it is an investment good as it affects an individual's time spent in market and non-market activities. This view of health as an investment good indicates that investment in health affects labour supply and productivity. In other words, superior health states should lead to an improvement in the labour's participation in labour market activities and their performance on the job. Similarly, Bloom and Canning (2000) summarised other direct and indirect links between health and productivity, such as the impact of improved health states on increased productivity through enhanced physical and mental effort, and the increase in investment in education due to a longer life expectancy that would again affect productivity. Despite Becker's (1962) arguments of health not necessarily being a major determinant of wages or at least not everywhere in the world, Mushkin (1962), Grossman (1972), Grossman and Benham (1974), Luft (1975), Berkowitz et al. (1983), Glick and Sahn (1998), and Cole and Neumayer (2006) have all identified this postulation that better health reflects in higher productivity and in turn increases wages an individual is offered.

5.2.2.2 Health Issues in Egypt:

In Egypt's context, there are numerous health issues that are likely to adversely affect the health states of individuals residing in Egypt, and hence productivity. Inadequate water sources and supply, air pollution, and noise pollution are all likely to affect health negatively (Abdel-Shafy & Aly, 2002; Kamal et al., 2010; Khaled, 2013; Hussein, 2014; "Study: Air Pollution Kills 35,000 a Year in Egypt, With Dust the Biggest Culprit," 2015; Dakkak, 2016). In addition, poor levels of hygiene lead to the spread of diseases like Hepatitis C (Mezban & Wakil, 2006), which is estimated to kill around 40,000 Egyptians per year, and that 1 in 10 Egyptians between ages 15 and 59 are infected (World Health Organisation [WHO], 2014). Add to this the poor standards of health care (as highlighted in "Surprise Visits to Egypt Public Hospitals Land Officials in Trouble," 2014) and of health facilities (Gadallah et al., 2003), and it is not surprising that health becomes a major determinant of the quality of human capital in Egypt. Egyptians are likely to suffer from more health problems, and these problems are likely to take longer to resolve (or sometimes not resolved at all). All of this is likely to have an impact on individual labour productivity levels in Egypt.

5.2.2.3 Self-Perceived Health:

To capture the above problems, we use a measure of self-perceived health to proxy for the unobserved individual labour productivity. In the ELMPS, this health measure is determined according to the answers respondents provide for the following question, 'how is your health state in general?' Respondents are given a 5-point scale that determines whether they view their health state as 'excellent/very good', 'good', 'fair', 'bad', or 'very bad'. Note that as previously-discussed (see section 3.4.3), we have combined 'bad' and 'very bad' health states in a single category, ending up with a 4-point scale, and we reversed the original ranking of the health states so that the '1' represents 'bad/very bad' health and '4' represents 'excellent/very good' health.

This measure is the most general individual-level representation of health available in the ELMPS, which is common to all individuals. Despite the usual criticisms towards self-perceived measures in the literature based on their subjectivity and the possible differences among people's understanding and evaluation of the rankings (see section 3.4.3), a subjective measure captures how people feel about their own health, which is ultimately very likely to influence their attitudes towards their ability to work. This measure is therefore popular in the literature that addresses health and wages (Contoyannis & Rice,

2001; Cai, 2009; Gambin, 2004; 2005; Hsieh et al., 2012). Moreover, the correlations between self-perceived health and actual health variables (see table 3.5) clearly indicate that individuals are consistent across their understanding of the variable and its rankings, which supports the potentiality of using this variable as a proxy.

5.3 Literature Review

Earlier literature's attention largely owed to the impact of wages on individuals' health (Hadley & Osei, 1982; Duleep, 1986; Ettner, 1996). While this relationship is not the focus of our study, it is nonetheless worth highlighting the health measures used in these studies. Hadley and Osei (1982) as well as Duleep (1986) used mortality rates to represent health, while Ettner (1996) utilised self-perceived health (similar to our analysis), alcoholism, and bed days, among other measures.

As the health factor increased in popularity, the general wage determination literature expanded to explicitly consider the impact of improved health states on wages across many countries and in a wide range of samples (Contoyannis & Rice, 2001; Gambin, 2004; 2005; Hsieh et al., 2012; Kedir, 2008; Thomas & Strauss, 1997; Cai, 2009; Pelkowski & Berger, 2004; Lee, 1982; Haveman et al., 1994; Berkowitz et al., 1983). Also, some authors extended their analysis to examine the effect of health on general labour market outcomes, such as labour supply and work hours (Pelkowski & Berger, 2004).

One of the challenges that confronted authors addressing health is the choice and logic of the measure to use to account for individuals' health. Similar to this research, Contoyannis and Rice (2001), Cai (2009), Gambin (2004; 2005), and Hsieh et al. (2012) used a scale-measure of health states. The authors have used the complete scale, or constructed dummy variables, or used both in their estimations. Likewise, Jäckle and Himmler (2010) used a scale-measure of health satisfaction. Still, Kedir (2008) and Thomas and Strauss (1997) used measures of height and weight to represent health, Mullahy and Sindelar (1995) and Barrett (2002) examined the effect of alcoholism on labour market outcomes, and Baldwin and Johnson (1994), and Walker and Thompson (1996) used disability measures.

Although all health measures used have a logical basis for their choice, they are all equally criticised. For instance, disability may represent a special case of health. Disabled people may not be less effective on the job if their disability does not interfere with their work

tasks. Also, there are numerous rules and laws governing the treatment of disabled workers to ensure fairness in the work place, and hence earnings may not be affected by disabilities. In fact, Walker and Thompson (1996) found that disabilities hardly affect wages. Yet, a counter to this would be that disabilities might deter a person's accessibility to certain jobs that pay higher. Jäckle and Himmler (2010) have criticised the self-perceived health measure, stating that it may not be entirely representative of actual health and may result in a measurement error. Hence, finding the appropriate measure is challenging and requires a number of assumptions to be made. Additionally, the lagged effect of health could result in endogeneity (Jäckle & Himmler, 2010). This, as well as other unobserved factors' biases and unobserved heterogeneity, could be corrected for by using panel data (Gambin, 2005; Jäckle & Himmler, 2010; Forbes et al., 2010). Unfortunately, we are unable to take advantage of the panel feature of the ELMPS, as health data is available in only one round.

Besides finding the appropriate health measure, the methodology used to estimate the model is another challenge. Both endogeneity and unobserved heterogeneity could affect the estimates (see Cai, 2009; Grossman, 1972). If better health could increase future income returns, then individuals as rational decision-makers would be keener on investing in health (Grossman, 1972). Similarly, unobserved heterogeneity that may result from unobserved factors that could affect wages and health, such as self-discipline, may also result in an endogeneity bias (Forbes et al., 2010).

These aspects of the relationship between health and wages render single equation models, such as Ordinary Least Squares (OLS), biased. Contoyannis and Rice (2001), who utilise single-equation models, acknowledge this shortcoming of their research results. Similarly, Hsieh et al. (2012) fail to account for simultaneity, or even acknowledge it. On the other hand, Grossman and Benham (1974), Lee (1982), and Haveman et al. (1994) all utilised simultaneous equation frameworks to deal with this endogeneity. Goldsmith et al. (2000), for instance, estimated a wage equation and an effort equation simultaneously using a Two-Stage Least Squares (2SLS). Still, these multiple-equation models pose a challenge with respect to the instrumentation of the endogenous variables. Health needs to be instrumented by factors that affect health, but not wages, and thus adhering to the exclusion restrictions. Cai (2009) used age, age squared, specific health conditions, and health risk behaviours to instrument health. Similarly, Thomas and Strauss (1997), Contoyannis and Rice (2001), and Jäckle and Himmler (2010) have all instrumented the relevant health measures, in order to deal with endogeneity and measurement biases.

Most of the studies to date have confirmed a positive relationship between health and wages. Numerous researchers have illustrated the significance of this positive relationship, and Swamy (1997) criticised the usual direction of ignoring the value of health in wage determination and productivity studies. Although the nature of the relationship is widely acknowledged and logical, the real question is how much more does health contribute to wages, or in other words, the magnitude of its impact relevant to other factors. This has varied across economies, and our analysis should allow an insight into the value and importance of health in Egypt. Additionally, while the analysis of the relationship between health and wages has been widely addressed in the literature, little has been done in regards to addressing this issue in the Egyptian labour market. This may be due to the lack of required data, especially representing a national sample. This reflects a gap in the literature that the analysis in this chapter aims to fill.

5.4 Econometric Framework

This section illustrates the equations to be estimated to answer the research question addressed in this chapter.

5.4.1 Wage Equation

The main equation of interest is an extended Mincer-type wage equation, similar to the model in chapter IV, although here we are no longer interested in the formal/informal divide. The equation to be estimated is identified as follows,

$$\boldsymbol{Log(w_i) = a + \beta_1(H_i) + \beta_2(X_i) + \beta_3(C_i) + \beta_4(J_i) + \mu_i} \qquad \textbf{(EQ.I)}$$

Where,

$Log(w_i)$ – Logarithm of hourly wages of individual *i*

H_i - Self-perceived health level of individual *i*

X_i - Individual characteristics of individual *i*

C_i - Human capital characteristics of individual *i*

J_i - Job characteristics of individual *i*

β - Coefficients

a - Constant term

μ - Error terms

As shown in EQ.I, the dependent variable is the logarithm of hourly wages [*Log (w)*], while the main independent variable is the self-perceived level of an individual's health state *(H)*. Additionally, we control for individual *(X)*, human capital *(C)*, and job *(J)* characteristics.

5.4.2 Health Equation

As already discussed, health *(H)* in EQ.I is likely to be endogenous. Therefore, we extend our model to a two-equation simultaneous model. The second equation models health *(H)* explicitly and this requires the identification of the health equation by including variables that do not appear in the wage equation. We model health *(H)* as,

$$\boldsymbol{H_i = \beta_1(X_i) + \beta_2(C_i) + \beta_3(J_i) + \beta_4(Z_i) + \varepsilon_i} \qquad \textbf{(EQ.II)}$$

Where,

H_i - Self-perceived health level of individual *i*

X_i - Individual characteristics of individual *i*

C_i - Human capital characteristics of individual *i*

J_i - Job characteristics of individual *i*

Z_i – Health characteristics of individual *i*

β - Coefficients

ε - Error terms

Still, the same measure of health is used in EQ.II but as the dependent variable in this case. Also, the individual *(X)*, human capital *(C)*, and job *(J)* characteristics are similar to those in the wage equation (EQ.I). In addition to these variables, we include *(Z)*, which include the prevalence of a work injury, dead sibling, and the respondents' mothers' employment status when respondent was 15 years old, as our health identifying variables, i.e. those that have a direct effect on health, but not wages.

A further complication of the above system of equations is that while the logarithm of hourly wages is a continuous variable, health is a discrete ordered variable. Our methodologies should account for this distinction, which is particularly significant in obtaining accurate results.

5.4.3 Selection Equation

Finally, we are also interested in correcting for the selection bias that may arise from individuals who drop out of the labour force because of ill-health, and therefore do not earn wages. To correct for this, we estimate a selection equation of the probability of participation as follows,

$$\mathbf{Pr}(\boldsymbol{y_i = 1|x_i}) = \mathbf{Pr}[\boldsymbol{a + \beta_1(X_i) + \beta_2(C_i) + \beta_3(L_i) + \gamma_i}] \quad \textbf{(EQ.III)}$$

Where,

$y_i = 1$ – Participation into the labour force for individual *i*

X_i - Individual characteristics of individual *i*

C_i - Human capital characteristics of individual *i*

J_i - Job characteristics of individual *i*

L_i – Selection-Specific characteristics of individual *i*

β – Coefficients

a - Constant term

γ – Error terms

Similar to chapter IV, the dependent variable of the selection equation (EQ.III) herein is a binary variable *(y = 1)*, but in this case representing whether the individual is participating in the labour market or not, based on the standard market definition. This variable is regressed over a set of individual *(X)*, human capital *(C)*, and selection-specific *(L)* characteristics. Again the selection-specific *(L)* characteristics, which include unemployment rates stratified by educational attainment level, the number of children in household, whether respondent is head of household, and the number of males in the household who are in the labour age (15-65 years old), are required to identify the selection equation and adhere to the exclusion restrictions, thus they are variables that affect selection, but not wages.

5.5 Methodology

As previously mentioned, we address two methodological issues in our analysis, which this section summarises below. Thereafter, a discussion of the methods employed in our estimations is provided.

5.5.1 Methodological Challenges

In this analysis, we address sample selection into the labour force and the endogeneity of health in the estimation of wages, which are both likely to lead to inconsistent and biased results. As a result, correcting for them is essential for reaching more accurate findings.

5.5.1.1 Sample Selection Bias:

As discussed in chapter IV, sample selection bias may arise from disregarding a proportion of the sample, for which our dependent variable of interest is unobservable. In the analysis herein, individuals who suffer from extreme bad health may opt out of the labour market completely, and hence their wage levels are unobservable, and they are unaccounted for in the sample we utilise in the wage estimations. Since we expect unobservable factors that affect an individual's choice in joining the labour market to also affect the wages that individual earns, we need to correct for any resulting bias from selection.

5.5.1.2 The Endogeneity of Health:

In addition, we address and correct for the endogeneity of health. We expect better health, which would reflect in productivity improvements, to improve wages received by labour. Meanwhile, individuals who earn more are likely to be more capable of maintaining and investing more in healthcare and health maintenance. Thus, this reverse causality is likely to result in an endogeneity bias in the wage equation's estimates. Another related source of endogeneity, as explained by Jäckle and Himmler (2010), is that since workers are aware of the effect of better health on wages, rational individuals would increase their investment in human capital (i.e. health) to improve the wages they are offered in the future. Thus, to obtain unbiased and consistent estimates, we need to instrument the endogenous variable, which in this case is health.

5.5.2 Methods of Estimation

In the following discussion, we outline the different methods used in the estimation of the wage equation. Also, we highlight how each method improves on the estimates obtained.

5.5.2.1 Ordinary Least Squares (OLS):

We start off by presenting the results of an OLS model of EQ.I, which is believed to yield biased and inconsistent estimates, as it overlooks both sample selection and endogeneity. The purpose for this model is only to highlight differences between results of models that address sample selection and endogeneity and the OLS model, which does not.

5.5.2.2 Two-Stage Least Squares (2SLS):

The 2SLS method is one potential method for dealing with the endogeneity of health. Typically, the 2SLS approach involves a two-stage model to deal with endogeneity, but in our modified version of the model, we incorporate an additional stage to address selection into participation. Thus, our model begins with estimating a Probit model of the probability of labour force participation (EQ.III), from which we calculate the Inverse Mills Ratio (*IMR)*, as we have done in chapter IV (see section 4.5.3). Note that the selection equation is assumed identified by the inclusion of the selection-specific variables *(L)*.

The following stage begins the typical 2SLS model estimation, which involves estimating a reduced-form health equation, regressing the endogenous variable on all of the exogenous variables and the *IMR*. This reduced-form health equation is identified as,

$$\boldsymbol{H_i = a + \beta_1(X_i) + \beta_2(C_i) + \beta_3(J_i) + \beta_4(Z_i) + \beta_5(IMR) + \varepsilon_i} \qquad \textbf{(EQ.IV)}$$

Similar to the selection equation (EQ.III), the reduced-form health equation (EQ.IV) requires identification, which is done by the inclusion of the health characteristics *(Z)*, representing factors that significantly affect health, but not wages.

We use the results of EQ.IV to acquire the predicted values of health, which are then used to substitute the original health variable in the wage equation. Thus, the final stage involves the estimation of the wage equation, which is identified as,

$$\boldsymbol{Log(w_i) = a + \beta_1(\widehat{H}_i) + \beta_2(X_i) + \beta_3(C_i) + \beta_4(J_i) + \beta_5(IMR) + \mu_i} \qquad \textbf{(EQ.V)}$$

Where,

$\widehat{H}_i$- Predicted value of self-perceived health level of individual *i*

Note that STATA runs the typical 2SLS stages, which includes the estimation of EQ.IV and EQ.V, simultaneously, and hence corrects the standard errors. Yet, the *IMR* obtained from the Probit model (EQ.III) is included in the 2SLS model estimation (EQ.IV and EQ.V), thus we need to correct for any variation that may be unexplained by using estimates from one model into the other, for which we bootstrap the error formulas of the three equations.

5.5.2.3 Maximum Likelihood Estimation (MLE):

While 2SLS corrects for the endogeneity of health, it still fails to account for the discrete ordered nature of the health measure, as the estimation of EQ.IV utilises a linear approach. Thus, concerns may arise regarding the validity of the results due to the information lost by treating health as a continuous variable. Moreover, the 2SLS model (EQ.IV and EQ.V) cannot be estimated simultaneously when we add the selection equation (EQ.III).

Therefore, we estimate the system using a Maximum Likelihood estimation (MLE) method within STATA, which allows mixing between different models to increase efficiency. Specifically, we use a conditional mixed process (CMP) estimator, which estimates a multi-equation mixed system, whereby endogenous variables can appear on the right side of other equations and their errors can be correlated. As Roodman (2015) explained, the possibility of mixing processes, implying that different equations are allowed to have different types of dependent variables, offers more flexibility in the model's construction. Accordingly, the wage equation (EQ.I) utilises a linear approach for its estimation, the health equation (EQ.II) utilises an Ordered Probit model, while participation into the labour force (EQ.III) employs a Probit model. Since CMP estimates the equations of interest simultaneously, the relevant STATA command prevents the need for any further adjustments or corrections.

Note that wages are only observed if participation > 0, and thus only a subset of the sample is used in the estimation of wages, while the selection estimation utilises the complete sample. CMP allows this kind of flexibility, since each equation can vary by observation.

Still, this method requires the identification of the various equations, and hence the selection and health instruments are included in the selection and health equations, respectively. It should be noted that we use the same instruments as well as the same sample in the 2SLS and MLE models to allow for more accurate and consistent comparisons of results.

5.6 Data

This section highlights the main aspects of the sample and the variables utilised in the estimation of each equation. Some statistical data are presented along with a more detailed explanation of the identifiers of the selection and the health equations.

5.6.1 Sample

As explained in the previous chapters, individuals under 15 or over 65 years old were dropped, in addition to any self-employed or unpaid workers. Furthermore, observations that did not provide information regarding any of the questions of interest were omitted. Similar to chapter IV, we restrict our sample to the private sector workers because wage determination in Egypt differs between the private and the public sectors (see section 2.5), and productivity is likely to affect wages only in the private sector. Thus, we are left with a sample of 21,319 observations, of which 14,383 observations are out of the labour force and 5,652 are waged workers employed in the private sector.

5.6.2 Variables

Table 5.1 below summarises the variables used in the estimation of each equation. Some variables are common between the equations, but for identification purposes, there must exist at least one variable that is specific to each equation.

Table 5.1: Variables - by Equation:

	Wage Equation (EQ.I)	Health Equation (EQ.II)	Selection Equation (EQ.III)
Dependent Variables			
	Logarithm of Hourly Wages	Self-perceived Health	Probability of Labour Force Participation
Explanatory Variables			
	Self-perceived Health	…….	…….
Individual Characteristics	Age	Age	Age
	Age Squared	Age Squared	Age Squared
	Gender*	Gender*	Gender*
	Marital Status*	Marital Status*	Marital Status*
	Region*	Region*	Region*
	Parents' Education*	Parents' Education*	Parents' Education*
Human Capital Characteristics	Education*	Education*	Education*
	Training Received*	…….	…….
Job Characteristics	Occupations*	…….	…….
	Tenure	…….	…….
	Tenure Squared	…….	…….
	Stability of Job*	…….	…….
	Union Membership*	…….	…….
	Supervisory Roles*	…….	…….
	Night Work*	Night Work*	…….
	Formality of Job*	…….	…….
	Firm Size*	…….	…….
Instrumental Variables[29]			
	…….	Incidence of Work Injury*	Educational Unemployment Rates[30]
	…….	Incidence of Dead Sibling*	Head of Household*
	…….	Mothers' Employment Status when respondent was 15 years old*	Number of Children in Household
	…….	…….	Number of males in the labour age (15-65 years old) in household

**Indicates the use of dummy variables*

[29] These represent health characteristics *(Z)* for the health equation (EQ.II) and selection-specific characteristics *(L)* for the selection equation (EQ.III).

[30] Data extracted from CAPMAS's Statistical Year Book (CAPMAS, 2012).

5.6.2.1 Dependent Variables:

Table 5.2 below shows some descriptive statistics with regards to the dependent variables of the three equations of interest. Note that the nature of the dependent variable of each equation is different. While the wage equation's dependent variable, which is the logarithm of hourly wages, is a continuous variable, the dependent variables of the health and the selection equations are both discrete variables. Also, the self-perceived health measure, which is the health equation's dependent variable, is an ordered discrete variable. Specifically, individuals were asked, 'How is your health in general?' and according to our modified scale (see sections 3.4.3; 5.2.2.3), answers were given on a scale of 1-4, with '1' representing the worst state of health and '4' representing the best. Conversely, the selection equation's dependent variable, which represents whether the individual is participating in the labour market or not, is a binary discrete variable.

As shown in table 5.2, our sample's average logarithm of hourly wages of 1.410 falls in the middle of the range reported in chapter IV for the formal and informal sector samples of 1.597 and 1.359, respectively (see table 4.2). Also, as illustrated in chapter III (see figure 3.4), the majority of the employed waged private sector sample reported the highest levels of health. Finally, there are 14,383 non-participating individuals in the labour force out of a total sample of 21,319 individuals (see table 5.2), of which 80.5% are women.

Table 5.2: Dependent Variables - Descriptions and Statistics:

Equation	Variables[31]	Description	Statistics[32]
EQ.I: WAGES	**LOG (WAGES/HR)**	**Logarithm of hourly wages**	1.410 *(0.662)*
EQ.II: HEALTH	**HEALTH**	**An ordered discrete variable. Individuals asked, "how is your health in general?" and answers given on a 4-point scale as follows;**	
		1 – Very bad/bad	76
		2 – Fair	565
		3 – Good	3,142
		4 – Excellent/very good	1,869
EQ.III: SELECTION	**LF**	**A dummy variable for whether the individual is participating in the labour force or not,**	
		1 if participating, 0 otherwise	6,936
	Reference	***Omitted: non-participating***	**14,383**

[31] Note that statistics for [LOG (WAGES/HR)] and (HEALTH) are provided for the private sector's waged workers, while those of (LF) are provided for the complete sample in the labour age (15-65 years old).

[32] Means and standard deviations (in brackets) provided for [LOG (WAGES/HR)], while frequency of observations provided for (HEALTH) and (LF).

5.6.2.2 Explanatory variables:

In the following discussion we focus on the individual, human capital, and job characteristics controlled for in the three equations of interest. Note that these variables in relation to wages have been discussed in chapter IV (see section 4.6.2.2), thus we only briefly refer to the wage equation and instead focus on the health and selection equations. Furthermore, we report the statistics of most variables for two separate samples, the non-participating and the employed waged private sector samples.

Individual factors controlled for in the three equations of interest are all the same (see table 5.1), since these factors, whose descriptive statistics are illustrated in table 5.3, are expected to equally affect wages, health, and selection, as we explain below.

Table 5.3: Individual Characteristics - Descriptions and Statistics:

Variables	Description	Statistics[33]	
		Non-Participating	Employed Waged
AGE	**Age of respondents in years**	31.60 *(14.53)*	*31.61 (9.79)*
Gender:	**A dummy variable for gender,**		
MALE	1 if male, 0 otherwise	2,806	5,285
Reference	***Omitted: females***	**11,577**	**367**
*Marital Status*Gender:*	**An interaction variable for marital status*gender,**		
MARRIED*MALE	1 if male and married, 0 otherwise	482	3,541
Reference	***Omitted: females of all marital statuses and males less than minimum age, single, contractually married, divorced, or widowed(er)***	**13,901**	**2,111**
MARRIED*FEMALE	1 if female and married, 0 otherwise	7,958	156
Reference	***Omitted: males of all marital statuses and females less than minimum age, single, contractually married, divorced, or widowed(er)***	**6,425**	**5,496**
Region:	**A categorical variable for region of residence,**		
RURAL LOWER	1 if rural lower area, 0 otherwise	3,758	1,615
URBAN UPPER	1 if urban upper area, 0 otherwise	1,952	697
URBAN LOWER	1 if urban lower area, 0 otherwise	1,534	614
ALEX/SUEZ CAN	1 if Alexandria or Suez canal, 0 otherwise	1,235	479
GREATER CAIRO	1 if Greater Cairo, 0 otherwise	1,731	719
Reference	***Omitted: rural upper region***	**4,173**	**1,528**
Parents' Education:	**A dummy variable for parents education,**		
FATHER EDUC	1 if father has some degree, 0 otherwise	4,756	1,410
Reference	***Omitted: uneducated fathers***	**9,627**	**4,242**
MOTHER EDUC	1 if mother has some degree, 0 otherwise	3,177	762
Reference	***Omitted: uneducated mothers***	**11,206**	**4,890**

[33] Means and standard deviations (in brackets) provided for continuous variables, while frequency of observations provided for categorical and dummy variables.

We find that average age is roughly equal for both the non-participating and the waged workers samples (see table 5.3). In terms of gender, we find that the majority of the non-participating sample constitutes women, while the majority of the waged employed sample constitutes men (see table 5.3). This confirms the higher likelihood of women opting out of the labour force completely. Expectedly, we find that married men make up a small proportion of the non-participating sample, while the number of non-participating married women is much larger (see table 5.3). Similarly, married males constitute the majority of the employed private sector workers as opposed to married women, whose proportion is significantly lower (see table 5.3). Region is again significant for wages, similar to chapter IV's discussion (see section 4.6.2.2), as well as health, since individuals residing in urban regions are expected to have access to superior labour market outcomes and health services. Still, we find fewer differences in sample distributions with regards to region, which is similar to the statistics of parents' education (see table 5.3), and thus require regression results to understand their impact in the Egyptian context.

While we control for educational attainment and training received in the wage equation, we exclude training from the health equation, since training received is unlikely to have an effect on health, and from the selection equation, as such information is only provided for the sample participating in the labour force. Conversely, we expect education to affect health, since better-educated individuals are likely to be keener about maintaining a better state of health and may have the resources and knowledge to achieve this. Similarly, we may expect those with higher educational attainment to participate more in the labour force, and indeed we can see that illiterate individuals are a larger fraction of the non-participating sample compared to the employed waged sample, while the opposite is true for university degree holders (see table 5.4). Note that those who received training make up a small proportion of our sample (see table 5.4).

Table 5.4: Human Capital Characteristics - Descriptions and Statistics:

Variables	Description	Statistics[34]	
		Non-Participating	Employed Waged
Education:	**A categorical variable for educational attainment level of respondent,**		
LIT/NO DIP	1 if literate with no diploma, 0 otherwise	426	256
ELEMENTARY	1 if elementary degree, 0 otherwise	1,726	783
MIDDLE SCHOOL	1 if middle school degree, 0 otherwise	2,420	415
GENERAL HIGH	1 if general high school degree, 0 otherwise	1,403	153
VOCATIONAL	1 if vocational high school degree, 0 otherwise	3,043	2,008
POST-SEC	1 if post-secondary degree, 0 otherwise	281	154
UNIVERSITY	1 if university degree, 0 otherwise	973	732
POST-GRAD	1 if post-graduate degree, 0 otherwise	31	22
Reference	***Omitted: illiterates***	**4,080**	**1,129**
TRAINING	**A dummy variable for whether respondent received training other than formal education,**		
	1 if received training, 0 otherwise	…….	211
Reference	***Omitted: no training received***	…….	**5,441**

Job Characteristics are mainly only included in the wage equation (see table 5.1), and the statistics below (see table 5.5) are provided only for the employed waged private sector sample, since these are the only individuals who provide information regarding these factors. These factors have already been discussed in chapter IV (see section 4.6.2.2), thus we limit our discussion here to any peculiarities regarding the specific sample in study.

The health equation only controls for individuals working nights, since this factor may have a negative effect on an individual's health, due to working abnormal hours to what the human physique is accustomed to. According to the statistics, a significant proportion of our sample is working nights (see table 5.5). The remaining job characteristics are hardly relevant to the health state of an individual. For instance, the size of firm or the sector of employment are unlikely to directly affect health, as individuals are generally assigned to certain work tasks, for which they should be appropriately compensated.

Regarding the wage equation, we find that union members or supervisors are a relatively small proportion of our sample (see table 5.5). Also, we find that agricultural/forestry/fishery, which we dropped from our sample in chapter IV (see section 4.6.1), comprises a large proportion of the sample, which is only preceded by 'craft/trade' workers and followed by 'machine operators' and 'service/sales' workers (see table 5.5). Note that the formality of the job is controlled for in the wage equation to highlight differences in wages owing to the sector of employment, since the sample is not stratified

[34] Frequency of observations.

by sector of employment contrary to the analysis in chapter IV, and we find that the majority of our sample is informally employed (see table 5.5). In this context, we find that the majority of our sample works in small-sized firms (see table 5.5). This is unsurprising given our earlier analysis of the private sector sample in chapter IV, which showed that smaller-sized firms are likely to be more prevalent in the informal sector (see section 4.6.2.2), which is the sector that represents the bigger proportion of our sample.

Table 5.5: Job Characteristics - Descriptions and Statistics:

Variables	Description	Statistics[35]
Occupation:	**A categorical variable for occupation of respondents,**	
PROFESSIONAL	1 if professional, 0 otherwise	358
TECHNICIAN	1 if technicians/associate professionals, 0 otherwise	210
CLERICAL	1 if clerical support worker, 0 otherwise	97
SERVICE/SALES	1 if service/sales worker, 0 otherwise	834
AGR/FOR/FISH	1 if agricultural/forestry/fishery worker, 0 otherwise	968
CRAFT/TRADE	1 if craft and related trades worker, 0 otherwise	1,851
MACHINE OP	1 if plant/machine operator, 0 otherwise	897
ELEMENTARY OC	1 if elementary occupation, 0 otherwise	375
Reference	***Omitted: managers***	**62**
TENURE	**The length of employment at current job in years**	10.32 *(9.20)*
Stability:	**A categorical variable for stability of job,**	
TEMPORARY	1 if temporary worker, 0 otherwise	732
SEASONAL	1 if seasonal worker, 0 otherwise	49
CASUAL	1 if casual worker, 0 otherwise	2,416
Reference	***Omitted: permanent workers***	**2,455**
UNION	**A dummy variable for union membership,**	
	1 if member in union, 0 otherwise	484
Reference	***Omitted: non-union members***	**5,168**
SUPERVISOR	**A dummy variable for supervisory roles,**	
	1 if respondent is a supervisor, 0 otherwise	479
Reference	***Omitted: non-supervisors***	**5,173**
NIGHT	**A dummy variable for working night (after 7 p.m.),**	
	1 if works nights, 0 otherwise	2,617
Reference	***Omitted: no night work***	**3,035**
FORMAL	**A dummy variable for formality of job,**	
	1 if job is formal, 0 otherwise	1,221
Reference	***Omitted: informal workers***	**4,431**
Firm Size:	**A categorical variable for size of firm,**	
MEDIUM	1 if firm with 50-99 workers, 0 otherwise	197
LARGE	1 if firm with 100+ workers, 0 otherwise	658
UNKNOWN	1 if size of firm unknown, 0 otherwise	204
Reference	***Omitted: small-size firms (less than 50 workers)***	**4,593**

5.6.2.3 Instrumental Variables:

We turn our attention here to the statistics of the identifiers of the health equation (see table 5.6) and the selection equation (see table 5.7), which need to be significant in the estimation of health and selection, respectively, whilst not related to wages, to serve their purpose and meet the exclusion restriction requirement.

[35] Means and standard deviations (in brackets) provided for continuous variables, while frequency of observations provided for categorical and dummy variables.

To instrument health, we utilise measures of whether the individual has a work injury, dead sibling, and the professional status of the respondents' mothers when respondent was 15 years old (see table 5.1).

Table 5.6: Health Characteristics - Descriptions and Statistics:

Variables	Description	Statistics[36]	
		Non-Participating	Employed Waged
INJURY	**A dummy variable for whether respondent has a work injury,**		
	1 if work injury prevalent, 0 otherwise	…….	364
Reference	***Omitted: no work injury***	…….	**5,288**
DEADSIB	**A dummy variable for whether respondent has a dead sibling,**		
	1 if has dead sibling, 0 otherwise	4,151	1,772
Reference	***Omitted: no dead sibling***	**10,232**	**3,880**
MOTHER NO-EMP	**A dummy variable for whether respondent's mother was working when respondent was 15 years old,**		
	1 if mother not working, 0 otherwise	1,462	525
Reference	***Omitted: working mothers***	**12,907**	**5,127**

Having a work injury or a dead sibling may mirror a certain view about health. Individuals who have a work injury are likely to view their working conditions as more hazardous to their health, and hence their views and ranking of their health state may be worse. Upon inspection of the statistics, we find that individuals who have had a work injury represent a minor proportion of the sample (see table 5.6). Similarly, having a dead sibling is likely to implicate a person's health state as well as their views of it, especially if that sibling has died at a younger age or due to a health condition. These individuals represent a more significant proportion of our sample, specifically 31.35% of the sample (see table 5.6). Note that both of the above factors are unlikely to affect the wages the individual is offered. Even in the case of a work injury, the individual is likely to have been compensated for it, but not received an increase in pay. Finally, we control for whether respondents' mothers were working when the respondent was 15 years old, and thus at the time of growth and dependence on their parents for maintaining a better state of health. While this factor is unlikely to affect the wages an individual earns in the labour market, we may expect it to have an effect on the individual's human capital, because mothers who had to ration their time between family caretaking and labour market activities might have had less time for their children's health and education. Only 525 employed individuals and 1,462 non-participating individuals have working mothers, as opposed to 5,127 and 12,907 individuals, respectively, who do not (see table 5.6).

[36] Frequency of observations.

Finally, we review the statistics of the selection identifiers (selection-specific characteristics). Again, these variables should impact selection directly, but not wages. Our selection identifiers (see table 5.1) are unemployment rates stratified by educational attainment level, whether respondent is head of household, the number of children in household, and the number of males in the labour age (15-65 years old) in household. Unemployment is expected to affect selection negatively, since those who face higher unemployment rates are likely to find it harder to find a job and may eventually give up and opt out of the labour force altogether. Conversely, unemployment is unlikely to affect wages directly, and any impact on wages would only be through its impact on selection (see section 4.6.2.3). More specifically, unemployment rates may affect the supply of labour in the market, and it is only through this channel that wages would react. For instance, higher unemployment may lead to an excess supply of labour if individuals chose to remain in the labour force, and as a result, wages may decline. Conversely, if this higher unemployment leads to non-participation in the labour market, then there would be little or no impact on wages. Similarly, household factors are likely to impact selection, but these are unlikely to have a direct effect on wages. Whether individuals are heads of household, the numbers of children in household, or the number of males in the labour age in household are not factors that employers would evaluate when hiring labour and offering a specific pay.

Table 5.7: Selection-Specific Characteristics - Descriptions and Statistics:

Variables	Description	Statistics[37]
UNEMP (EDUC)	**Unemployment rates stratified by educational level**	22.52 *(19.21)*
HEAD	**A dummy variable for head of household,**	
	1 if respondent is head of household, 0 otherwise	5,091
Reference	***Omitted: not head of household***	**16,228**
Number of Children:	**An interaction variable for gender*number of children in household,**	
MALE*CHILD	Males*number of children (below 15 years old) in household for males	0.506 *(1.050)*
FEMALE*CHILD	Females*number of children (below 15 years old) in household for females	0.882 *(1.323)*
MALE (15-65) in HH	**The number of males in the labour active age (15-65 years old) in the individual's household**	1.092 *(0.952)*

In terms of the statistics, we find that almost 24% of our sample is heads of households (see table 5.7). This represents a pressure on the individual to join the labour force, in order to provide for those in the household. Furthermore, we identify selection by the number of children (below 15 years old) in the household. Given that having young children increases

[37] Means and standard deviations (in brackets) provided for continuous variables, while frequency of observations provided for categorical and dummy variables.

pressure on adults to provide for their families, it is not surprising that this influences selection into the labour force but not wages. Still, we expect that the effect of the number of children to differ between men and women, especially since the male breadwinner norm is prevalent in Egypt. Thus, we construct two variables, MALE*CHILD and FEMALE*CHILD, which interact gender with the number of dependents below 15 years of age. We find that women's average number of dependents exceed that of men (see table 5.7). Similarly, we utilise the number of males in the labour age in household to identify selection, as having more men in the working age in the household is likely to add less pressure on the individual to join the labour force. According to our sample's statistics (see table 5.7), the average number of males in the labour age in the individuals' households is 1. Lastly, the sample's average unemployment rate is 22.5%.

5.7 Results and Analysis

In this section, we present and discuss the results of the equations of interest modelled for the complete labour sample and separately for the male labour sample. We start off with a discussion of the selection equations' results (see section 5.7.1), followed by the results of the wage equations (see section 5.7.2). Note that the male labour sample, of 5,285 observations, is only slightly smaller than the complete labour sample of 5,652 observations.

5.7.1 Probability of Labour Force Participation

The selection equation results identify the effect of numerous labour factors on the probability of participating in the labour force. Note that the results reported by the 2SLS and MLE models (see table 5.8) are quite similar, implying that in dealing with selection, both models use the same approach and are equally acceptable.

Our results indicate that most of the selection-specific characteristics are highly significant for the complete labour sample's probability of participation in the labour force (see table 5.8, columns 1 and 2). More specifically, being head of household increases the probability of participation into the labour force, while being in an educational category with higher unemployment decreases the probability of participation for the individual. Similarly, women with more children in the household and individuals in households with more males in the working age have lower probability of participation (see table 5.8, columns 1 and 2). Conversely, in the males-only labour sample, the only variable that significantly

identifies selection is the number of males in the working age in the household (see table 5.8, columns 3 and 4). Note that as mentioned in chapter III (see section 3.3), we are mainly interested in the models utilising the complete labour sample, and the male labour sample's models are only illustrated to highlight major differences, if any. Thus, we model both samples utilising the same variables to provide comparable results.

Table 5.8: Selection Equation Results[38] (Complete/Male Labour Samples):

	(1)	*(2)*	*(3)*	*(4)*
	DEPENDENT VARIABLE: Pr (PARTICIPATION)			
	COMPLETE LABOUR SAMPLE		**MALE LABOUR SAMPLE**	
Variables	**2SLS**	**MLE**	**2SLS**	**MLE**
Selection-Specific Characteristics				
UNEMP (EDUC)	-0.014** *(0.007)*	-0.014** *(0.006)*	-0.017 *(0.013)*	-0.018 *(0.016)*
HEAD	0.148** *(0.059)*	0.161*** *(0.057)*	-0.068 *(0.116)*	0.074 *(0.112)*
Number of Children:				
MALE*CHILD	0.009 *(0.015)*	0.009 *(0.015)*	-0.025 *(0.017)*	-0.026 *(0.016)*
FEMALE*CHILD	-0.100*** *(0.015)*	-0.100*** *(0.015)*	…….	…….
MALE (15-65) in HH	-0.034** *(0.016)*	-0.033** *(0.016)*	-0.067*** *(0.025)*	-0.068*** *(0.025)*
Individual Characteristics				
AGE	0.278*** *(0.008)*	0.277*** *(0.008)*	0.398*** *(0.013)*	0.399*** *(0.012)*
AGE SQUARED	-0.004*** *(0.0001)*	-0.004*** *(0.0001)*	-0.005*** *(0.0002)*	-0.005*** *(0.0001)*
MALE	1.255*** *(0.046)*	1.254*** *(0.047)*	…….	…….
*Marital Status*Gender:*				
MARRIED*MALE	1.193*** *(0.076)*	1.180*** *(0.068)*	0.669*** *(0.117)*	0.661*** *(0.107)*
MARRIED*FEMALE	-0.709*** *(0.045)*	-0.707*** *(0.044)*	…….	…….
Region:				
RURAL LOWER	0.326*** *(0.036)*	0.323*** *(0.036)*	-0.0003 *(0.056)*	-0.003 *(0.054)*
URBAN UPPER	0.162*** *(0.043)*	0.161*** *(0.045)*	0.054 *(0.063)*	0.050 *(0.066)*
URBAN LOWER	0.361*** *(0.047)*	0.361*** *(0.047)*	0.136* *(0.070)*	0.128* *(0.074)*
ALEX/SUEZ CAN	0.205*** *(0.051)*	0.201*** *(0.053)*	0.057 *(0.077)*	0.050 *(0.079)*
GREATER CAIRO	0.233*** *(0.047)*	0.233*** *(0.048)*	0.207*** *(0.076)*	0.204*** *(0.071)*
Parents' Education:				
FATHER EDUC	-0.094*** *(0.034)*	-0.097*** *(0.034)*	-.0.158*** *(0.049)*	-0.158*** *(0.050)*
MOTHER EDUC	-0.258*** *(0.041)*	-0.256*** *(0.039)*	-0.349*** *(0.053)*	-0.352*** *(0.056)*
Human Capital Characteristics				
Education:				
LIT/NO DIP	0.133* *(0.072)*	0.136* *(0.080)*	-0.056 *(0.129)*	-0.051 *(0.122)*
ELEMENTARY	0.046 *(0.059)*	0.050 *(0.062)*	-0.246** *(0.113)*	-0.237** *(0.115)*
MIDDLE SCHOOL	-0.429*** *(0.064)*	-0.424*** *(0.065)*	-0.794*** *(0.112)*	-0.781*** *(0.117)*
GENERAL HIGH	-0.178 *(0.295)*	-0.180 *(0.283)*	-0.739 *(0.579)*	-0.711 *(0.686)*
VOCATIONAL	1.078*** *(0.288)*	1.076*** *(0.278)*	0.537 *(0.576)*	0.563 *(0.685)*
POST-SEC	0.601*** *(0.085)*	0.607*** *(0.083)*	-0.188 *(0.157)*	-0.178 *(0.155)*
UNIVERSITY	1.273*** *(0.205)*	1.272*** *(0.198)*	0.313 *(0.406)*	0.335 *(0.480)*
POST-GRAD	1.088*** *(0.294)*	1.113*** *(0.269)*	-0.087 *(0.518)*	-0.080 *(0.563)*
Constant	-5.219*** *(0.148)*	-5.217*** *(0.138)*	-5.049*** *(0.207)*	-5.061*** *(0.199)*
N	***21,319***	***21,319***	***8,517***	***8,517***
Pseudo R2	***0.5491***	…….	***0.5041***	…….

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1*

[38] 2SLS models: bootstrapped standard errors.

Other results of the complete labour sample's models (see table 5.8, columns 1 and 2) worth highlighting include the higher probability of participation of older individuals, which increases at a declining rate, and of men, which confirms the much lower female participation rates in the Egyptian labour market. Also, marriage impacts the participation of men and women differently, where it increases men's participation but decreases women's participation. This is sensible since married women would have to ration their time between household chores and labour market activities, while the primary purpose of men in the Egyptian context is to provide for their households. In terms of region of residence, we find that all regions significantly increase the probability of participation relative to the rural upper areas, and the highest differentials are reported for the rural lower and urban lower regions. Likewise, we report that literacy, vocational, post-secondary, university, and post-graduate degrees significantly increase the complete labour sample's probability of participation compared to the illiterate individuals. Thus, similar to our analysis in chapter IV, we have to again emphasise the importance placed on education on enhancing labour market outcomes, and thus the requirement for addressing education and human capital accumulation more effectively in the Egyptian economy. Finally, we find that having educated parents actually decreases the probability of participation, a result that may need further explicit analysis to understand, but goes beyond the scope of our research. Note that parents' education may be correlated with other variables that have a significant effect on participation, such as education, and thus requires to be exclusively dealt with to reach more accurate results.

There are some differences between the results reported for the complete labour sample and those of the male labour sample (see table 5.8). For instance, the impact of age and having educated parents are of a larger magnitude for males than the complete labour sample, while the impact of men's marriage is of a smaller magnitude. In terms of region of residence, only the urban lower and Cairo regions are significant for the male labour sample, and the male labour sample's coefficient of the urban lower region is much lower than that reported for the complete labour sample. Likewise, we find that among the male labour sample, only elementary degrees significantly increase the probability of labour force participation than illiterates (see table 5.8, columns 3 and 4).

5.7.2 The Effect of Health on Wages

We use three methods to estimate the wage equation (see section 5.5.2), OLS, 2SLS, and MLE. While the OLS results are presented solely for comparison purposes, as this model

overlooks selection into participation and the endogeneity of health in the wage model. To correct for these biases, we estimate the 2SLS and MLE models.

5.7.2.1 Health Equation Results:

We begin by briefly reviewing the most important results of the health equation estimation (see table 5.9), in order to assess whether our instruments serve their purpose and are properly identifying health. This is especially significant since weak instruments may be more detrimental to the results we obtain than overlooking endogeneity altogether.

One way of determining the weakness of instruments is to examine their significance in the estimation of the health equation. According to our results (see table 5.9), all the instruments/identifiers are highly significant across both models and for both samples. This implies that the models are properly identified, and hence results that correct for endogeneity are superior to the OLS results.

Table 5.9: Health Equation[39] - Identifiers Results[40] (Complete/Male Labour Samples):

	(1)	***(2)***	***(3)***	***(4)***
	DEPENDENT VARIABLE: HEALTH			
	COMPLETE LABOUR SAMPLE		**MALE LABOUR SAMPLE**	
Variables[41]	**2SLS**	**MLE**	**2SLS**	**MLE**
Health Characteristics				
INJURY	-0.161*** *(0.035)*	-0.286*** *(0.060)*	-0.165*** *(0.035)*	-0.301*** *(0.060)*
DEADSIB	-0.041** *(0.019)*	-0.085** *(0.034)*	-0.043** *(0.020)*	-0.091*** *(0.034)*
MOTHER NO-EMP	0.097*** *(0.031)*	0.157*** *(0.055)*	0.113*** *(0.033)*	0.195*** *(0.058)*
IMR	0.090 *(0.059)*	…….	0.016 *(0.068)*	…….
N	***5,652***	***5,652***	***5,285***	***5,285***
R2	***0.1063***	…….	***0.1061***	…….

Standard errors in brackets
**** p<0.01, ** p<0.05, * p<0.1*

[39] Bootstrapped 2SLS models do not report the health equation results, thus results of this model are acquired from a 2SLS model without bootstrapping. This seems reasonable since the outcome equation's (the wage equation) coefficients are the same, but only the standard errors are different to a limited extent.

[40] For complete results of the health equations, see appendix 5, table 5.14.

[41] Control variables include: age, age squared, male (only in the complete labour sample models), married males, married females (only in the complete labour sample models), region dummies (6), whether respondents' parents are educated, respondents' educational attainment dummies (9), and working nights. Additional control variables only in the 2SLS model include: training received, occupational dummies (9), tenure, tenure squared, job stability dummies (4), union membership, supervisory roles, formality of job, and firm size dummies (4).

Our central concern in this analysis is not the determinants of health but rather the impact that health has on wages. We will therefore only comment briefly on the estimates of the health model. The coefficients of each model differ in magnitude and definition, and these differences owe to the fact that MLE treats the health variable as an ordered discrete variable and uses an Ordered Probit model to estimate the health equation, while the 2SLS model utilises a linear approach and treats the health variable as continuous. Thus, MLE may prohibit the loss of information, which is likely to occur with 2SLS models, providing us with more accurate results. Still, the impact of the health instruments on health are found to be similar across both models, where the prevalence of an injury and dead siblings decrease the health states reported, while the non-working mothers increase the health states reported (see table 5.9), all matching earlier postulations (see section 5.6.2.3).

We have also conducted tests of weakness of instruments, which STATA allows post running a 2SLS model. The rule of thumb is that the F-test of the joint significance of instruments should exceed 10 for the instruments to be acceptable. Our F-test results of 12.275 for the complete labour sample and 13.265 for the male labour sample (see table 5.10) are thus acceptable.

Table 5.10: Tests of Instruments (2SLS Model):

Statistics	Results	
	COMPLETE LABOUR	MALE LABOUR
R-Squared	0.1063	0.1061
Adjusted R-Squared	0.0991	0.0988
Partial R-Squared	0.0065	0.0075
Bootstrap	F (3,5606) = 12.275	F (3, 5241) = 13.265
Prob>F	0.0000	0.0000

Other factors exhibit the expected relationships (see appendix 5, table 5.14), where married women report worse states of health, while married men report better states of health. We also find health differentials in favour of individuals residing in urban upper regions and Alexandria/Suez Canal, which also represents an urban region, compared with those living in rural upper regions. Quite unsurprisingly, higher educational attainment improves an individual's reported health, although the differentials are wider for the complete labour sample than the male labour sample. Finally, mothers' education is only significant for the male labour sample, and these individuals report better states of health.

5.7.2.2 Wage Equation Results:

While the 2SLS and MLE models report very similar findings for the probability of selection into the labour force (see table 5.8), results are relatively distinct with respect to the effect of health on wages (see table 5.11), highlighting the importance of addressing the particular discrete ordered nature of the health variable. Furthermore, 2SLS and MLE results are greatly distinct from the OLS model, reinforcing the importance of dealing with the selection and endogeneity biases for achieving more accurate results.

Our OLS model reports the insignificance of health for the private sector wages of both samples (see table 5.11, column 1). Yet, once endogeneity and sample selection are accounted for, health is found to have a significant and positive effect on wage levels of both samples according to the 2SLS and MLE models (see table 5.11, columns 2 and 3). This is perhaps the most important enhancement to the estimations. Furthermore, we find that the IMILLS ratio (IMR) is significant only for the male labour sample, implying that the selection bias is significant only for this sample. The negative IMR implies that the unobserved factors that affected men's participation into the labour force have a negative impact on their wages.

Similarly, the difference between the MLE and 2SLS health coefficient sizes may be explained by how the estimation takes into account the discrete ordered nature of the health measure, which 2SLS overlooks. Accordingly, we accept and particularly focus on results obtained from the MLE model, as these may be perceived to be the most precise, since the model deals with selection, endogeneity, and the discrete ordered nature of the health measure, and thus prevents the loss of information and corrects for the likely biases. MLE reports a significant increase of private sector wages for the complete labour sample of 19.9% and for the male labour sample of 24.2% as a result of one point increase in health states (see table 5.11, column 3). These coefficients are much lower than those reported by the 2SLS models for both samples (see table 5.11, column 2), implying that the loss of information as a result of overlooking the discrete ordered nature of the health variable over-estimates the effect of health on wages. Also, 2SLS reports a much lower R-squared value than OLS (see table 5.11, column 2), implying that the variation in wages is probably better explained with the OLS rather than the 2SLS model, thus we remain favourable of the MLE results rather than 2SLS.

Table 5.11: Wage Equation[42] - Health Results[43] (Complete/Male Labour Samples):

Variables[44]	*(1)* OLS	*(2)* 2SLS	*(3)* MLE
	DEPENDENT VARIABLE: WAGES		
COMPLETE LABOUR SAMPLE			
HEALTH	-0.011 *(0.013)*	0.308* *(0.181)*	0.199** *(0.092)*
IMR	…….	-0.090 *(0.066)*	…….
N	***5,652***	***5,652***	***5,652***
R2	***0.1721***	***0.0804***	***……..***
MALE LABOUR SAMPLE			
HEALTH	-0.015 *(0.013)*	0.400** *(0.164)*	0.242*** *(0.083)*
IMR	…….	-0.150** *(0.069)*	…….
N	***5,285***	***5,285***	***5,285***
R2	***0.1520***	***……..***	***……..***

Standard errors in brackets
**** p<0.01, ** p<0.05, * p<0.1*

Still, the MLE findings imply that health plays a major role in determining wages in Egypt. Thus, if health represents productivity as we have postulated, then it is likely that healthier individuals will have higher productivity levels, and consequently get paid more, which indicates the great benefits that may be redeemed in terms of productivity and wage enhancements by improving health states. In comparison with similar findings for other countries in the literature, health seems to have a larger and more significant impact on wages in the Egyptian labour market than in other advanced economies, though the same relationship has also been identified in the latter. For instance, Jäckle and Himmler (2010) reported very small coefficients for German labour, albeit still positive and significant. These distinctions could be linked to a variety of factors. For instance, the Egyptian economy relies heavily on manual labour in numerous sectors and industries. While technological advancements are occurring, they lag much behind the level of technology commonly found in more advanced economies. Thus, enhancing productivity is perhaps most possible by improving workers' health states. In addition, poor health services exacerbate the situation, and hence healthier individuals may be preferred by employers in order to cut costs, especially when medical insurance is involved with the job.

[42] 2SLS models: bootstrapped standard errors.
[43] For complete results of the wage equations, see appendix 5, tables 5.12; 5.13.
[44] Control variables include: age, age squared, male (only in the complete labour sample models), married males, married females (only in the complete labour sample models), region dummies (6), whether respondents' parents are educated, respondents' educational attainment dummies (9), training received, occupational dummies (9), tenure, tenure squared, job stability dummies (4), union membership, supervisory roles, working nights, formality of job, and firm size dummies (4).

The rest of the results (see appendix 5, tables 5.12; 5.13) are limited in variability across the different models and samples. Therefore, we focus here on summarizing any significant results, and focus on the MLE results, which we perceive as most accurate.

Certain wage gaps are reinforced by the results obtained in this analysis, such as the gender wage differentials, where men are found to earn more than women (see table 5.12, column 3). This confirms again the perception of employers' preference for offering men higher wages. Also, returns to education increase with general high school, post-secondary school, and university degrees for both samples (see table 5.12, column 3; table 5.13, column 3). Note that post-secondary school degree holders have a smaller differential relative to illiterates than general high school degree holders for both samples, implying that there is little incentive for individuals to attain a post-secondary school degree. Additionally, we find that men with university degrees have the smallest differential relative to illiterate individuals and compared to other degree holders (see table 5.13, column 3). Similarly, we find that training contributes positively to wages for both samples, but the male labour sample's coefficient is larger than that of the complete labour sample (see table 5.12, column 3; table 5.13, column 3).

Likewise, we find differentials between the occupations. All our coefficients for occupations use managers as the base category. For the complete labour sample, the smallest differential is between agricultural/forestry/fishery workers and our base category of managers, while the largest is between elementary workers and managers (see table 5.12, column 3). Also, service/sales workers in the complete labour sample earn 20.8% less than managers. It should be noted that service/sales workers are often offered low basic wages as they mainly rely on commissions that might increase their total pay to a great extent. In this context, wage differentials in the male labour sample for all the above categories (see table 5.13, column 3) are higher than that in the complete labour sample (see table 5.12, column 3). Finally, in terms of differentials, results attained here further substantiate the wage differential in favour of formal labour (see table 5.12, column 3; table 5.13, column 3), highlighting again the superiority of formal employment in Egypt.

Finally, wages are found to increase with tenure at a declining rate for both samples (see table 5.12, column 3; table 5.13, column 3), that is the longer the individuals remain in the same job, the lower the increase of their wages. Union membership again proved to be a significant factor in wage determination and the coefficients reported of 17% and 16.3%

for the complete and male labour samples, respectively, fall within the range of coefficients reported in more developed economies, which varied between 15-17% (Ewing & Payne, 1999; Rebitzer, 1995). Also for both samples, supervisors as well as those working in medium and large firms earn more than their respective categories, while those working night shifts earn less (see table 5.12, column 3; table 5.13; column 3).

5.8 Concluding Remarks

To sum up, this chapter has addressed the impact of productivity on the Egyptian private sector's wage levels. Due to the unavailability of individual labour productivity measures, we have used health as a proxy. This rests on the assumption that healthier individuals are more likely to exert more effort and perform better on the job, an issue that has been addressed and confirmed by various studies.

In modelling wages, we expected two biases due to selection into participation in the labour force and the endogeneity of health. Accordingly, we utilised 2SLS and MLE approaches, and in both cases, we have corrected for selection into the labour force participation and the endogeneity of health biases. While we found that the impact of the selection bias on wages is limited, we found that correcting for the endogeneity of health significantly influences the health results. Specifically, once endogeneity is addressed, better health is found to significantly contribute to wages of both samples. Furthermore, we found that the 2SLS model, which overlooks the discrete ordered nature of health, over-estimates the effect of health on wages relative to our preferred MLE model.

Thus, we conclude that health plays an important role in enhancing the private sector's wage levels. Furthermore, if health is indeed an appropriate proxy for productivity, then this effect of health is of even higher value, especially given Egypt's high reliance on manual labour, poor health-care services, and the ease of diseases spreading. Accordingly, health should be viewed and evaluated from two angles (Cai, 2009). Health is an end in itself, as improving the population's health is crucial for their well-being. In addition, health also plays an instrumental role in labour markets. Egyptian policy-makers and officials therefore need to review the role of health in economic development and labour markets. On a final note, it is important to recognise that one solution does not fit all in the Egyptian context. Policy-makers should formulate policies that target groups separately, such as men and women, different occupations, formal and informal jobholders, etc.

5.9 Appendix 5

Table 5.12: Wage Equation Results (Complete Labour Sample):

	(1)	*(2)*	*(3)*
	DEPENDENT VARIABLE: WAGES		
Variables	**OLS**	**2SLS**[45]	**MLE**
HEALTH	-0.011 *(0.013)*	0.308* *(0.181)*	0.199** *(0.092)*
Individual Characteristics			
AGE	0.013** *(0.006)*	0.001 *(0.012)*	0.003 *(0.009)*
AGE SQUARED	-0.0001 *(0.0001)*	0.0002 *(0.0002)*	0.0001 *(0.0001)*
MALE	0.364*** *(0.047)*	0.312*** *(0.068)*	0.318*** *(0.057)*
*Marital Status*Gender:*			
MARRIED*MALE	0.103*** *(0.023)*	0.073** *(0.033)*	0.077*** *(0.027)*
MARRIED*FEMALE	0.161** *(0.065)*	0.244** *(0.098)*	0.225*** *(0.073)*
Region:			
RURAL LOWER	-0.108*** *(0.023)*	-0.101*** *(0.024)*	-0.106*** *(0.024)*
URBAN UPPER	-0.085*** *(0.029)*	-0.123*** *(0.037)*	-0.112*** *(0.031)*
URBAN LOWER	-0.097*** *(0.031)*	-0.097*** *(0.033)*	-0.101*** *(0.032)*
ALEX/SUEZ CAN	-0.031 *(0.035)*	-0.114* *(0.059)*	-0.089** *(0.044)*
GREATER CAIRO	0.061* *(0.032)*	0.058* *(0.035)*	0.055* *(0.032)*
Parents' Education:			
FATHER EDUC	0.036 *(0.023)*	0.043* *(0.025)*	0.040* *(0.023)*
MOTHER EDUC	0.061** *(0.029)*	0.059* *(0.030)*	0.060** *(0.029)*
Human Capital Characteristics			
Education:			
LIT/NO DIP	0.014 *(0.042)*	0.008 *(0.045)*	0.010 *(0.043)*
ELEMENTARY	0.016 *(0.029)*	0.015 *(0.032)*	0.017 *(0.030)*
MIDDLE SCHOOL	-0.014 *(0.036)*	-0.019 *(0.041)*	-0.012 *(0.038)*
GENERAL HIGH	0.145*** *(0.054)*	0.166*** *(0.059)*	0.168*** *(0.058)*
VOCATIONAL	0.058** *(0.025)*	0.015 *(0.034)*	0.030 *(0.028)*
POST-SEC	0.137** *(0.055)*	0.106 *(0.067)*	0.116** *(0.057)*
UNIVERSITY	0.182*** *(0.040)*	0.130*** *(0.049)*	0.142*** *(0.043)*
POST-GRAD	0.080 *(0.137)*	0.068 *(0.164)*	0.066 *(0.140)*
TRAINING	0.102** *(0.045)*	0.137** *(0.062)*	0.103** *(0.044)*
Job Characteristics			
Occupation:			
PROFESSIONAL	-0.021 *(0.087)*	0.038 *(0.121)*	-0.021 *(0.086)*
TECHNICIAN	-0.132 *(0.091)*	-0.048 *(0.124)*	-0.131 *(0.091)*
CLERICAL	-0.180* *(0.102)*	-0.076 *(0.142)*	-0.183* *(0.102)*
SERVICE/SALES	-0.210** *(0.087)*	-0.138 *(0.118)*	-0.208** *(0.086)*
AGR/FOR/FISH	-0.173* *(0.089)*	-0.096 *(0.122)*	-0.170* *(0.089)*
CRAFT/TRADE	-0.020 *(0.087)*	0.055 *(0.119)*	-0.018 *(0.087)*
MACHINE OP	-0.126 *(0.087)*	-0.051 *(0.118)*	-0.125 *(0.087)*
ELEMENTARY OC	-0.261*** *(0.090)*	-0.167 *(0.125)*	-0.257*** *(0.090)*
TENURE	0.008*** *(0.003)*	0.008** *(0.003)*	0.008*** *(0.003)*
TENURE SQUARED	-0.0002** *(0.0001)*	-0.0002** *(0.0001)*	-0.0002** *(0.0001)*
Stability:			
TEMPORARY	-0.132*** *(0.027)*	-0.128*** *(0.030)*	-0.134*** *(0.026)*
SEASONAL	0.332*** *(0.088)*	0.383*** *(0.097)*	0.332*** *(0.088)*
CASUAL	0.209*** *(0.022)*	0.220*** *(0.025)*	0.209*** *(0.022)*
UNION	0.170*** *(0.034)*	0.168*** *(0.042)*	0.170*** *(0.034)*
SUPERVISOR	0.178*** *(0.032)*	0.184*** *(0.037)*	0.176*** *(0.032)*
NIGHT	-0.070*** *(0.018)*	-0.072*** *(0.020)*	-0.072*** *(0.018)*
FORMAL	0.133*** *(0.027)*	0.122*** *(0.031)*	0.132*** *(0.027)*
Firm Size:			
MEDIUM	0.087* *(0.046)*	0.085 *(0.054)*	0.089* *(0.046)*
LARGE	0.075** *(0.030)*	0.082** *(0.034)*	0.076** *(0.030)*
UNKNOWN	-0.008 *(0.044)*	0.003 *(0.043)*	-0.006 *(0.044)*
IMR	…….	-0.090 *(0.066)*	…….
Constant	0.663*** *(0.146)*	-0.198 *(0.663)*	0.202 *(0.332)*
N	***5,652***	***5,652***	***5,652***
R2	***0.1721***	***0.0804***	***……..***

Standard errors in brackets
**** p<0.01, ** p<0.05, * p<0.1*

[45] Bootstrapped standard errors.

Table 5.13: Wage Equation Results (Male Labour Sample):

	(1)	*(2)*	*(3)*
	DEPENDENT VARIABLE: WAGES		
Variables	**OLS**	**2SLS**[46]	**MLE**
HEALTH	-0.015 *(0.013)*	0.400** *(0.164)*	0.242*** *(0.083)*
Individual Characteristics			
AGE	0.016** *(0.006)*	-0.008 *(0.013)*	0.003 *(0.010)*
AGE SQUARED	-0.0001 *(0.0001)*	0.0003 *(0.0002)*	0.0001 *(0.0001)*
*Marital Status*Gender:*			
MARRIED*MALE	0.096*** *(0.023)*	0.070** *(0.027)*	0.079*** *(0.025)*
Region:			
RURAL LOWER	-0.108*** *(0.023)*	-0.088*** *(0.025)*	-0.098*** *(0.024)*
URBAN UPPER	-0.087*** *(0.029)*	-0.136*** *(0.038)*	-0.119*** *(0.031)*
URBAN LOWER	-0.103*** *(0.032)*	-0.097*** *(0.035)*	-0.104*** *(0.033)*
ALEX/SUEZ CAN	-0.035 *(0.036)*	-0.139** *(0.057)*	-0.103** *(0.043)*
GREATER CAIRO	0.031 *(0.033)*	0.033 *(0.037)*	0.027 *(0.034)*
Parents' Education:			
FATHER EDUC	0.027 *(0.023)*	0.045* *(0.026)*	0.037 *(0.024)*
MOTHER EDUC	0.055* *(0.030)*	0.055 *(0.034)*	0.053* *(0.031)*
Human Capital Characteristics			
Education:			
LIT/NO DIP	0.002 *(0.043)*	0.008 *(0.047)*	-0.006 *(0.044)*
ELEMENTARY	-0.001 *(0.030)*	0.007 *(0.033)*	0.004 *(0.031)*
MIDDLE SCHOOL	-0.021 *(0.036)*	-0.014 *(0.046)*	-0.017 *(0.041)*
GENERAL HIGH	0.118** *(0.055)*	0.182*** *(0.069)*	0.155** *(0.064)*
VOCATIONAL	0.052** *(0.026)*	0.013 *(0.031)*	0.030 *(0.028)*
POST-SEC	0.145** *(0.057)*	0.117 *(0.074)*	0.129** *(0.059)*
UNIVERSITY	0.113*** *(0.041)*	0.072 *(0.048)*	0.081* *(0.044)*
POST-GRAD	-0.104 *(0.152)*	-0.137 *(0.190)*	-0.136 *(0.158)*
TRAINING	0.135*** *(0.047)*	0.170** *(0.067)*	0.135*** *(0.047)*
Job Characteristics			
Occupation:			
PROFESSIONAL	0.033 *(0.089)*	0.106 *(0.126)*	0.037 *(0.088)*
TECHNICIAN	-0.157* *(0.094)*	-0.064 *(0.127)*	-0.156* *(0.093)*
CLERICAL	-0.252** *(0.106)*	-0.117 *(0.153)*	-0.257** *(0.106)*
SERVICE/SALES	-0.254*** *(0.087)*	-0.163 *(0.121)*	-0.252*** *(0.087)*
AGR/FOR/FISH	-0.228** *(0.090)*	-0.130 *(0.123)*	-0.226** *(0.089)*
CRAFT/TRADE	-0.069 *(0.087)*	0.024 *(0.120)*	-0.066 *(0.087)*
MACHINE OP	-0.164* *(0.088)*	-0.069 *(0.120)*	-0.162* *(0.087)*
ELEMENTARY OC	-0.325*** *(0.091)*	-0.210* *(0.124)*	-0.322*** *(0.091)*
TENURE	0.005* *(0.003)*	0.005 *(0.003)*	0.005* *(0.003)*
TENURE SQUARED	-0.0001* *(0.0001)*	-0.0002** *(0.0001)*	-0.0001* *(0.0001)*
Stability:			
TEMPORARY	-0.107*** *(0.028)*	-0.104*** *(0.034)*	-0.108*** *(0.028)*
SEASONAL	0.274*** *(0.090)*	0.345*** *(0.099)*	0.274*** *(0.089)*
CASUAL	0.202*** *(0.022)*	0.219*** *(0.026)*	0.202*** *(0.022)*
UNION	0.163*** *(0.036)*	0.162*** *(0.045)*	0.163*** *(0.036)*
SUPERVISOR	0.213*** *(0.033)*	0.217*** *(0.038)*	0.210*** *(0.033)*
NIGHT	-0.066*** *(0.018)*	-0.068*** *(0.020)*	-0.069*** *(0.019)*
FORMAL	0.105*** *(0.028)*	0.085** *(0.032)*	0.103*** *(0.028)*
Firm Size:			
MEDIUM	0.090* *(0.049)*	0.088 *(0.059)*	0.092* *(0.049)*
LARGE	0.069** *(0.031)*	0.090** *(0.037)*	0.071** *(0.031)*
UNKNOWN	-0.012 *(0.045)*	0.008 *(0.048)*	-0.009 *(0.044)*
IMR	…….	-0.150** *(0.069)*	…….
Constant	1.061*** *(0.139)*	-0.009 *(0.635)*	0.432 *(0.337)*
N	***5,285***	***5,285***	***5,285***
R2	***0.1520***	…….	…….

Standard errors in brackets
**** p<0.01, ** p<0.05, * p<0.1*

[46] Bootstrapped standard errors.

Table 5.14: Health Equation Results[47] (Complete/Male Labour Samples):

	(1)	*(2)*	*(3)*	*(4)*
	DEPENDENT VARIABLE: HEALTH			
	COMPLETE LABOUR SAMPLE		**MALE LABOUR SAMPLE**	
Variables	**2SLS**	**MLE**	**2SLS**	**MLE**
Health Characteristics				
INJURY	-0.161*** *(0.035)*	-0.286*** *(0.060)*	-0.165*** *(0.035)*	-0.301*** *(0.060)*
DEADSIB	-0.041** *(0.019)*	-0.085** *(0.034)*	-0.043** *(0.020)*	-0.091*** *(0.034)*
MOTHER NO-EMP	0.097*** *(0.031)*	0.157*** *(0.055)*	0.113*** *(0.033)*	0.195*** *(0.058)*
Individual Characteristics				
AGE	0.012 *(0.010)*	0.031* *(0.019)*	0.002 *(0.013)*	0.002 *(0.036)*
AGE SQUARED	-0.0004*** *(0.0001)*	-0.001*** *(0.0003)*	-0.0003 *(0.0002)*	-0.0004 *(0.0005)*
MALE	0.017 *(0.066)*	0.130 *(0.122)*	…….	…….
*Marital Status*Gender:*				
MARRIED*MALE	0.038 *(0.031)*	0.124** *(0.057)*	0.018 *(0.027)*	0.049 *(0.056)*
MARRIED*FEMALE	-0.131* *(0.078)*	-0.325** *(0.139)*	…….	…….
Region:				
RURAL LOWER	-0.023 *(0.024)*	-0.007 *(0.042)*	-0.035 *(0.025)*	-0.032 *(0.042)*
URBAN UPPER	0.114*** *(0.030)*	0.226*** *(0.054)*	0.114*** *(0.031)*	0.231*** *(0.055)*
URBAN LOWER	-0.011 *(0.033)*	0.027 *(0.057)*	-0.019 *(0.034)*	0.014 *(0.059)*
ALEX/SUEZ CAN	0.245*** *(0.037)*	0.507*** *(0.065)*	0.238*** *(0.039)*	0.492*** *(0.069)*
GREATER CAIRO	-0.004 *(0.033)*	0.034 *(0.057)*	-0.022 *(0.035)*	0.008 *(0.060)*
Parents' Education:				
FATHER EDUC	-0.018 *(0.024)*	-0.035 *(0.042)*	-0.024 *(0.025)*	-0.044 *(0.046)*
MOTHER EDUC	0.041 *(0.031)*	0.076 *(0.056)*	0.058* *(0.033)*	0.124* *(0.064)*
Human Capital Characteristics				
Education:				
LIT/NO DIP	0.014 *(0.044)*	0.021 *(0.078)*	-0.0001 *(0.045)*	-0.005 *(0.081)*
ELEMENTARY	0.005 *(0.031)*	-0.008 *(0.054)*	0.009 *(0.032)*	-0.004 *(0.059)*
MIDDLE SCHOOL	0.058 *(0.040)*	0.061 *(0.072)*	0.084* *(0.043)*	0.131 *(0.096)*
GENERAL HIGH	0.003 *(0.061)*	-0.081 *(0.109)*	0.034 *(0.070)*	-0.024 *(0.163)*
VOCATIONAL	0.106*** *(0.027)*	0.186*** *(0.046)*	0.096*** *(0.027)*	0.161*** *(0.047)*
POST-SEC	0.060 *(0.058)*	0.102 *(0.101)*	0.065 *(0.060)*	0.099 *(0.106)*
UNIVERSITY	0.117*** *(0.043)*	0.252*** *(0.066)*	0.099** *(0.044)*	0.215*** *(0.066)*
POST-GRAD	0.003 *(0.143)*	0.048 *(0.246)*	0.121 *(0.162)*	0.284 *(0.286)*
TRAINING	-0.103** *(0.047)*	…….	-0.084* *(0.050)*	…….
Job Characteristics				
Occupation:				
PROFESSIONAL	-0.183** *(0.091)*	…….	-0.168* *(0.094)*	…….
TECHNICIAN	-0.260*** *(0.095)*	…….	-0.224** *(0.100)*	…….
CLERICAL	-0.327*** *(0.106)*	…….	-0.334*** *(0.113)*	…….
SERVICE/SALES	-0.218** *(0.091)*	…….	-0.214** *(0.093)*	…….
AGR/FOR/FISH	-0.229** *(0.093)*	…….	-0.233** *(0.095)*	…….
CRAFT/TRADE	-0.221** *(0.091)*	…….	-0.215** *(0.093)*	…….
MACHINE OP	-0.227** *(0.091)*	…….	-0.224** *(0.093)*	…….
ELEMENTARY OC	-0.282*** *(0.094)*	…….	-0.273*** *(0.097)*	…….
TENURE	0.002 *(0.003)*	…….	-0.0001 *(0.003)*	…….
TENURE SQUARED	0.00002 *(0.0001)*	…….	0.0001 *(0.0001)*	…….
Stability:				
TEMPORARY	-0.018 *(0.028)*	…….	-0.006 *(0.030)*	…….
SEASONAL	-0.154* *(0.092)*	…….	-0.162* *(0.095)*	…….
CASUAL	-0.033 *(0.023)*	…….	-0.035 *(0.023)*	…….
UNION	0.008 *(0.036)*	…….	0.002 *(0.038)*	…….
SUPERVISOR	-0.022 *(0.034)*	…….	-0.016 *(0.035)*	…….
NIGHT	0.009 *(0.019)*	0.016 *(0.031)*	0.008 *(0.019)*	0.022 *(0.033)*
FORMAL	0.032 *(0.028)*	…….	0.042 *(0.030)*	…….
Firm Size:				
MEDIUM	0.017 *(0.048)*	…….	0.017 *(0.052)*	…….
LARGE	-0.015 *(0.031)*	…….	-0.041 *(0.033)*	…….
UNKNOWN	-0.026 *(0.046)*	…….	-0.038 *(0.047)*	…….
IMR	0.091 *(0.059)*	…….	0.016 *(0.068)*	…….
Constant	3.285*** *(0.251)*	…….	3.493*** *(0.243)*	…….
N	***5,652***	***5,652***	***5,285***	***5,285***
R2	***0.1063***	…….	***0.1061***	…….

Standard errors in brackets
**** p<0.01, ** p<0.05, * p<0.1*

[47] Results of 2SLS models without bootstrapping.

Chapter VI
Determinants of Job Satisfaction: The Contribution of Wages to Job Satisfaction

6.1 Introduction

Contrary to the previous two chapters, which focused on the determinants of wages, we focus on the determinants of another important outcome of work in this chapter, which is job satisfaction. Specifically, we turn our attention to the determinants of job satisfaction in the Egyptian private sector, focusing on the impact of wages. Thus, the research question we address is, what is the effect of higher wages on job satisfaction? To answer this question, we utilise data from the 2012 round of the Egypt Labour Market Panel Survey (ELMPS) to estimate a satisfaction equation that traces the effect of wage levels, among other labour factors, on various measures of job satisfaction in Egypt.

It is important to analyse job satisfaction for a number of reasons. To begin with, job satisfaction, which represents the most accurate measure of utility derived from a person's job, is expected to contribute significantly to the overall life utility of an individual, since a person's job constitutes a major part of their lives. Thus, it has become an integral part of economic research (Brown & McIntosh, 2003). Additionally, job satisfaction is expected to significantly affect labour market outcomes. Clark (1996) explained that job satisfaction could impact labour market decisions in two ways. On the one hand, workers are likely to make their labour market participation, quits, and effort decisions based on how satisfied they are with their jobs, implying that job satisfaction is not merely relevant to wage issues, but also to labour effort and productivity. On the other hand, employers would like their employees to be satisfied to ensure better outcomes for their businesses. Thus, this topic may not only be a concern for employees, but also for employers and policy-makers. More pertinent to Egypt, job satisfaction issues have been largely disregarded by Egyptian literature, and its analysis in the Egyptian context is relatively in its infancy. This could be traced back to the lack of required data. Accordingly, this chapter aims to address job satisfaction more explicitly in the Egyptian labour market and uses nationally representative data that are relatively recent to do so.

Similar to chapter V, we expect two biases in the estimation of the job satisfaction equation. A sample selection bias may arise because a proportion of individuals do not engage in the labour market at all. If this lack of engagement is caused by some systematic

factors that also influence job satisfaction, then a selection bias arises in the estimated coefficients. Also, an endogeneity bias is likely to prevail because while wages may improve job satisfaction, higher job satisfaction levels could themselves push workers to improve their performance, and hence earn more. Attempting to correct for both biases simultaneously is especially challenging because the job satisfaction measure is a discrete ordered variable.

This chapter proceeds as follows, section **(6.2)** comprises a brief discussion of the evolution of the concept of job satisfaction and its theoretical framework. Section **(6.3)** highlights the relevant literature of the empirical research in the area, which is followed by a discussion of the relevant formal econometric framework in section **(6.4)**. Section **(6.5)** is comprised of three parts, beginning with a discussion of the various job satisfaction measures relevant to our analysis, followed by an explanation of the methodological challenges of sample selection and endogeneity, and finally an illustration of the methods utilised in the estimations. Section **(6.6)** follows and illustrates the variables utilised in the estimations. Finally, section **(6.7)** comprises the regression results and analysis, while section **(6.8)** summarises the most significant findings and concludes the chapter.

6.2 The Concept of Job Satisfaction and Theoretical Background

This section begins by defining job satisfaction and highlighting the criticisms accompanying this measure and then discusses the theoretical basis of job satisfaction studies.

6.2.1 The Definition of Job Satisfaction

Locke (1976), who provides one of the earliest thorough reviews of the concept of job satisfaction, initially defines job satisfaction as the positive feelings individuals experience towards their jobs in comparison to other labour market opportunities or some reference. While this definition highlights the subjective and behavioural aspect of the concept of job satisfaction, most scholars are in agreement when it comes to the general understanding of job satisfaction measures. Hamermesh (1999) stated, “All of the available sets of data describe job satisfaction (JS) as a categorical response that presumably maps the worker’s underlying feelings about his/her job to a few discrete choices” (p.3). Still, a distinction should be made between job satisfaction and morale, which are often used interchangeably. Locke (1976) highlighted that morale is future-oriented, while job

satisfaction is past- and present-oriented. This distinction highlights the importance of the factor of time and its impact on satisfaction levels that may be induced as more experiences are accumulated from the labour market.

Job satisfaction measures, similar to numerous scale-ranked measures, have been met with numerous criticisms concerning their usefulness and accuracy in analytical studies. One criticism relates to the subjectivity of the job satisfaction measures. Since these measures represents individuals' own appraisal of their jobs, it is plausible to expect that each individual would understand or view the rankings differently as well as compare their jobs to distinct alternatives. Thus, results may be distorted with each individual's subjective view of satisfaction levels. Freeman (1978), who was among the earliest to economically address job satisfaction, began his paper by pronouncing the subjectivity of job satisfaction measures as well as addressing these concerns and the validity of this measure. Freeman (1978) concluded that while the measure represents complexities due to the psychological aspect involved, it still contains useful information.

Another criticism of job satisfaction studies relates to the failure of acknowledging the adaptation theory, which is based on the Hedonic Treadmill model. Hanglberger and Merz (2015) explained that the Hedonic Treadmill model proposes that the impact of factors on job satisfaction may be short-lived, and eventually workers return to their baseline happiness level. Thus, changes owing to the factors that impact job satisfaction should not be viewed as permanent. Various studies have addressed this adaptation theory, but in relation to general life events, such as disability (Oswald & Powdthavee, 2008) and divorce (Lucas, 2005).

Despite the above criticisms in which authors remain inconclusive, the consistency of empirical results with respect to various influences (Brown & McIntosh, 2003; Clark, 1997) eventually led to the general acceptance of job satisfaction studies, methods, and conclusions reached. Additionally, there has not been much progress in identifying an alternative variable to measure job satisfaction levels. Accordingly, the value and importance of this measure in informing us much about the labour market has not been compromised.

6.2.2 The Evolution of Job Satisfaction Theories

Job Satisfaction, representing utility from work, stemmed from under the umbrella of utility maximisation issues. Utility is considered one form of welfare, and as Clark (1996) explained, the distribution of welfare represents one of the main interests for social scientists at large, and specifically economists. Locke (1976) explained that the roots of job satisfaction date back to the beginning of the 1900s, when Taylor (1914) became interested in how workers' attitudes affect their performance, leading to various studies that addressed the impact of fatigue, boredom, and rest pauses on workers' performance.

Locke (1976) identified three major schools of thought or historical trends in job satisfaction studies. The first and oldest school, the physical-economic school, which corresponded with the work of Taylor (1914), highlighted the influence of working conditions or environment on job satisfaction. This was followed by the social or human relations school, which emphasised the impact of employer-employee relations on job satisfaction. One of the most popular studies that addressed this school's ideas is known as the Hawthorne studies, which was later criticised and re-evaluated (Carey, 1967). Finally, the newest school of thought, the growth (work itself) school, highlighted the link between job satisfaction and growth in skill, efficacy, and responsibility. Recent economic studies can be viewed to link all of these ideas by producing a single framework that equally emphasises the various factors identified by the different schools.

Moreover, it should be noted that the root of the theoretical basis of job satisfaction lies more in psychological and sociological theories. Locke (1976) had differentiated between process theories and content theories. Process theories determine the potential factors that could contribute to job satisfaction and their impact. Locke (1976) extended the discussion further to outline the main contributing factors to job satisfaction, including the nature of work, pay, promotions, recognition, and working conditions. He further reviewed some of the studies that addressed the impact of these factors on job satisfaction, whose significance lies in how they instituted the different variables relevant to job satisfaction, which future studies, specifically economic ones, have utilised and examined. Still, these studies are hardly relevant here as they are out-dated and not strictly economic. Moreover, they have addressed a single factor at a time, which contrasts empirical economic studies that aim to include and control for as many relevant variables as possible by estimating multivariate equations.

On the other hand, Content theories identify the specific needs and values that enhance job satisfaction. Locke (1976) highlighted two content theories, Maslow's Hierarchy of Needs theory and Herzberg's Motivator-Hygiene theory. Maslow's Hierarchy of Needs theory ranks an individual's five basic needs in a certain order, where one type will not satisfy a person unless the previous need has already been fulfilled. These five needs in order are physiological, safety, belongingness, esteem, and self-actualisation. Conversely, Herzberg's Motivator-Hygiene theory differentiates between motivator factors and dissatisfaction factors. The former includes achievement, growth and advancement, recognition, nature of work, as well as responsibility, while the latter include company policies, working conditions, salary, status, security, supervision, and work relationships.

Thus, regardless of the discipline considered, studies of job satisfaction have undergone a long process of evolution and development. This helped establish numerous consistencies with respect to findings, which validate the present studies and their analyses.

6.3 Literature Review

Based on the above discussion of theory, we note that job satisfaction studies go back a long way and across a range of disciplines, which preceded empirical economic research that mainly dates back to the 1970s (Hamermesh, 1976; Freeman, 1978). In this section, we review some of the economic job satisfaction studies.

The main research question addressed in these studies revolved around identifying and inspecting the impact of the determinants of job satisfaction. Among the most popular studies in the area is Clark (1996), which examined the impact of various individual and job characteristics on job satisfaction levels in Britain. Over time, researchers began to focus on specific aspects of job satisfaction, including gender differentials (Bender et al., 2005; Clark, 1997; Sousa-Poza & Sousa-Poza, 2003), age (Kalleberg & Loscocco, 1983), job matching with education (Belfield & Harris, 2002), union membership (Gordon & Denisi, 1995; Schwochau, 1987; Bender & Sloane, 1998), sectoral differentials (Brown & McIntosh, 2003), occupational differentials (Shields & Ward, 2001; Laband & Lentz, 1998; Ward & Sloane, 2000), regional differences (Jones & Sloane, 2009), part-time work effect (Booth & Van Ours, 2008), and returns to wages (Borjas, 1979; Igalens & Roussel, 1999; Blaul, 1994; Chevalier & Lydon, 2002).

The literature that addressed the impact of wages on job satisfaction could be divided into two categories, studies focusing on the absolute wage (Albert & Davia, 2005) and those focusing on relative income, comparing an individual's own wages with some benchmark (Clark & Oswald, 1996). Scholars supported the use of the relative income measure by explaining that absolute pay is usually only weakly significant to job satisfaction due to unobserved factors in the relationship between job satisfaction and wages, and thus argued that relative income is a more appropriate measure to use in job satisfaction studies (Clark, 1996; Clark & Oswald, 1996). Also, Clark and Oswald (1996) substantiated their use of relative income by the ideas of 'Relative Deprivation' theory, which postulates that individuals evaluate their pay relative to a yardstick when determining their job satisfaction level. Nevertheless, Chevalier and Lydon (2002) argued that there was little basis to the above-discussed ideas, and that the effect of these unobserved factors is eliminated once endogeneity is addressed.

Additionally, and similar to the ELMPS, a variety of other surveys employed in the literature included questions about the individuals' levels of satisfaction with pay, promotion opportunities, and job content. This contributed to an extension of the literature in this area (Brown & McIntosh, 2003; Gazioglu & Tansel, 2006). There are two potential methods for examining these additional job satisfaction measures, which we refer to as 'Components of Job Satisfaction'. One method analyses each job satisfaction component separately (Gazioglu & Tansel, 2006), while another method employs a Principal Component Analysis (PCA), which reduces the number of components to a small number of derived variable(s) that capture the most variation in the components. This is then used as a dependent variable in a typical satisfaction equation (Brown & McIntosh, 2003).

In this context, Brown and McIntosh (2003) estimated a satisfaction equation by regressing overall job satisfaction on all of the different satisfaction variables along with the common individual and job characteristics utilised in such studies. One problem with this approach is that these satisfaction variables are likely to be components, rather than determinants, of overall job satisfaction. Additionally, the rest of the control factors they utilised may be determinants of these components of job satisfaction variables. In fact, Brown and McIntosh (2003) admitted that the high correlations between the control variables and the other components of job satisfaction measures could be the reason behind the insignificant results for the rest of the control variables. Thus, it may be more appropriate to examine the correlation between overall job satisfaction and the components of job satisfaction

variables (see table 3.6) separately from examining the impact of other variables on overall job satisfaction.

Generally, there is a large degree of consistency in the job satisfaction literature in terms of data, methods, and findings. In terms of data, scholars have identified and examined a variety of job satisfaction determinants, including age, gender, health, education, race, housing tenure, region, income, hours, industry, occupation, firm size, union membership, and stability of job (Clark 1996; Clark & Oswald, 1996; Gazioglu & Tansel, 2006; Sousa-Poza & Sousa-Poza, 2003; Bender et al., 2005). As the literature developed, additional determinants were addressed, such as travel time and night work (Jones & Sloane, 2009), number of children (Kalleberg & Loscocco, 1983; Brown & McIntosh, 2003), and training (Shields & Ward, 2001; Gazioglu & Tansel, 2006).

Similarly, methods of estimation were somewhat consistent across the literature. Due to the discrete ordered nature of the job satisfaction variables, Ordered Probit models have been estimated to address job satisfaction, whether with cross-sectional data (Brown & McIntosh, 2003) or panel data (Jones & Sloane, 2009). Yet, this method fails to account for the potential endogeneity of wages in the estimation of job satisfaction. To correct for this endogeneity, Albert and Davia (2005) estimated a simultaneous model for wages and job satisfaction, in which job satisfaction was modelled as a continuous rather than a discrete variable. Chevalier and Lydon (2002), who also estimated a simultaneous model, have discussed the complexities of finding appropriate and strong identifiers/instruments for each equation, especially as most of the explanatory variables that go in the wage equation are also included in the job satisfaction equation. In fact, even Chevalier and Lydon (2002), who utilised the spouse's characteristics to identify the wage equation, admitted that they could not find strong identifiers for the job satisfaction equation. Thus, correcting for endogeneity, whilst acknowledging the discrete nature of job satisfaction measures, complicates our model.

In terms of findings, a number of relationships have been consistent across the literature. Most relevant to our analysis is the particular relationship highlighted between job satisfaction, wages, and productivity. Higher wages have been acknowledged to have a major role in improving labour's morale and contentment with their jobs, as represented in job satisfaction measures (Locke, 1976; Bender et al., 2005; Clark, 1996; Chevalier & Lydon, 2002; Jones & Sloane 2009), which in turn should reflect in superior performance

and productivity levels. Gazioglu and Tansel (2006) specifically pointed out this relationship between job satisfaction and productivity, quits, and absenteeism, which are of utmost concern to all employers. Similarly, Clark et al. (1998) found that workers who reported lower levels of satisfaction in Germany were more likely to quit their jobs than others, and Oswald et al. (2009) found that happiness in the workplace leads to an increase in labour productivity, pinpointing the importance of job satisfaction in enhancing labour market outcomes.

Other consistent findings among the different studies include differentials in job satisfaction based on gender, age, and education. Women are consistently found to report higher levels of job satisfaction compared to men (Gazioglu & Tansel, 2006; Sousa-Poza & Sousa-Poza, 2003; Bender et al., 2005). Also, the more educated have been found to report lower job satisfaction levels (Clark & Oswald, 1996; Gazioglu & Tansel, 2006), while job satisfaction was found to be U-shaped in age (Brown & McIntosh, 2003; Gazioglu & Tansel, 2006). These differentials were mainly traced back to differences in expectations. For instance, younger or more educated individuals may have higher expectations than older ones with more labour market experience or those with fewer educational achievements. Brown and McIntosh (2003) also outlined a number of statistically significant relationships from the literature, such as the positive relationship between job satisfaction and marriage, good health, and senior occupations as opposed to a negative relationship with firm size.

Turning to Egypt, we find that job satisfaction data for a nationally representative sample of Egyptian labour was only made available in 2012 and is yet to be utilised in analyses. Thus, with the exception of a minority of studies that were neither strictly economic nor empirical, and those that used actual data used small unrepresentative samples (Badran & Kafafy, 2008), a gap remains in the Egyptian literature. Accordingly, this research utilises the newly available nationally representative satisfaction data of Egypt to understand what contributes to job satisfaction, and in particular, to consider the impact of wages in determining job satisfaction.

6.4 Econometric Framework

As previously discussed, the concept of job satisfaction stems from utility maximisation. Thus, the discussion of the econometric framework begins by illustrating the utility

function, from which the job satisfaction equation, illustrated afterwards, is derived. This section illustrates the specific job satisfaction equation of interest, but the discussion of the wage and selection equations required to address the endogeneity of wages and selection into participation, respectively, are retained to the following section (see section 6.5), since these have already been discussed in chapter V (see section 5.4).

6.4.1 Utility Function

Job satisfaction is considered to be the way workers view their utility from work, and a person's utility from work is only one part of overall life utility. Accordingly, economists (Clark & Oswald, 1996) illustrate life satisfaction/utility as follows,

$$\boldsymbol{v = v[u(y, h), \mu]}$$

Where,

v - Life satisfaction

u – Utility from work

y – Income

h - Hours of work

μ - Utility from non-job related aspects

The above model represents life utility (v) as a function of utility from work (u) and utility from other non-job related aspects (μ). Utility from work is determined by two main factors, which include income and hours of work. Clark (1997) summarised why such a model is appropriate and useful based on Argyle's (1989) claim of the importance of job satisfaction in overall life satisfaction, the expected correlations between job satisfaction and variables such as quits, absenteeism, and productivity, as well as job satisfaction being the closest proxy for measurement of utility from work.

As more studies were conducted, more variables were found to have an impact on this utility from work. Accordingly, the model was extended to account for more determinants of utility from work that can be categorised into a set of individual *(x)*, human capital *(c)*, and job *(j)* characteristics. Individual characteristics generally include demographic factors, such as age, gender, and region, while human capital factors include education, experience, and training. Job characteristics, on the other hand, may include any factor related to an individual's job, such as occupations, firm size and location, union membership, and others. This extended model is demonstrated as follows,

$$\boldsymbol{v = v[u(y, h, x, c, j), \mu]}$$

Where,

x - Individual characteristics

c - Human capital Characteristics

j - Job characteristics

Thus, utility from work can be solely defined as a sub-utility function as follows,

$$\boldsymbol{u = u(y, h, x, c, j)}$$

Clark and Oswald (1996), who particularly concentrated on wages and hours of work, specified two assumptions concerning the above 'utility from work' function. Firstly, utility is increasing in wage levels. Secondly, utility is decreasing in hours of work. In other words, as wage levels increase, levels of job satisfaction should increase, while an increase in hours of work should reduce the reported levels of job satisfaction.

6.4.2 Job Satisfaction Equation

Based on the above functions, the specific job satisfaction equation to be estimated can be derived and is identified as,

$$\boldsymbol{S_i = \beta_1[Log(w_i)] + \beta_2(X_i) + \beta_3(C_i) + \beta_4(J_i) + \mu_i} \qquad \textbf{(EQ.I)}$$

Where,

S_i - Satisfaction level of individual *i*

$Log(w_i)$ – Logarithm of hourly wages of individual *i*

X_i – Individual characteristics of individual *i*

C_i – Human capital characteristics of individual *i*

J_i - Job characteristics of individual *i*

β – Coefficients

μ – Error terms

EQ.I represents a form of non-linear equation, where the discrete ordered dependent variable, which is the satisfaction level of individuals (*S)*, is regressed on the individuals' logarithm of hourly wages [*Log (w)*] and the control variables, including individual *(X)*, human capital *(C)*, and job *(J)* characteristics. Note that 'hours of work' is among the job characteristics *(J)* in our model as it represents one of the control variable in our analysis.

6.5 Methodology

This section begins by discussing the various satisfaction variables used in our analysis. This is followed by an illustration of the methodological challenges of estimating the effect of wages on job satisfaction and the methods utilised in the estimation of the satisfaction equations.

6.5.1 Job Satisfaction Measures

As discussed in chapter III (see section 3.4.4), the ELMPS provides us with nine different job satisfaction variables. The 'overall job satisfaction' measure resembles the variable used in the various job satisfaction studies. The other eight variables, which we refer to as 'components of job satisfaction' measures, include satisfaction with job security, satisfaction with wages, satisfaction with type of work, satisfaction with working hours, satisfaction with working schedule, satisfaction with working conditions, satisfaction with distance to work/commuting, and satisfaction with matching between qualifications and the job. Our objective would essentially require the estimation of a satisfaction equation for each satisfaction measure of interest to examine the determinants of these satisfaction variables and provide insights into which factors are the most influential in improving job satisfaction in Egypt.

Four notes are worth making at this stage. First, overall job satisfaction may be estimated by a typical satisfaction equation (EQ.I), as is common in the literature. Second, the satisfaction with specific job aspects measures may be perceived as components of overall job satisfaction, as discussed in chapter III and verified by the significant correlation coefficients (see table 3.6). Third, 'satisfaction with wages' is likely to be highly correlated with our main independent variable of interest, which is wages, and thus may bring forward a host of different biases. Consequently, we omit this variable from our analysis, as our objective is to primarily examine the impact of wages on satisfaction levels. Fourth, the components of job satisfaction variables are likely to be highly correlated, thus examining each variable separately may provide redundant results and not very intuitive conclusions. Accordingly, we utilise the better-suited Principal Component Analysis (PCA) method, whose main essence is to limit the number of dependent variables to only those with the most variation. This results in a derived variable(s), which is then examined by a typical satisfaction equation.

6.5.2 Methodological Challenges

There are two methodological issues that we need to address in our estimations, namely the sample selection bias and the endogeneity of wages.

6.5.2.1 Sample Selection Bias:

Similar to chapter V, we expect a sample selection bias because some individuals may drop out of the labour force for many reasons, such as extreme dissatisfaction with labour market conditions. Since these individuals do not provide information regarding job satisfaction or wages and they are normally dropped out of the sample of interest, this unaccounted for sample may impact our estimations, leading to biased results. Accordingly, we need to to correct for this bias. This selection equation is identified as,

$$\mathbf{Pr}(\boldsymbol{y_i = 1|x_i}) = \mathbf{Pr}[\boldsymbol{a + \beta_1(X_i) + \beta_2(C_i) + \beta_3(L_i) + \gamma_i}] \qquad \textbf{(EQ.II)}$$

Where,

$y_i = 1$ – Participation into labour force for individual *i*

X_i – Individual characteristics of individual *i*

C_i – Human capital characteristics of individual *i*

J_i - Job characteristics of individual *i*

L_i – Selection-Specific characteristics of individual *i*

β – Coefficients

a - Constant term

$\gamma -$ Error terms

6.5.2.2 The Endogeneity of Wages:

Another methodological issue concerns the endogeneity of wages in the estimation of job satisfaction. Higher wages are expected to enhance an individual's satisfaction level with the job. Yet, this increased job satisfaction may imply that workers are more content with their jobs, and therefore may exert more effort and contribute higher productivity, which would mirror in an individual's pay, as postulated by economic theory. Thus, this reverse causality may lead to biased and inconsistent results. Consequently, to conduct accurate estimations and be able to make correct conclusions and inferences, we need to correct for this bias. Instrumenting the endogenous variable, which in this case is the individual's wage level, is commonly used to do this, and we identify our wage equation as follows,

$$\boldsymbol{Log(w_i) = a + \beta_1(X_i) + \beta_2(C_i) + \beta_3(J_i) + \beta_4(I_i) + \varepsilon_i} \qquad \textbf{(EQ.III)}$$

Where,

$Log(w_i)$ – Logarithm of hourly wages of individual *i*

X_i – Individual characteristics of individual *i*

C_i – Human capital characteristics of individual *i*

J_i - Job characteristics of individual *i*

I_i – Wage identifiers of individual *i*

β – Coefficients

a - Constant term

ε - Error terms

Note that we have dropped the health variable from the wage equation (EQ.III), to avoid any further biases, as we have seen in chapter V that health is endogenous to wages.

6.5.3 The Estimation of Overall Job Satisfaction

A variety of differentiated methods are utilised to answer our research question. Specifically, we utilise Ordinary Least Squares (OLS), Ordered Probit (OPROBIT), Two-Stage Least Squares (2SLS), and Maximum Likelihood Estimation (MLE), which we explain in this section. The methods and results are organised in such a way as to trace the effect of relaxing assumptions on the results obtained by the different models.

6.5.3.1 Ordinary Least Squares (OLS):

Firstly, a basic OLS model of EQ.I is estimated. This model is based on the linearity assumption, which treats the dependent variable as a continuous variable. In addition, it overlooks sample selection and assumes the exogeneity of wages. We therefore only use the OLS results for comparison purposes.

6.5.3.2 Ordered Probit (OPROBIT):

This second approach, which is more evident across the literature, relaxes this linearity assumption and instead utilises a non-linear model to estimate EQ.I to account for the discrete ordered nature of job satisfaction. However, it fails to correct for sample selection and the endogeneity of wages, and therefore similar to OLS, we might expect the results of this estimation to also be biased and inconsistent. They are therefore only included for comparison purposes.

6.5.3.3 Two-Stage Least Squares (2SLS):

Similar to the 2SLS model estimated in chapter V (see section 5.5.2.2), we estimate a 2SLS model of job satisfaction to address the endogeneity of wages and sample selection. The model begins by estimating a selection equation (EQ.II), from which we calculate the Inverse Mills Ratio *(IMR)*, as we have done in previous chapters, to be included in the job satisfaction equation to correct for the likely sample selection bias. The model continues with the typical two stages of 2SLS models, incorporating a selection correction term. We estimate a reduced-form wage equation (EQ.IV) as follows.

$$\boldsymbol{Log(w_i) = \beta_1(X_i) + \beta_2(C_i) + \beta_3(J_i) + \beta_4(I_i) + \beta_5(IMR) + \mu_i} \qquad \textbf{(EQ.IV)}$$

As shown in EQ.IV, the logarithms of hourly wages [*Log (w)*] are regressed on all of the exogenous individual *(X)*, human capital *(C)*, and job *(J)* characteristics, the *IMR*, and the wage identifiers *(I)*, which should be significantly correlated with wages, but not job satisfaction, to adhere to the exclusion restrictions. The variables *(I)* include the private sectors' average weekly wages in the respondents' industries stratified by gender, occupations, tenure, and tenure squared.

The above allows us to obtain a predicted value for wages, which is then inserted into the job satisfaction equation as a substitute to the original observed wage variable, and we correct for any variation that may be unexplained by using estimates from one model into the other by bootstrapping the whole procedure. Thus, the wage equation we estimate is,

$$\boldsymbol{S_i = \beta_1\left[\widehat{Log(w_i)}\right] + \beta_2(X_i) + \beta_3(C_i) + \beta_4(J_i) + \beta_5(IMR) + \mu_i} \qquad \textbf{(EQ.IV)}$$

Where,

$\boldsymbol{Log\ (w_i)}$– Predicted Logarithm of hourly wages of individual *i*

While the 2SLS method allows us to correct for the endogeneity of wages in the estimation of job satisfaction, this method takes us back to the linearity assumption and treats job satisfaction as a continuous variable, since the job satisfaction equation is estimated utilising a linear method. Drawing on Heckman's (1977; 1979) arguments, Goldsmith et al. (2000) explained that the coefficients obtained by this model are consistent, while standard deviations are not, and hence are not problematic for the purpose of similar research. Still, we remain sceptical about the results due to the nature of the dependent variable of job

satisfaction. Accordingly, we need to correct for selection and instrument wages, whilst utilising a non-linear estimation method, such as the OPROBIT model.

6.5.3.4 Maximum Likelihood Estimation (MLE):

Our preferred estimation method, the MLE, allows us to estimate an Instrumental Variable Ordered Probit model that includes selection. This method relaxes the linearity assumption by acknowledging the discrete ordered nature of the job satisfaction measure and allows the instrumentation of wages and selection to deal with the endogeneity and sample selection biases, respectively. Thus, the method is similar to 2SLS, but more fitting for the discrete ordered dependent variable and should provide more efficient results, as argued by Roodman (2015).

We use the conditional mixed process (CMP) estimator to estimate a multi-equation simultaneous system, which allows us to mix between models with linear and discrete dependent variables, as explained in chapter V (see section 5.5.2.3). Thus, we specify that our three equations of interest, the satisfaction equation (EQ.I), the selection equation (EQ.II), and the wage equation (EQ.III), be estimated by Ordered Probit, Probit, and OLS, respectively. The estimation is conducted taking into account that equations may vary by observation, thus the selection equation utilises the complete sample, while the wage and job satisfaction equations utilise only the subset with complete observations (i.e. the employed individuals who provide information regarding their wages and job satisfaction levels). Note that in order to promote consistency of the results, we use the same sample and instruments in the 2SLS and MLE models to facilitate comparisons of results.

6.5.4 The Estimation of Components of Job Satisfaction

While all of the above methods can be used to estimate the satisfaction equation regardless of what the satisfaction variable is, there may be a more efficient way to estimate the components of job satisfaction equations, precisely by using a Principal Component Analysis (PCA).

6.5.4.1 Principal Component Analysis (PCA):

As illustrated earlier (see section 6.5.1), we are interested in the impact of wages on seven components of job satisfaction variables, including satisfaction with job security, satisfaction with type of work, satisfaction with working hours, satisfaction with working schedule, satisfaction with working conditions, satisfaction with distance to

job/commuting, and satisfaction with matching between qualifications and the job. Inspecting the correlations between these variables, we find that all variables are highly and significantly correlated (see table 6.1), indicating that the variables may be showing similar or related aspects of the job and the likelihood that results of separate estimations of these variables may be repetitive and not very intuitive to analyse. For instance, we can observe a very high and significant correlation between satisfaction with working hours and satisfaction with working schedule, equal to 0.798 (see table 6.1). Thus, it may be more sensible and efficient to produce a combined measure(s) that captures all the variation in the least possible number of variables.

Table 6.1: Correlation Coefficients – Components of Job Satisfaction Measures:

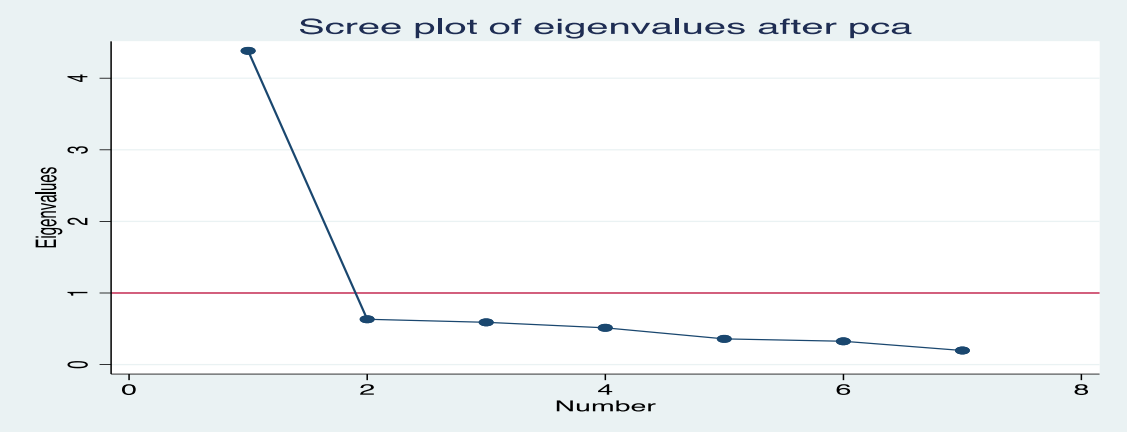
	Job Security	Type of Work	Work Hours	Work Schedule	Work Conditions	Commuting	Matching
Job Security	1.0000						
Type of Work	0.584*	1.0000					
Work Hours	0.533*	0.632*	1.0000				
Work Schedule	0.512*	0.607*	0.798*	1.0000			
Work Conditions	0.564*	0.660*	0.643*	0.664*	1.0000		
Commuting	0.390*	0.475*	0.492*	0.520*	0.529*	1.0000	
Matching	0.468*	0.623*	0.515*	0.522*	0.570*	0.452*	1.0000

$p<0.05$

6.5.4.2 Preparation of the Principle Components Measure(s):

A PCA approach allows us to derive that combined variable. The first step of this procedure is to determine how many components or variables should be retained, and this depends on how many components illustrate the most variation. Since we address seven variables, there are equally seven components. The rule of thumb is to retain the component(s) that has an eigenvalue above 1. Out of the seven components, only one is retained as it exceeds 1 (see figure 6.1) and represents 62.6% of the variance.

Figure 6.1: Eigenvalues after PCA:



In order to understand this new variable, we inspect the loading of each of the original components of job satisfaction variables on the retained component. All of the seven variables load roughly equally on the retained component (see table 6.2), although working hours, schedule, and conditions load the most followed closely by the type of work. Still, the new variable can be explained as a combination of the seven original components of job satisfaction variables. This component is then used to predict the new variable in the second step.

Table 6.2: Components of Job Satisfaction Variables' Loading on Retained Component:

Variable	Loading	Unexplained
Satisfaction with Job Security	0.347	0.471
Satisfaction with Type of Work	0.398	0.306
Satisfaction with Working Hours	0.403	0.290
Satisfaction with Working Schedule	0.403	0.287
Satisfaction with Working Conditions	0.403	0.290
Satisfaction with Commute to Job	0.327	0.531
Satisfaction with Matching (Qualifications & Job)	0.356	0.444

To strengthen the argument of why the utilisation of such an approach is superior to running separate satisfaction equations for each variable, a Kaiser-Meyer-Olkin sampling adequacy test can be conducted. The rule of thumb is that the result of this test needs to exceed 0.5. As table 6.3 illustrates, the result of 0.899 far exceeds 0.5, and accordingly using PCA is justified in our case.

Table 6.3: Kaiser-Meyer-Olkin Measure of Sampling Adequacy:

Variable	KMO
Satisfaction with Job Security	0.940
Satisfaction with Type of Work	0.904
Satisfaction with Working Hours	0.852
Satisfaction with Working Schedule	0.848
Satisfaction with Working Conditions	0.924
Satisfaction with Commute to Job	0.952
Satisfaction with Matching (Qualifications & Job)	0.924
Overall	**0.899**

Finally, we inspect the correlation coefficient between overall job satisfaction and the derived variable of components of job satisfaction, and we find that the two variables are significantly correlated at the 0.05 significance level, with a correlation coefficient equal to 0.739. This mirrors the high correlation between the overall job satisfaction variable and the original components of job satisfaction variables (see table 3.6), from which this derived variable is obtained.

6.5.4.3 Methods of Estimation:

Finally, it should be noted that PCA does not allow us to estimate the satisfaction equation of interest, but only allows us to construct the dependent variable that is to be utilised in the estimation. By inspecting the values obtained of the predicted variable, which serves as the dependent variable in our estimation, it turns out that unlike the original components of job satisfaction variables, the predicted variable is continuous with a minimum of -4.859 and a maximum of 3.046. Consequently, it is more appropriate to utilise linear models that deal with continuous variables. In addition, the likelihoods of the prevalence of endogeneity and sample selection biases still hold, thus we use the 2SLS and MLE approaches explained previously (see sections 6.5.3.3; 6.5.3.4) to deal with both biases and compare these results with those of an OLS model (see section 6.5.3.1), which is presumed biased and inconsistent. Note that while we use the same instruments as the ones used for the estimation of overall job satisfaction, the sample is slightly different, as we explain below (see section 6.6.1).

6.6 Data

This section illustrates our sample followed by the demonstration of the dependent, explanatory, and instrumental variables, along with their statistical descriptions.

6.6.1 Sample

Similar to chapters IV and V, the sample of interest drops individuals younger than 15 or older than 65 years old, self-employed and unpaid workers, as well as any individuals who did not provide information with regards to all variables of interest. Also, we focus our analysis on private sector workers, in order to facilitate comparisons between the findings of this chapter and previous ones, and since wage determination, which is also involved with our estimations herein, differs between the public and private sectors (see section 2.5). The entire employed sample of interest has provided information regarding the overall level of job satisfaction. Yet, some respondents have stated in relation to components of job satisfaction variables that these were not applicable to their jobs, and thus treated as missing observations. Accordingly, the sample size differs contingent on what the dependent variable of interest is.

6.6.2 Variables

Table 6.4 summarises the dependent, explanatory, and instrumental variables of each equation of interest. Note that many variables that determine wages also determine job satisfaction.

Table 6.4: Variables - by Equation:

	Satisfaction Equation (EQ.I)	Selection Equation (EQ.II)	Wage Equation (EQ.III)
Dependent Variables			
	Job Satisfaction Level	Probability of Labour Force Participation	Logarithm of Hourly Wages
Explanatory Variables			
	Logarithm of Hourly Wages	…….	…….
Individual Characteristics	Age	Age	Age
	Age Squared	Age Squared	Age Squared
	Gender*	Gender*	Gender*
	Marital Status*	Marital Status*	Marital Status*
	Region*	Region*	Region*
	Parents' Education*	Parents' Education*	Parents' Education*
Human Capital Characteristics	Education*	Education*	Education*
	Training*	…….	Training*
Job Characteristics	Logarithm of Hours Worked Weekly	…….	…….
	Stability of Job*	…….	Stability of Job*
	Union Membership*	…….	Union Membership*
	Supervisory Roles*	…….	Supervisory Roles*
	Night Work*	…….	Night Work*
	Formality of Job*	…….	Formality of Job*
	Logarithm of Time to Reach Job	…….	…….
	Firm Size*	…….	Firm Size*
Instrumental Variables[48]			
	…….	Educational Unemployment Rates[49]	Private Sector Average Weekly Wages by Gender/Industry[50]
	…….	Head of Household*	Tenure
	…….	Number of Children in Household	Tenure Squared
	…….	Number of males in the labour age (15-65 years old) in household	Occupations*

**Indicates the use of dummy variables*

[48] These represent selection-specific characteristics *(L)* for the selection equation (EQ.II) and the wage identifiers *(I)* for the wage equation (EQ.III).
[49] Data extracted from CAPMAS's Statistical Year Book (CAPMAS, 2012).
[50] Data extracted from CAPMAS's Statistical Year Book (CAPMAS, 2012).

6.6.2.1 Dependent Variables:

We focus our discussion here on the main dependent variables of interest, which represent the job satisfaction variables. Note that we have discussed wages and labour force participation, the dependent variables of the wage equation (EQ.III) and the selection equation (EQ.II), respectively, in previous chapters (see sections 4.6.2.1; 5.6.2.1). Since the sample utilised in our analysis herein is very similar to the samples utilised in previous chapters, we refrain from discussing these variables again and only provide some descriptive statistics in table 6.18 in appendix 6.

In terms of the dependent variables of the job satisfaction equations, we are interested in examining eight satisfaction variables. The first variable represents the overall job satisfaction level of the individual. Individuals were asked, 'How satisfied are you with your current job?' and their answers were given on a scale of 1-5, where '5' represents the highest level of satisfaction and '1' represents the lowest level of satisfaction. After dropping all missing observations, we are left with a total sample of 21,060 individuals, out of which 5,396 individuals are waged workers employed in the private sector. Table 6.5 illustrates the overall job satisfaction variable's sample distribution, which shows that the majority of our sample has reported being satisfied with their jobs.

Table 6.5: Overall Job Satisfaction – Sample Distribution:

Ranking	Frequency	Percentage	Cumulative
1 – Fully Dissatisfied	753	13.95	13.95
2 – Rather Dissatisfied	658	12.19	26.15
3 – Neither Satisfied nor Dissatisfied	939	17.40	43.55
4 – Rather Satisfied	1,714	31.76	75.32
5 – Fully Satisfied	1,332	24.68	100.00
Total	**5,369**	**100.00**	

As for the rest of the satisfaction variables, individuals were asked similar questions to the one above concerning the overall job satisfaction, but with regards to the different job aspects such as job security, type of work, etc. Respondents also rated their satisfaction levels according to a similar scale to the one illustrated in table 6.5, however, an additional rank '6' was added to the scale to represent a 'not applicable' option. Inspecting each variable's sample size after dropping this sixth rank, we find that that the largest proportion of the sample that reported 'not applicable' is with regards to satisfaction with job security followed by satisfaction with matching between qualifications and job (see table 6.6). Since this additional rank does not inform much about satisfaction, we resolved to treat

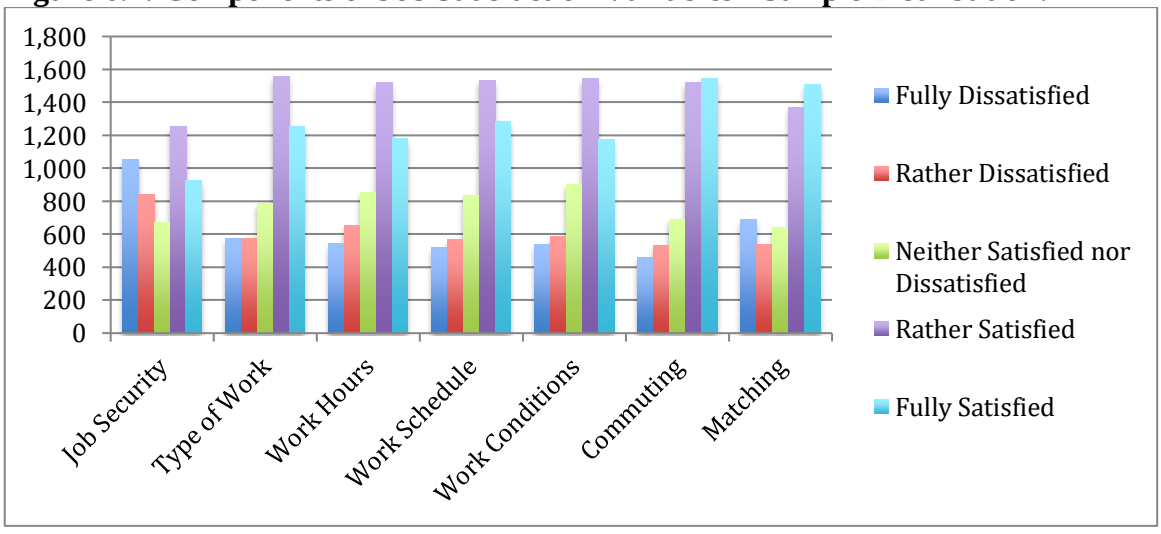
them as missing observations and drop them from our sample. Consequently, in relation to the examination of the components of job satisfaction, we restrict our total sample to 20,411 observations of which 4,747 observations are waged workers in the private sector.

Table 6.6: Sample Size - by Components of Job Satisfaction Variables:

Variables	Sample Size
Satisfaction with Job Security	4,957
Satisfaction with Type of Work	5,392
Satisfaction with Working Hours	5,321
Satisfaction with Working Schedule	5,239
Satisfaction with Working Conditions	5,366
Satisfaction with Commute to Job	5,336
Satisfaction with Matching (Qualifications & Job)	5,131

Similar to the sample distributions of scale-ranked variables and the overall job satisfaction variable, whose observations are usually clustered around a specific rank, the majority of the sample reported the highest levels of satisfaction for all components of job satisfaction (see figure 6.2). Still, the proportion of individuals who reported 'fully satisfied' with job security is the smallest compared to the other variables. For instance, 19.5% of the sample reported 'fully satisfied' with job security as opposed to 32.5% with regards to matching.

Figure 6.2: Components of Job Satisfaction Variables - Sample Distribution:



6.6.2.2 Explanatory variables:

We turn our discussion here to the explanatory variables (individual, human capital, and job characteristics) used in our estimations. Most of these variables have been discussed in the previous two chapters in the context of their relation to wages (see sections 4.6.2.2; 5.6.2.2), thus we refocus the below discussion of these on their relation to job satisfaction.

Table 6.7 illustrates the explanatory variables and their descriptive statistics. We restrict the sample reviewed below to 5,396 observations, which is the sample utilised in the estimation of the overall job satisfaction equation. Rather than presenting general statistics, which may be similar to the previous two chapters, we focus on the cross-tabulation of the overall job satisfaction measure with the various explanatory variables, which demonstrates the average level of satisfaction reported by each category and the percentage of sample that reported the highest level of overall job satisfaction.

To begin with, average job satisfaction levels increase with higher hourly wages, though as wages increase beyond 41 EGP, the situation reverses and job satisfaction begins to decrease (see table 6.7). In terms of individual characteristics, statistics show that most go in line with major findings in the literature. Average satisfaction of women and married individuals are higher than those reported by men and individuals of other marital statuses, respectively, and a large proportion of women and married individuals reported the highest overall job satisfaction level (see table 6.7). In the context of this chapter's analysis, regions are particularly significant, as urban areas are perceived to offer better job opportunities. Consequently, we can expect job satisfaction to be higher in an area like Greater Cairo than other regions, which our statistics verify (see table 6.7). Also, we find that average satisfaction levels increase with age (see table 6.7), which implies that older individuals are more satisfied with their jobs. We also control for respondents' parents' education. Having educated parents may imply that individuals were better prepared for the labour market and for better prospective opportunities and labour market outcomes in the future, and thus may lead to higher satisfaction levels. Indeed, we find that average satisfaction levels are higher among individuals with educated parents (see table 6.7).

In terms of human capital characteristics, we find puzzling statistics, which require the regression results that controls for other variables. For example, we find that with some higher levels of education and training received, average job satisfaction levels are higher (see table 6.7), which goes against popular results of satisfaction levels declining with superior human capital (Clark & Oswald, 1996; Gazioglu & Tansel, 2006). Note that training is one of the determinants that had not been examined as much in the literature, and Gazioglu and Tansel (2006) found that undertaking training improved job satisfaction levels, thus the outcome may differ across the human capital factors.

Table 6.7: Explanatory Variables (Individual, Human Capital, and Job Characteristics) – Descriptions and Statistics:

(1) **Variables**	*(2)* **Description**	*(3)* **Means**[51]	*(4)* **% Fully Satisfied**[52]
LOG (WAGES/HR)	**Logarithm of hourly wages**		
	Hourly Wages < 2 Egyptian pounds (EGP)		
	$2 \geq Hourly\ Wages < 6$	3.307	23.04
	$6 \geq Hourly\ Wages < 17$	3.348	22.94
	$17 \geq Hourly\ Wages < 26$	3.597	29.09
	$26 \geq Hourly\ Wages < 41$	4.151	45.28
	$41 \geq Hourly\ Wages \leq 100$	3.972	47.22
	Hourly Wages >100	3.360	20.00
Individual Characteristics			
AGE	**Age of respondents in years**		
	$15 \geq Age \leq 22$	3.236	20.98
	$23 \geq Age \leq 32$	3.332	23.02
	$33 \geq Age \leq 50$	3.538	27.03
	$51 \leq Age \leq 60$	3.763	34.07
	Age > 60	3.983	38.33
Gender:	**A dummy variable for gender,**		
MALE	1 if male, 0 otherwise	3.387	23.94
Reference	***Omitted: females***	**3.769**	**35.93**
*Marital Status*Gender:*	**An interaction variable for marital status*gender,**		
MARRIED*MALE			
Reference	1 if male and married, 0 otherwise	3.495	26.09
	Omitted: females of all marital statuses and males less than minimum age, single,	**3.268**	**22.34**
MARRIED*FEMALE	***contractually married, divorced, or widowed(er)***		
Reference	1 if female and married, 0 otherwise	3.806	32.09
	Omitted: males of all marital statuses and females less than minimum age, single, contractually married, divorced, or widowed(er)	**3.400**	**24.50**
Region:	**A categorical variable for region of residence,**		
RURAL LOWER	1 if rural lower area, 0 otherwise	3.343	20.76
URBAN UPPER	1 if urban upper area, 0 otherwise	3.348	25.00
URBAN LOWER	1 if urban lower area, 0 otherwise	3.522	27.57
ALEX/SUEZ CAN	1 if Alexandria or Suez canal, 0 otherwise	3.772	35.70
GREATER CAIRO	1 if Greater Cairo, 0 otherwise	3.781	40.58
Reference	***Omitted: rural upper region***	**3.166**	**16.23**
Parents' Education:	**A dummy variable for parents education,**		
FATHER EDUC	1 if father has some degree, 0 otherwise	3.477	30.75
Reference	***Omitted: uneducated fathers***	**3.388**	**22.62**
MOTHER EDUC	1 if mother has some degree, 0 otherwise	3.569	34.18
Reference	***Omitted: uneducated mothers***	**3.385**	**23.15**
Human Capital Characteristics			
Education:	**A categorical variable for educational attainment level of respondent,**		
LIT/NO DIP	1 if literate with no diploma, 0 otherwise	3.482	20.41
ELEMENTARY	1 if elementary degree, 0 otherwise	3.435	22.77
MIDDLE SCHOOL	1 if middle school degree, 0 otherwise	3.475	26.75
GENERAL HIGH	1 if general high school degree, 0 otherwise	3.053	16.00
VOCATIONAL	1 if vocational high school degree, 0 otherwise	3.253	20.86
POST-SEC	1 if post-secondary degree, 0 otherwise	3.529	26.80
UNIVERSITY	1 if university degree, 0 otherwise	3.622	37.85
POST-GRAD	1 if post-graduate degree, 0 otherwise	3.727	31.82
Reference	***Omitted: illiterates***	**3.522**	**24.95**

[51] Cross tabulation of mean value of overall job satisfaction by explanatory variable.

[52] Percentage of respondents in each category who reported the highest level of overall job satisfaction 'fully satisfied'.

Table 6.7 (Continued):

(1)	*(2)*	*(3)*	*(4)*
TRAINING	**A dummy variable for whether respondent received training other than formal education,**		
	1 if received training, 0 otherwise	3.626	34.48
Reference	***Omitted: no training received***	**3.402**	**24.30**
	Job Characteristics		
LOG (HRS/WK)	**Logarithm of weekly hours worked**		
	Weekly Hours < 20	2.956	13.31
	$20 \geq Weekly\ Hours < 40$	3.170	17.41
	$Weekly\ Hours = 40$	3.389	26.28
	$40 > Weekly\ Hours \leq 80$	3.522	27.66
	$Weekly\ Hours > 80$	3.324	22.40
Stability:	**A categorical variable for stability of job,**		
TEMPORARY	1 if temporary worker, 0 otherwise	3.235	17.78
SEASONAL	1 if seasonal worker, 0 otherwise	3.234	25.53
CASUAL	1 if casual worker, 0 otherwise	3.036	14.06
Reference	***Omitted: permanent workers***	**3.826**	**36.92**
UNION	**A dummy variable for union membership,**		
	1 if member in union, 0 otherwise	4.013	45.32
Reference	***Omitted: non-union members***	**3.354**	**22.77**
SUPERVISOR	**A dummy variable for supervisory roles,**		
	1 if respondent is a supervisor, 0 otherwise	3.860	43.01
Reference	***Omitted: non-supervisors***	**3.369**	**22.99**
NIGHT	**A dummy variable for working night (after 7 p.m.),**		
Reference	1 if works nights, 0 otherwise	3.443	26.46
	Omitted: no night work	**3.382**	**23.17**
FORMAL	**A dummy variable for formality of job,**		
	1 if job is formal, 0 otherwise	4.011	44.66
Reference	***Omitted: informal workers***	**3.242**	**19.09**
SKILL	**A dummy variable for whether job requires any skill**		
Reference	1 if job requires skill, 0 otherwise	3.580	29.83
	Omitted: no skill required	**3.300**	**21.35**
LTRAVEL	**Logarithm of time (minutes) to reach job**		
	$Minutes \leq 15$	3.380	24.46
	$15 > Minutes \leq 30$	3.394	23.06
	$30 > Minutes \leq 60$	3.446	25.95
	$60 > Minutes \leq 120$	3.511	28.16
	Minutes > 120	3.676	32.37
Firm Size:	**A categorical variable for size of firm,**		
MEDIUM	1 if firm with 50-99 workers, 0 otherwise	3.801	38.78
LARGE	1 if firm with 100+ workers, 0 otherwise	3.858	38.81
UNKNOWN	1 if size of firm unknown, 0 otherwise	3.446	22.05
Reference	***Omitted: small-size firms (less than 50 workers)***	**3.326**	**21.10**

Finally, a number of job characteristics are controlled for in the estimations (see table 6.4). We report higher average job satisfaction levels for those working 40 hours a week, which is a normal full-time workload of a week, compared with those working less (see table 6.7). This implies that those who work less and may be considered part-timers are not as satisfied with their jobs, which is not surprising, since part-time jobs are usually worse and individuals working part-time are usually doing so out of necessity rather than choice. Surprisingly, average job satisfaction levels are higher for those working between 40 to 80 hours a week, while this average declines beyond 80 hours (see table 6.7). This may be

relevant to overtime pay, where individuals may be happier if they work overtime as they may earn more, but up to a certain point. Note that the statistics show that individuals would rather work overtime than working less than a normal full-time workload. Also, the time it takes to reach work reported mixed findings with higher means for those who spend more time travelling to work (see table 6.7). This again requires regression results, but a possible explanation could relate to the possibility that people may choose jobs that require more travelling if that job is considered a better labour market opportunity, such as jobs found in major cities. Similarly, individuals who work in larger firms have higher average job satisfaction levels (see table 6.7), which may oppose some of the literature's findings, however, it may imply better job opportunities in these firms. Note that average job satisfaction is higher for the medium-sized firms' workers than the large-sized ones (see table 6.7), which may imply that individuals are happier in bigger firms, but up till a certain point.

The rest of the variables provide sensible statistics, where average satisfaction levels reported increase with more stable jobs, union membership, supervisory roles, skill requirement, and formality, while declines with night work (see table 6.7).

6.6.2.3 Instrumental Variables:

We use four variables to instrument wages, including the private sector's average weekly wages stratified by gender and industry, as well as occupations, tenure, and tenure squared (see table 6.4). These variables are likely to affect wages earned, but not job satisfaction, and thus adhere to the exclusion restrictions rule. Specifically, average weekly wages are likely to be the guidelines around which wages are set, however, it is unlikely that individuals compare their wages to these aggregate measures, but rather actual available labour market opportunities or those of similar workers that they know of. Also, we have seen that some occupations may affect wages in the previous chapters. Still, occupations are not normally expected to affect job satisfaction, since individuals take up jobs that are available and match their education, training, and preferences. Similarly, wages are normally implicated by how long an individual has been in a certain job, where workers would be getting pay raises the longer they are on the job, and thus wages may be affected by tenure. Conversely, how long an individual has spent on the job is not likely to affect whether these individuals are happier with their jobs.

Table 6.8 provides the descriptive statistics for these variables. We report an average weekly wage of 390.73 EGP for our sample and an average tenure of roughly 10 years. Additionally, a significantly large proportion of our sample comprises the craft/related trades workers, similar to agricultural/forestry/fishery, plant/machine operators, and service sales, while the smallest are the managers.

Table 6.8: Wage Identifiers - Descriptions and Statistics:

Variables	Description	Statistics[53]
WAGE REF	**Private average weekly wages stratified by gender and industry**	390.728 *(139.404)*
Occupation:	**A categorical variable for occupation of respondents,**	
PROFESSIONAL	1 if professional, 0 otherwise	351
TECHNICIAN	1 if technicians/associate professionals, 0 otherwise	208
CLERICAL	1 if clerical support worker, 0 otherwise	94
SERVICE/SALES	1 if service/sales worker, 0 otherwise	813
AGR/FOR/FISH	1 if agricultural/forestry/fishery worker, 0 otherwise	943
CRAFT/TRADE	1 if craft and related trades worker, 0 otherwise	1,787
MACHINE OP	1 if plant/machine operator, 0 otherwise	822
ELEMENTARY OC	1 if elementary occupation, 0 otherwise	318
Reference	***Omitted: managers***	60
TENURE	**The length of employment at current job in years**	10.312 *(9.215)*

Table 6.9 illustrates the descriptive statistics of the selection equation identifiers, which were discussed in detail in chapter V (see section 5.6.2.3), thus we do not repeat their elaborate discussion here. These variables include whether the respondent is head of household, number of children in household, number of males in the labour age (15-65 years) in household, and unemployment rates stratified by educational attainment level.

Table 6.9: Selection-Specific Characteristics - Descriptions and Statistics:

Variables	Description	Statistics[54]
UNEMP (EDUC)	**Unemployment rate stratified by educational level**	22.55 *(19.21)*
HEAD	**A dummy variable for head of household,**	
	1 if respondent is head of household, 0 otherwise	4,931
Reference	***Omitted: not head of household***	**16,129**
Number of Children:	**An interaction variable for gender*number of children in household,**	
MALE*CHILD	Number of children (below 15 years old) in household for males	0.494 *(1.041)*
FEMALE*CHILD	Number of children (below 15 years old) in household for females	0.890 *(1.326)*
MALE (15-65) in HH	**The number of males in the labour age (15-65 years old) in the individual's household**	1.089 *(0.954)*

[53] Means and standard deviations (in brackets) provided for continuous variables, while frequency of observations provided for categorical and dummy variables.
[54] Means and standard deviations (in brackets) provided for continuous variables, while frequency of observations provided for categorical and dummy variable.

6.7 Results and Analysis

Our models address two main job satisfaction variables, the overall job satisfaction variable and the components of job satisfaction derived variable. We model these variables utilising a variety of methods (see section 6.5). Note that as previously explained, the overall job satisfaction is a discrete ordered variable, while the components of job satisfaction derived variable is a continuous variable, and hence requires non-linear and linear methods, respectively, for their estimations. The sample utilised in the analysis of each variable slightly differs in size due to differences with respect to the missing observations. Our overall job satisfaction models utilise a complete sample of 21,060 observations and a subset of employed private sector workers of 5,396 observations, while our components of job satisfaction models utilise a complete sample of 20,413 observations and a subset of 4,747 observations. Also, the sample sizes decline once the models are limited to the male labour sample only. We divide our discussion into three main sections. Section 6.7.1 discusses the results of the selection equations estimated to address sample selection, while section 6.7.2 focuses on the results of the wage equations estimated to deal with the endogeneity of wages in job satisfaction. Finally, section 6.7.3, which represents the core of our analysis, presents and discusses the results of the satisfaction equations.

6.7.1 Probability of Labour Force Participation

Unsurprisingly, the results reported by the selection equations of the models addressing overall job satisfaction are almost identical to those of models addressing components of job satisfaction, since the samples utilised in the estimation of each variable are very similar. Thus, we focus our discussion on the selection equation's results of the models utilised in the estimation of overall job satisfaction, while we present results for the selection equations of the components of job satisfaction models in appendix 6 (see table 6.20). Also, since the results for the selection equation are similar to those in chapter V (see table 5.8), we only present and discuss the most important results in this chapter (see table 6.10).

Table 6.10: Selection Equation[55] (Overall Job Satisfaction Models) - Selected Results[56] (Complete/Male Labour Samples):

	(1)	*(2)*	*(3)*	*(4)*
	DEPENDENT VARIABLE: Pr (PARTICIPATION)			
	COMPLETE LABOUR SAMPLE		**MALE LABOUR SAMPLE**	
Variables[57]	**2SLS**	**MLE**	**2SLS**	**MLE**
Selection-Specific Characteristics				
UNEMP (EDUC)	-0.014** *(0.006)*	-0.014** *(0.006)*	-0.017 *(0.013)*	-0.017 *(0.016)*
HEAD	0.128** *(0.060)*	0.128** *(0.058)*	0.057 *(0.119)*	0.045 *(0.112)*
Number of Children:				
MALE*CHILD	0.007 *(0.016)*	0.007 *(0.015)*	-0.026 *(0.017)*	-0.026 *(0.016)*
FEMALE*CHILD	-0.102*** *(0.015)*	-0.104*** *(0.015)*	…….	…….
MALE (15-65) in HH	-0.035** *(0.016)*	-0.036** *(0.016)*	-0.068*** *(0.026)*	-0.070*** *(0.025)*
Constant	-5.257*** *(0.152)*	-5.261*** *(0.140)*	-5.152*** *(0.212)*	-5.170*** *(0.202)*
N	***21,060***	***21,060***	***8,291***	***8,291***
Pseudo R2	***0.5492***	…….	***0.5051***	…….

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1*

Similar to chapter V's findings (see section 5.7.1), the 2SLS and MLE models' selection equation's results are quite similar, since the selection equations' methods of estimation are essentially the same across both models. In summary, almost all the selection identifiers are highly significant for the complete labour sample, as opposed to only one significant identifier for the male labour sample. More specifically, we find that individuals facing higher educational unemployment rates, women with more children in the household, and individuals with more males in the labour age (15-65 years old) in the household have a lower probability of selecting into the labour force, while heads of households have a higher probability of participation (see table 6.10, columns 1 and 2). On the other hand, the only significant factor for the male labour sample's participation is the number of males in the labour age in the household, and men who have more males in the labour age in their households have a lower probability of participation (see table 6.10, columns 3 and 4). Again, this is not surprising and picks up the extent to which the 'male breadwinner' norm prevails in Egypt.

[55] 2SLS models: bootstrapped standard errors.
[56] For complete results of the overall job satisfaction models' selection equations, see appendix 6, table 6.19.
[57] Control variables include: age, age squared, male (only in the complete labour sample models), married males, married females (only in the complete labour sample models), region dummies (6), whether respondents' parent's are educated, and respondents' educational attainment dummies (9).

6.7.2 Wage Equation Results

We start our discussion with the wage equations estimated in the models that address overall job satisfaction (see section 6.7.2.1), which is followed by highlighting any differences between these results and those of the wage equations estimated in the models that address components of job satisfaction (see section 6.7.2.2). Note that we focus our discussion only on the wage identifiers as the rest of the variables in relation to wages have already been discussed in the previous two chapters.

6.7.2.1 Wage Equations - Overall Job Satisfaction Models:

According to the 2SLS and MLE models for the complete and male labour samples, most of the identifying variables for wages are highly significant in the estimations of wages (see table 6.11).

Our identifying variables for wages are the private sector's average weekly wages in the gender/industry category that the individual belongs to, length of tenure of employment, and also occupation type (see table 6.11). We find that average weekly wages are highly significant in influencing wages for both samples and across both models. We also find that wages significantly increase as tenure increases, but at a decreasing rate. Similarly, we find that there is a statistically significant wage differential in favour of managers relative to other occupations for both samples. We prefer the MLE method of estimation to 2SLS, as it deals with all the methodological issues we are concerned with, acknowledges the discrete ordered nature of the overall job satisfaction variable, and estimates the model as a simultaneous system, which 2SLS does not once selection correction is included in the analysis.

Table 6.11: Wage Equation[58] (Overall Job Satisfaction Models) - Selected Results[59] (Complete/Male Labour Samples):

	(1)	*(2)*	*(3)*	*(4)*
	DEPENDENT VARIABLE: WAGES			
	COMPLETE LABOUR SAMPLE		**MALE LABOUR SAMPLE**	
Variables[60]	**2SLS**	**MLE**	**2SLS**	**MLE**
Wage Identifiers				
WAGE REF	0.0003*** *(0.0001)*	0.0003*** *(0.0001)*	0.0003*** *(0.0001)*	0.0002*** *(0.0001)*
TENURE	0.007** *(0.003)*	0.009*** *(0.003)*	0.005 *(0.003)*	0.006** *(0.003)*
TENURE SQUARED	-0.0002** *(0.0001)*	-0.0002*** *(0.0001)*	-0.0001* *(0.0001)*	-0.0002** *(0.0001)*
Occupation:				
PROFESSIONAL	-0.053 *(0.085)*	0.020 *(0.084)*	0.006 *(0.087)*	0.083 *(0.082)*
TECHNICIAN	-0.152* *(0.089)*	-0.128 *(0.088)*	-0.175* *(0.092)*	-0.146* *(0.087)*
CLERICAL	-0.212** *(0.100)*	-0.182* *(0.099)*	-0.286*** *(0.104)*	-0.255** *(0.098)*
SERVICE/SALES	-0.148* *(0.085)*	-0.189** *(0.085)*	-0.199** *(0.085)*	-0.244*** *(0.081)*
AGR/FOR/FISH	-0.102 *(0.088)*	-0.158* *(0.090)*	-0.172* *(0.089)*	-0.237*** *(0.085)*
CRAFT/TRADE	-0.010 *(0.085)*	-0.046 *(0.088)*	-0.065 *(0.086)*	-0.125 *(0.083)*
MACHINE OP	-0.116 *(0.085)*	-0.161* *(0.086)*	-0.163* *(0.086)*	-0.210** *(0.082)*
ELEMENTARY OC	-0.235*** *(0.089)*	-0.292** *(0.090)*	-0.286*** *(0.090)*	-0.353*** *(0.085)*
IMR	-0.082 *(0.054)*	…….	-0.167*** *(0.062)*	…….
Constant	2.029*** *(0.244)*	0.700*** *(0.201)*	2.641*** *(0.242)*	1.161*** *(0.179)*
N	***5,396***	***5,396***	***5,062***	***5,062***
R2	***0.2366***	…….	***0.2175***	…….

Standard errors in brackets
**** p<0.01, ** p<0.05, * p<0.1*

In addition to the above, we also find that the F-test of the joint significance of the instruments is high, 8.842 for the complete labour sample and 9.362 for the male labour sample (see table 6.12), but does not exceed the critical value of 10 for the instruments to be acceptable. Once again, therefore, we prefer the MLE model.

[58] Bootstrapped 2SLS models do not report the wage equation results, thus results of this model are acquired from a 2SLS model without bootstrapping. This seems reasonable since the outcome equation's (the satisfaction equation) coefficients are the same, but only the standard errors are different to a limited extent.

[59] For complete results of the overall job satisfaction models' wage equations, see appendix 6, table 6.25.

[60] Control variables include: age, age squared, male (only in the complete labour sample models), married males, married females (only in the complete labour sample models), region dummies (6), whether respondents' parent's are educated, respondents' educational attainment dummies (9), training received, job stability dummies (4), union membership, supervisory, roles, working nights, formality of job, and firm size dummies (4). Additional control variables only in the 2SLS model include: logarithm of weekly hours worked, skill requirement, and logarithm of time to reach job.

Table 6.12: Tests of Instruments[61] (Overall Job Satisfaction Models) – 2SLS (Complete/Male Labour Samples):

Statistics	Results	
	COMPLETE LABOUR SAMPLE	MALE LABOUR SAMPLE
R-Squared	0.2366	0.2175
Adjusted R-Squared	0.2301	0.2106
Partial R-Squared	0.0179	0.0201
Bootstrap	F (11,5349) = 8.842	F (11, 5017) = 9.362
Prob>F	0.0000	0.0000

6.7.2.2 Wage Equations – Components of Job Satisfaction Models:

With respect to the wage equations estimated in the models that address satisfaction with individual aspects of job satisfaction, results reported (see table 6.13) are very similar to the wage equation results of the models addressing overall job satisfaction (see table 6.11), except for some slight differences. Specifically, we find differences in the significance of tenure for wages and some differences in the coefficients of individuals' occupations. Once again, the F-test of joint significance of the wage instruments is high, but not above the critical value. Therefore, we prefer the MLE in this case too.

[61] Test conducted post-2SLS model estimation.

Table 6.13: Wage Equation[62] (Components of Job Satisfaction Models) - Selected Results[63] (Complete/Male Labour Samples):

	(1)	*(2)*	*(3)*	*(4)*
	DEPENDENT VARIABLE: WAGES			
	COMPLETE LABOUR SAMPLE		**MALE LABOUR SAMPLE**	
Variables[64]	**2SLS**	**MLE**	**2SLS**	**MLE**
Wage Instruments				
WAGE REF	0.0003*** *(0.0001)*	0.0002** *(0.0001)*	0.0003*** *(0.0001)*	0.0002** *(0.0001)*
TENURE	0.010*** *(0.003)*	0.009*** *(0.003)*	0.007** *(0.003)*	0.007*** *(0.003)*
TENURE SQUARED	-0.0002*** *(0.0001)*	-0.0002*** *(0.0001)*	-0.0002** *(0.0001)*	-0.0002*** *(0.0001)*
Occupation:				
PROFESSIONAL	-0.055 *(0.086)*	0.009 *(0.075)*	0.010 *(0.088)*	0.063 *(0.076)*
TECHNICIAN	-0.129 *(0.091)*	-0.136* *(0.079)*	-0.144 *(0.093)*	-0.148* *(0.080)*
CLERICAL	-0.215** *(0.101)*	-0.181** *(0.090)*	-0.295*** *(0.105)*	-0.252*** *(0.093)*
SERVICE/SALES	-0.117 *(0.087)*	-0.224*** *(0.076)*	-0.168* *(0.088)*	-0.263*** *(0.075)*
AGR/FOR/FISH	-0.070 *(0.090)*	-0.220*** *(0.081)*	-0.139 *(0.092)*	-0.264*** *(0.079)*
CRAFT/TRADE	0.005 *(0.087)*	-0.130 *(0.080)*	-0.049 *(0.088)*	-0.170** *(0.077)*
MACHINE OP	-0.089 *(0.087)*	-0.221*** *(0.077)*	-0.138 *(0.088)*	-0.247*** *(0.076)*
ELEMENTARY OC	-0.219** *(0.091)*	-0.358*** *(0.079)*	-0.266*** *(0.092)*	-0.389*** *(0.079)*
IMR	-0.074 *(0.057)*	…….	-0.163** *(0.066)*	…….
Constant	2.009*** *(0.261)*	0.787*** *(0.219)*	2.655*** *(0.265)*	1.269*** *(0.194)*
N	***4,747***	***4,747***	***4,443***	***4,443***
R2	***0.2474***	…….	***0.2277***	…….

Standard errors in brackets
**** p<0.01, ** p<0.05, * p<0.1*

Table 6.14: Tests of Instruments[65] (Components of Job Satisfaction Models) – 2SLS (Complete/Male Labour Samples):

Statistics	**Results**	
	COMPLETE LABOUR SAMPLE	**MALE LABOUR SAMPLE**
R-Squared	0.2474	0.2277
Adjusted R-Squared	0.2400	0.2200
Partial R-Squared	0.0175	0.0195
Bootstrap	F (11,4700) = 7.596	F (11, 4389) = 7.954
Prob>F	0.0000	0.0000

[62] Bootstrapped 2SLS models do not provide the wage equation results, thus results of this model are acquired from a 2SLS model without bootstrapping. This seems reasonable since the outcome equation's (the satisfaction equation) coefficients are the same, but only the standard errors are different to a limited extent.
[63] For complete results of the components of job satisfaction models' wage equations, see appendix 6, table 6.26.
[64] Control variables include: age, age squared, male (only in the complete labour sample models), married males, married females (only in the complete labour sample models), region dummies (6), whether respondents' parent's are educated, respondents' educational attainment dummies (9), training received, job stability dummies (4), union membership, supervisory, roles, working nights, formality of job, and firm size dummies (4). Additional control variables for 2SLS model only include: logarithm of weekly hours worked, skill requirement, and logarithm of time to reach job.
[65] Test conducted post-2SLS model estimation.

6.7.3 Satisfaction Equations

This final section begins with the discussion of the overall job satisfaction results (see section 6.7.3.1) followed by those of the components of job satisfaction (see section 6.7.3.2).

6.7.3.1 Overall Job Satisfaction:

In estimating overall job satisfaction, we have utilised four distinct models, OLS, OPROBIT, 2SLS, and MLE, which is our preferred model. The various models utilise a complete labour sample of 5,396 observations and a male labour sample of 5,062 observations (see table 6.15).

Our first model, the OLS model assumes linearity and overlooks the endogeneity of wages and the sample selection biases that we are concerned with. Our second model, the OPROBIT model, which relaxes the linearity assumption, still overlooks both biases. Thus, these two models provide biased and inconsistent results and are only presented for comparison purposes. According to both models (see table 6.15, columns 1 and 2), wages significantly increase overall job satisfaction levels, whether for the complete labour sample or the male labour sample separately.

The 2SLS and MLE models correct for both the sample selection and the endogeneity biases. According to these models' results, we find that wages still significantly increase the levels of overall job satisfaction for both samples (see table 6.15, columns 3 and 4), however, the magnitude of these coefficients is much larger than those reported by the OLS and OPROBIT models. Thus, overlooking endogeneity and selection seems to impose a downward bias on the results obtained.

Table 6.15: Overall Job Satisfaction Equation[66] – Wages Results[67] (Complete/Male Labour Samples):

Variables[68]	*(1)* OLS	*(2)* OPROBIT	*(3)* 2SLS	*(4)* MLE
	DEPENDENT VARIABLE: OVERALL JOB SATISFACTION			
COMPLETE LABOUR SAMPLE				
LOG (WAGES/HR)	0.183*** *(0.029)*	0.155*** *(00251)*	0.580** *(0.262)*	0.661*** *(0.190)*
IMR	…….	0.079 *(0.121)*	…….	…….
N	***5,396***	***5,396***	***5,396***	***5,396***
R2	***0.1379***	…….	***0.1086***	…….
Pseudo R2	…….	***0.0517***	…….	…….
MALE LABOUR SAMPLE				
LOG (WAGES/HR)	0.184*** *(0.031)*	0.155*** *(0.026)*	0.880*** *(0.264)*	0.879*** *(0.154)*
IMR	…….	0.339** *(0.144)*	…….	…….
N	***5,062***	***5,062***	***5,062***	***5,062***
R2	***0.1336***	…….	***0.0467***	…….
Pseudo R2	…….	***0.0496***	…….	…….

Standard errors in brackets
**** p<0.01, ** p<0.05, * p<0.1*

Note that we cannot compare the coefficients reported by the 2SLS and MLE models, since each model is based on a different assumption (linearity vs. non-linearity), and thus the coefficients are not equivalent. Observing the average marginal effects of each outcome, which is obtained after non-linear methods of estimation like MLE, is likely to provide more intuitive understanding into the subject. They are also more comparable to the coefficients reported by 2SLS as they show the effect of the percentage change in the explanatory variables that leads to individuals reporting a particular outcome. According to the MLE model, an increase in wages of 18.4% and 24.1% for the complete labour and the male labour samples, respectively (see table 6.16; columns 4 and 5), leads to the respondents reporting the highest level of satisfaction 'fully satisfied'. These average marginal effects are much lower than the 2SLS model coefficient of wages (see table 6.15; column 3).

[66] 2SLS models: bootstrapped standard errors.
[67] For complete results of the overall job satisfaction equations, see appendix 6, table 6.21.
[68] Control variables include: age, age squared, male (only in the complete labour sample models), married males, married females (only in the complete labour sample models), region dummies (6), whether respondents' parent's are educated, respondents' educational attainment dummies (9), training received, logarithm of weekly hours worked, job stability dummies (4), union membership, supervisory roles, working nights, formality of job, skill requirement, logarithm of time to reach job, and firm size dummies (4).

Table 6.16: Average Marginal Effects[69] - Overall Job Satisfaction MLE[70] Models (Complete/Male Labour Samples):

Variables[71]	*(1)* Outcome (1)	*(2)* Outcome (2)	*(3)* Outcome (3)	*(4)* Outcome (4)	*(5)* Outcome (5)
COMPLETE LABOUR SAMPLE					
LOG (WAGES/HR)	-0.148***	-0.052***	-0.030***	0.045***	0.184***
	(0.049)	*(0.009)*	*(0.005)*	*(0.010)*	*(0.053)*
N	***5,396***	***5,396***	***5,396***	***5,396***	***5,396***
MALE LABOUR SAMPLE					
LOG (WAGES/HR)	-0.213***	-0.057***	-0.029***	0.059***	0.241***
	(0.045)	*(0.004)*	*(0.003)*	*(0.005)*	*(0.044)*
N	***5,062***	***5,062***	***5,062***	***5,062***	***5,062***

Standard errors in brackets
**** p<0.01, ** p<0.05, * p<0.1*

As a consequence to the aforementioned differences highlighted between the 2SLS and MLE models, we remain favourable of the MLE model, which relaxes the linearity assumption of the 2SLS model, thus prohibiting the loss of information, while still addresses the endogeneity and sample selection biases. According to our MLE results, we can safely deduce the importance of wages in determining overall job satisfaction levels in Egypt, which reports a larger coefficient than other significant control variables that have a positive impact on satisfaction levels, such as formality of the job and weekly hours worked. This indicates the value workers place on the wage rate they receive from their jobs. Furthermore, the magnitude of the effect of wages on overall job satisfaction is even bigger with respect to the male labour sample compared with the complete labour sample, highlighting the importance that Egyptian men place on the wages they earn.

Focusing on the MLE model, the rest of the results (see appendix 6, table 6.21, columns 4 and 8) are in line with the findings of the literature. For the complete labour sample's model, we find that overall job satisfaction levels is lower for early labour market enterers and then increases as they progress in age, and females report higher levels of satisfaction

[69] For complete results of marginal effects of the MLE models, see appendix 6, table 6.22 (complete labour sample) and table 6.23 (male labour sample).
[70] For complete set of results of marginal effects of the OPROBIT models, see appendix 6, table 6.22 (complete labour sample) and table 6.23 (male labour sample).
[71] Control variables include: age, age squared, male (only in the complete labour sample models), married males, married females (only in the complete labour sample models), region dummies (6), whether respondents' parent's are educated, respondents' educational attainment dummies (9), training received, logarithm of weekly hours worked, job stability dummies (4), union membership, supervisory roles, working nights, formality of job, skill requirement, logarithm of time to reach job, and firm size dummies (4).

than men. We find that married men report higher levels of overall job satisfaction compared to women and also compared to unmarried or single men. Also, individuals residing in urban areas, including urban upper, urban lower, Alexandria/Suez canal, and Cairo regions, all report higher levels of overall job satisfaction. In terms of human capital factors, education and training are both negative and highly statistically significant in determining overall job satisfaction. In fact, we find that the level of satisfaction is lowest for the higher levels of education. Thus, our results confirm the literature's findings concerning the effect of education on overall job satisfaction levels (Clark, 1996; Clark & Oswald, 1996).

Finally, in terms of job characteristics, many variables turned out to be insignificant in determining overall job satisfaction, especially after accounting for endogeneity. Nevertheless, an interesting result is that of the logarithm of weekly hours worked. We find that those who worked longer hours per week report significantly higher levels of satisfaction. While it is puzzling to find such a result, it might due to the correlation between hours and other explanatory variables, such as wages, stability, and formality of the job. Another plausible explanation is due to reverse causality since more satisfied employees are likely to work longer hours.

Other results are less surprising, where we find that less stable jobholders, such as temporary, seasonal, and casual workers, report lowers levels of overall job satisfaction, while formal jobholders and individuals whose jobs require a skill report higher levels of overall job satisfaction. Note that the coefficient of formality of job is relatively high, indicating the importance and value of formal employment in the Egyptian labour market, which has been addressed in the previous two chapters.

On a final note, the results of the male labour sample's model are generally very similar to those of the complete labour sample. Particularly, the factors that are significant for determining overall satisfaction of the complete labour sample are mostly also significant for the male labour sample's overall job satisfaction. The only exception is age, which is insignificant in the male labour sample's model. The main differences between the samples' results are with respect to the magnitudes of the coefficients reported (see appendix 6, table 6.21, column 8). For instance, differentials based on education, marital status, weekly hours worked, formality of job, skill requirement are narrower in the male labour sample's model. Similar to the previous chapters' findings, we emphasise the

requirement of gender-based policies, since labour market outcomes are different for the male labour sample than the complete labour sample.

6.7.3.2 Components of Job Satisfaction:

We turn our attention to the components of job satisfaction variable, which captures satisfaction with certain aspects of an individual's job. Individuals were asked about the various components of job satisfaction separately and we derived a combined variable for their responses using a principle components analysis (PCA) framework. In this section, we will discuss the impact of wages on satisfaction as captured by this variable.

Wages are highly significant for components of job satisfaction, and the wage coefficients are larger once the endogeneity and sample selection biases are addressed. According to our MLE model, we report an increase in components of job satisfaction levels of the complete labour sample by roughly 66%, which is higher than the 2SLS model's wage coefficient of 58% (see table 6.17, columns 2 and 3). The wage coefficients reported by the MLE and 2SLS models for the male labour sample are roughly equal at 58%.

Table 6.17: Components of Job Satisfaction Equation[72] - Wages Results[73] (Complete/Male Labour Samples):

Variables[74]	*(1)* OLS	*(3)* 2SLS[75]	*(4)* MLE
	DEPENDENT VARIABLE: DERIVED VARIABLE OF SATISFACTION WITH COMPONENTS OF JOB		
COMPLETE LABOUR SAMPLE			
LOG (WAGES/HR)	0.183*** *(0.029)*	0.580** *(0.262)*	0.661*** *(0.190)*
IMR	…….	0.132 *(0.188)*	…….
N	***5,396***	***5,396***	***5,396***
R2	***0.1379***	***0.1086***	…….
Pseudo R2	…….	…….	…….
MALE LABOUR SAMPLE			
LOG (WAGES/HR)	0.184*** *(0.031)*	0.880*** *(0.264)*	0.879*** *(0.154)*
IMR	…….	0.490** *(1.382)*	…….
N	***5,062***	***5,062***	***5,062***
R2	***0.1336***	***0.0467***	…….
Pseudo R2	…….	…….	…….

Standard errors in brackets
**** p<0.01, ** p<0.05, * p<0.1*

With regards to the rest of the control variables, there are some differences between the components of job satisfaction models and those of the overall job satisfaction. In particular, two variables, namely the time it takes to reach job and supervisory roles, have reported significant results for the components of job satisfaction according to the MLE models (see appendix 6, table 6.24), which were insignificant for the MLE models addressing overall job satisfaction (see appendix 6, table 6.21). The logarithm of time to reach work has reported a negative coefficient, which is plausible to expect as the more time it takes to reach the job, the less likely workers would be satisfied (see appendix 6, table 6.24). Surprisingly, we find that supervisors are also less satisfied than non-supervisors (see appendix 6, table 6.24), though this might relate to increased stress of the roles without commensurate remuneration.

[72] 2SLS models: bootstrapped standard errors.
[73] For complete results of the overall job satisfaction equations, see appendix 6, table 6.21.
[74] Control variables include: age, age squared, male (only in the complete labour sample models), married males, married females (only in the complete labour sample models), region dummies (6), whether respondents' parent's are educated, respondents' educational attainment dummies (9), training received, logarithm of weekly hours worked, job stability dummies (4), union membership, supervisory roles, working nights, formality of job, skill requirement, logarithm of time to reach job, and firm size dummies (4).
[75] Bootstrapped standard errors.

6.8 Concluding Remarks

To sum up, in this chapter, we analyse the impact of higher wages in alleviating levels of job satisfaction. In doing this, we correct for both sample selection and endogeneity of wages. We also consider job satisfaction as a response to a single question relating to how satisfied individuals are with their overall job as well as a variable constructed from responses to a range of questions regarding their satisfaction with certain aspects of the job.

We find that wages are highly significant in increasing job satisfaction for all samples, and across all models. We find that the magnitude of this effect is higher for men compared to the complete labour sample, highlighting the importance of pay for men. This is plausible as men are regarded as the main financial supporters of their households, and hence wages are likely to have a strong impact on their happiness with their jobs. Similarly, we find that even when individuals are asked about their satisfaction with specific aspects of their jobs, wage levels still play a significant role in determining these satisfaction levels. Furthermore, the magnitude of the impact of wages on the components of job satisfaction is even higher than that reported for overall job satisfaction.

Another valuable finding is the role of formal employment in leading to higher job satisfaction. Our findings indicate the value Egyptian labour places on formal employment, which is often associated with fixed contracts for a minimum period of a year, more difficulty of firing without just cause, compensation in case of being laid off, as well as social insurance and health insurance. Thus, workers seem to value the job security and benefits accompanied by working in the formal sector more than many of the other factors. Consequently, policy-makers and employers should seek ways to utilise this factor in improving satisfaction levels.

6.9 Appendix 6

Table 6.18: Wages and Labour Force Participation - Descriptions and Statistics:

Variables	Description	Statistics[76]	
		(1)[77]	(2)[78]
LOG (WAGES/HR)	**Logarithm of hourly wages**	1.413 *(0.659)*	1.414 *(0.666)*
LF	**A dummy variable for whether the individual is participating in the labour force or not,**		
	1 if participating, 0 otherwise	6,677	6,028
Reference	***Omitted: non-participating***	**14,383**	**14,383**

Table 6.19: Selection Equation Results[79] - Overall Job Satisfaction Models (Complete/Male Labour Samples):

	(1)	*(2)*	*(3)*	*(4)*
	DEPENDENT VARIABLE: Pr (Participation)			
	COMPLETE LABOUR SAMPLE		**MALE LABOUR SAMPLE**	
Variables	**2SLS**	**MLE**	**2SLS**	**MLE**
Selection-Specific Characteristics				
UNEMP (EDUC)	-0.014** *(0.006)*	-0.014** *(0.006)*	-0.017 *(0.013)*	-0.017 *(0.016)*
HEAD	0.128** *(0.060)*	0.128** *(0.058)*	0.057 *(0.119)*	0.045 *(0.112)*
Number of Children:				
MALE*CHILD	0.007 *(0.016)*	0.007 *(0.015)*	-0.026 *(0.017)*	-0.026 *(0.016)*
FEMALE*CHILD	-0.102*** *(0.015)*	-0.104*** *(0.015)*	…….	…….
MALE (15-65) in HH	-0.035** *(0.016)*	-0.036** *(0.016)*	-0.068*** *(0.026)*	-0.070*** *(0.025)*
Individual Characteristics				
AGE	0.277*** *(0.009)*	0.277*** *(0.008)*	0.401*** *(0.013)*	0.402*** *(0.012)*
AGE SQUARED	-0.004*** *(0.0001)*	-0.004*** *(0.0001)*	-0.005*** *(0.0002)*	-0.006*** *(0.0001)*
MALE	1.245*** *(0.049)*	1.246*** *(0.048)*	…….	…….
*Marital Status*Gender:*				
MARRIED*MALE	1.217*** *(0.078)*	1.216*** *(0.069)*	0.671*** *(0.117)*	0.680*** *(0.107)*
MARRIED*FEMALE	-0.711*** *(0.046)*	-0.711*** *(0.044)*	…….	…….
Region:				
RURAL LOWER	0.348*** *(0.037)*	0.348*** *(0.037)*	0.025 *(0.055)*	0.022 *(0.054)*
URBAN UPPER	0.164*** *(0.044)*	0.163*** *(0.046)*	0.066 *(0.063)*	0.061 *(0.066)*
URBAN LOWER	0.370*** *(0.050)*	0.368*** *(0.048)*	0.170** *(0.072)*	0.164** *(0.075)*
ALEX/SUEZ CAN	0.212*** *(0.051)*	0.210*** *(0.054)*	0.077 *(0.080)*	0.072 *(0.079)*
GREATER CAIRO	0.231*** *(0.047)*	0.232*** *(0.049)*	0.229*** *(0.077)*	0.231*** *(0.072)*
Parents' Education:				
FATHER EDUC	-0.090*** *(0.034)*	-0.090*** *(0.034)*	-0.158*** *(0.049)*	-0.158*** *(0.050)*
MOTHER EDUC	-0.248*** *(0.042)*	-0.249*** *(0.039)*	-0.340*** *(0.053)*	-0.343*** *(0.056)*
Human Capital Characteristics				
Education:				
LIT/NO DIP	0.153** *(0.071)*	0.152* *(0.082)*	-0.035 *(0.129)*	-0.042 *(0.122)*
ELEMENTARY	0.053 *(0.061)*	0.054 *(0.063)*	-0.242** *(0.113)*	-0.242** *(0.115)*
MIDDLE SCHOOL	-0.394*** *(0.066)*	-0.390*** *(0.066)*	-0.758*** *(0.112)*	-0.751*** *(0.116)*
GENERAL HIGH	-0.141 *(0.286)*	-0.139 *(0.283)*	-0.700 *(0.584)*	-0.720 *(0.683)*
VOCATIONAL	1.119*** *(0.279)*	1.121*** *(0.277)*	0.569 *(0.582)*	0.550 *(0.681)*
POST-SEC	0.642*** *(0.088)*	0.643*** *(0.083)*	-0.150 *(0.163)*	-0.153 *(0.154)*
UNIVERSITY	1.315*** *(0.199)*	1.317*** *(0.197)*	0.344 *(0.411)*	0.325 *(0.478)*
POST-GRAD	1.125*** *(0.291)*	1.126*** *(0.269)*	-0.057 *(0.525)*	-0.068 *(0.560)*
Constant	-5.257*** *(0.152)*	-5.261*** *(0.140)*	-5.152*** *(0.212)*	-5.170*** *(0.202)*
N	***21,060***	***21,060***	***8,291***	***8,291***
Pseudo R2	***0.5492***	…….	***0.5051***	…….

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1*

[76] Means and standard deviations (in brackets) provided for [LOG (WAGES/HR)], while frequency of observations provided for (LF).
[77] Statistics for the sample utilised in the estimation of overall job satisfaction.
[78] Statistics for the sample utilised in the estimation of components of job satisfaction.
[79] 2SLS models: bootstrapped standard errors.

Table 6.20: Selection Equation Results[80] - Components of Job Satisfaction Models (Complete/Male Labour Samples):

	(1)	*(2)*	*(3)*	*(4)*
	DEPENDENT VARIABLE: Pr (Participation			
	COMPLETE LABOUR SAMPLE		**MALE LABOUR SAMPLE**	
Variables	**2SLS**	**MLE**	**2SLS**	**MLE**
Selection-Specific Characteristics				
UNEMP (EDUC)	-0.015** *(0.007)*	-0.015** *(0.006)*	-0.018 *(0.015)*	-0.018 *(0.016)*
HEAD	0.148** *(0.061)*	0.147** *(0.058)*	0.081 *(0.120)*	0.064 *(0.114)*
Number of Children:				
MALE*CHILD	0.007 *(0.016)*	0.007 *(0.016)*	-0.027 *(0.018)*	-0.027 *(0.017)*
FEMALE*CHILD	-0.103*** *(0.015)*	-0.103*** *(0.015)*	…….	…….
MALE (15-65) in HH	-0.038** *(0.017)*	-0.039** *(0.017)*	-0.069** *(0.027)*	-0.073*** *(0.026)*
Individual Characteristics				
AGE	0.278*** *(0.009)*	0.278*** *(0.008)*	0.404*** *(0.013)*	0.405*** *(0.012)*
AGE SQUARED	-0.004*** *(0.0001)*	-0.004*** *(0.0001)*	-0.006*** *(0.0002)*	-0.006*** *(0.0001)*
MALE	1.193*** *(0.047)*	1.194*** *(0.049)*	…….	…….
*Marital Status*Gender:*				
MARRIED*MALE	1.218*** *(0.077)*	1.218*** *(0.070)*	0.665*** *(0.118)*	0.675*** *(0.109)*
MARRIED*FEMALE	-0.710*** *(0.044)*	-0.710*** *(0.045)*	…….	…….
Region:				
RURAL LOWER	0.347*** *(0.038)*	0.346*** *(0.038)*	0.018 *(0.058)*	0.018 *(0.056)*
URBAN UPPER	0.179*** *(0.045)*	0.178*** *(0.047)*	0.080 *(0.067)*	0.075 *(0.068)*
URBAN LOWER	0.362*** *(0.049)*	0.361*** *(0.049)*	0.151** *(0.071)*	0.146* *(0.077)*
ALEX/SUEZ CAN	0.205*** *(0.052)*	0.204*** *(0.055)*	0.087 *(0.081)*	0.083 *(0.082)*
GREATER CAIRO	0.240*** *(0.049)*	0.241*** *(0.050)*	0.248*** *(0.079)*	0.248*** *(0.074)*
Parents' Education:				
FATHER EDUC	-0.090** *(0.035)*	-0.090*** *(0.034)*	-0.152*** *(0.051)*	-0.153*** *(0.051)*
MOTHER EDUC	-0.225*** *(0.042)*	-0.227*** *(0.040)*	-0.317*** *(0.056)*	-0.323*** *(0.058)*
Human Capital Characteristics				
Education:				
LIT/NO DIP	0.212*** *(0.075)*	0.212** *(0.083)*	0.018 *(0.133)*	0.020 *(0.125)*
ELEMENTARY	0.074 *(0.064)*	0.075 *(0.065)*	-0.220* *(0.122)*	-0.216* *(0.118)*
MIDDLE SCHOOL	-0.338*** *(0.067)*	-0.335*** *(0.068)*	-0.697*** *(0.122)*	-0.687*** *(0.119)*
GENERAL HIGH	-0.060 *(0.295)*	-0.057 *(0.284)*	-0.598 *(0.657)*	-0.586 *(0.693)*
VOCATIONAL	1.186*** *(0.288)*	1.189*** *(0.278)*	0.655 *(0.656)*	0.667 *(0.692)*
POST-SEC	0.704*** *(0.086)*	0.703*** *(0.084)*	-0.089 *(0.168)*	-0.089 *(0.158)*
UNIVERSITY	1.379*** *(0.204)*	1.382*** *(0.198)*	0.444 *(0.461)*	0.452 *(0.485)*
POST-GRAD	1.169*** *(0.298)*	1.172*** *(0.270)*	0.054 *(0.565)*	0.056 *(0.566)*
Constant	-5.343*** *(0.159)*	-5.344*** *(0.144)*	-5.317*** *(0.227)*	-5.326*** *(0.208)*
N	***20,413***	***20,413***	***7,674***	***7,674***
Pseudo R2	***0.5404***	…….	***0.5073***	…….

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1*

[80] 2SLS models: bootstrapped standard errors.

Table 6.21: Overall Job Satisfaction Equation Results[81] (Complete/Male Labour Samples):

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
	DEPENDENT VARIABLE: OVERALL JOB SATISFACTION							
	COMPLETE LABOUR SAMPLE				**MALE LABOUR SAMPLE**			
Variables	**OLS**	**OPROBIT**	**2SLS**	**MLE**	**OLS**	**OPROBIT**	**2SLS**	**MLE**
LOG (WAGES/HR)	0.183*** *(0.029)*	0.155*** *(0.025)*	0.580** *(0.262)*	0.661*** *(0.190)*	0.184*** *(0.031)*	0.155*** *(0.026)*	0.880*** *(0.264)*	0.879*** *(0.154)*
Individual Characteristics								
AGE	-0.045*** *(0.012)*	-0.039*** *(0.010)*	-0.043** *(0.021)*	-0.036** *(0.017)*	-0.044*** *(0.012)*	-0.039*** *(0.010)*	-0.006 *(0.026)*	-0.017 *(0.019)*
AGE SQUARED	0.001*** *(0.0002)*	0.001*** *(0.0001)*	0.001* *(0.0003)*	0.0004* *(0.0002)*	0.001*** *(0.0002)*	0.001*** *(0.0001)*	0.00002 *(0.0003)*	0.0002 *(0.0003)*
MALE	-0.351*** *(0.099)*	-0.311*** *(0.086)*	-0.461*** *(0.162)*	-0.439* *(0.126)*	…….	…….	…….	…….
*Marital Status*Gender:*								
MARRIED*MALE	0.198*** *(0.048)*	0.160*** *(0.041)*	0.184*** *(0.067)*	0.127** *(0.057)*	0.200*** *(0.049)*	0.164*** *(0.042)*	0.186*** *(0.061)*	0.107** *(0.050)*
MARRIED*FEMALE	0.141 *(0.142)*	0.097 *(0.124)*	0.027 *(0.170)*	-0.061 *(0.147)*	…….	…….	…….	…….
Region:								
RURAL LOWER	-0.039 *(0.049)*	-0.028 *(0.041)*	0.018 *(0.064)*	0.041 *(0.049)*	-0.028 *(0.050)*	-0.015 *(0.042)*	0.061 *(0.062)*	0.073 *(0.045)*
URBAN UPPER	0.152** *(0.061)*	0.139*** *(0.052)*	0.187*** *(0.070)*	0.177*** *(0.053)*	0.155** *(0.062)*	0.144*** *(0.053)*	0.221*** *(0.071)*	0.196*** *(0.052)*
URBAN LOWER	0.60 *(0.066)*	0.065 *(0.056)*	0.111 *(0.074)*	0.124** *(0.059)*	0.043 *(0.068)*	0.050 *(0.058)*	0.135* *(0.075)*	0.128** *(0.058)*
ALEX/SUEZ CAN	0.194** *(0.075)*	0.192*** *(0.064)*	0.217*** *(0.076)*	0.215*** *(0.064)*	0.192** *(0.078)*	0.196*** *(0.067)*	0.234** *(0.081)*	0.220*** *(0.066)*
GREATER CAIRO	0.124* *(0.068)*	0.150** *(0.058)*	0.111 *(0.071)*	0.121** *(0.060)*	0.117 *(0.071)*	0.144** *(0.061)*	0.123 *(0.075)*	0.119* *(0.061)*
Parents' Education:								
FATHER EDUC	-0.054 *(0.048)*	-0.030 *(0.041)*	-0.068 *(0.051)*	-0.048 *(0.041)*	-0.053 *(0.050)*	-0.027 *(0.042)*	-0.090 *(0.055)*	-0.058 *(0.042)*
MOTHER EDUC	-0.007 *(0.060)*	-0.009 *(0.051)*	-0.039 *(0.066)*	-0.049 *(0.053)*	0.045 *(0.063)*	0.032 *(0.054)*	-0.035 *(0.071)*	-0.041 *(0.065)*
Human Capital Characteristics								
Education:								
LIT/NO DIP	-0.167* *(0.090)*	-0.159** *(0.076)*	-0.159* *(0.085)*	-0.148* *(0.076)*	-0.164* *(0.092)*	-0.155** *(0.077)*	-0.166* *(0.090)*	-0.144* *(0.077)*
ELEMENTARY	-0.182*** *(0.062)*	-0.159*** *(0.053)*	-0.185*** *(0.066)*	-0.158*** *(0.053)*	-0.186*** *(0.064)*	-0.161*** *(0.054)*	-0.217*** *(0.070)*	-0.164*** *(0.054)*
MIDDLE SCHOOL	-0.120 *(0.076)*	-0.087 *(0.064)*	-0.133* *(0.080)*	-0.097 *(0.068)*	-0.108 *(0.077)*	-0.073 *(0.066)*	-0.201** *(0.090)*	-0.123* *(0.071)*
GENERAL HIGH	-0.529*** *(0.113)*	-0.437*** *(0.096)*	-0.595*** *(0.136)*	-0.511*** *(0.102)*	-0.575*** *(0.117)*	-0.476*** *(0.099)*	-0.825*** *(0.160)*	-0.625*** *(0.110)*
VOCATIONAL	-0.361*** *(0.052)*	-0.296*** *(0.045)*	-0.364*** *(0.056)*	-0.292*** *(0.046)*	-0.365*** *(0.054)*	-0.298*** *(0.045)*	-0.400*** *(0.058)*	-0.303*** *(0.045)*
POST-SEC	-0.311*** *(0.113)*	-0.264*** *(0.096)*	-0.336*** *(0.121)*	-0.298*** *(0.098)*	-0.284** *(0.119)*	-0.239** *(0.101)*	-0.369*** *(0.131)*	-0.314*** *(0.100)*
UNIVERSITY	-0.464*** *(0.075)*	-0.356*** *(0.064)*	-0.514*** *(0.097)*	-0.410*** *(0.070)*	-0.458*** *(0.078)*	-0.343*** *(0.067)*	-0.568*** *(0.098)*	-0.416*** *(0.066)*
POST-GRAD	-0.408 *(0.278)*	-0.364 *(0.241)*	-0.403* *(0.235)*	-0.382 *(0.241)*	-0.588* *(0.316)*	-0.528* *(0.269)*	-0.566** *(0.267)*	-0.483* *(0.266)*
TRAINING	-0.189** *(0.094)*	-0.178** *(0.081)*	-0.225** *(0.098)*	-0.235*** *(0.083)*	-0.225** *(0.102)*	-0.205** *(0.088)*	-0.315** *(0.113)*	-0.304*** *(0.087)*

[81] 2SLS models: bootstrapped standard errors.

Table 6.21 (Continued):

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Job Characteristics								
LOG (HRS/WEEK)	0.190*** *(0.039)*	0.170*** *(0.033)*	0.333*** *(0.107)*	0.162*** *(0.032)*	0.192*** *(0.040)*	0.171*** *(0.034)*	0.440*** *(0.110)*	0.153*** *(0.032)*
Stability:								
TEMPORARY	-0.400*** *(0.056)*	-0.365*** *(0.047)*	-0.337*** *(0.073)*	-0.265*** *(0.065)*	-0.398*** *(0.060)*	-0.357*** *(0.050)*	-0.311*** *(0.073)*	-0.223*** *(0.062)*
SEASONAL	-0.410** *(0.188)*	-0.315** *(0.160)*	-0.455** *(0.205)*	-0.460*** *(0.166)*	-0.426** *(0.192)*	-0.330** *(0.163)*	-0.480** *(0.230)*	-0.498*** *(0.162)*
CASUAL	-0.618*** *(0.046)*	-0.515*** *(0.039)*	-0.664*** *(0.055)*	-0.605*** *(0.045)*	-0.612*** *(0.047)*	-0.511*** *(0.040)*	-0.693*** *(0.057)*	-0.619*** *(0.041)*
UNION	0.178** *(0.071)*	0.163*** *(0.062)*	0.109 *(0.084)*	0.061 *(0.075)*	0.156** *(0.075)*	0.143** *(0.065)*	0.037 *(0.089)*	-0.013 *(0.074)*
SUPERVISOR	0.084 *(0.067)*	0.109* *(0.058)*	0.002 *(0.086)*	-0.0004 *(0.073)*	0.073 *(0.071)*	0.097 *(0.061)*	-0.094 *(0.096)*	-0.091 *(0.074)*
NIGHT	-0.064* *(0.037)*	-0.054* *(0.032)*	-0.048 *(0.038)*	-0.006 *(0.037)*	-0.081** *(0.038)*	-0.069** *(0.032)*	-0.057 *(0.040)*	0.0003 *(0.036)*
FORMAL	0.436*** *(0.056)*	0.404*** *(0.049)*	0.386*** *(0.065)*	0.316*** *(0.063)*	0.436*** *(0.059)*	0.403*** *(0.051)*	0.364*** *(0.065)*	0.279*** *(0.062)*
SKILL	0.123*** *(0.037)*	0.105*** *(0.032)*	0.088** *(0.044)*	0.067** *(0.034)*	0.135*** *(0.038)*	0.114*** *(0.033)*	0.073 *(0.046)*	0.055* *(0.032)*
LOG (TRAVEL)	0.019 *(0.020)*	0.013 *(0.017)*	0.008 *(0.023)*	0.010 *(0.017)*	0.020 *(0.021)*	0.015 *(0.018)*	0.004 *(0.024)*	0.009 *(0.016)*
Firm Size:								
MEDIUM	0.018 *(0.097)*	0.029 *(0.085)*	-0.015 *(0.098)*	-0.013 *(0.085)*	0.035 *(0.105)*	0.030 *(0.091)*	-0.025 *(0.111)*	-0.033 *(0.090)*
LARGE	-0.003 *(0.065)*	0.004 *(0.056)*	-0.024 *(0.065)*	-0.026 *(0.056)*	0.004 *(0.068)*	0.007 *(0.059)*	-0.030 *(0.072)*	-0.033 *(0.058)*
UNKNOWN	0.002 *(0.094)*	-0.019 *(0.079)*	0.002 *(0.094)*	-0.013 *(0.079)*	0.028 *(0.096)*	-0.006 *(0.081)*	0.025 *(0.097)*	-0.003 *(0.080)*
IMR	…….	…….	0.079 *(0.121)*	…….	…….	…….	0.339** *(0.144)*	…….
Cut1	…….	-1.440 *(0.236)*	…….	-0.883* *(0.454)*	…….	-1.115 *(0.230)*	…….	0.201 *(0.409)*
Cut2	…….	-0.961 *(0.236)*	…….	-0.428 *(0.446)*	…….	-0.633 *(0.230)*	…….	0.630 *(0.397)*
Cut3	…….	-0.445 *(0.236)*	…….	0.063 *(0.439)*	…….	-0.114 *(0.230)*	…….	1.092*** *(0.387)*
Cut4	…….	0.488 *(0.236)*	…….	0.949** *(0.428)*	…….	0.819 *(0.230)*	…….	1.924*** *(0.6371)*
Constant	3.739*** *(0.275)*	…….	2.811*** *(0.717)*	…….	3.362*** *(0.270)*	…….	0.927 *(0.835)*	…….
N	***5,396***	***5,396***	***5,396***	***5,396***	***5,062***	***5,062***	***5,062***	***5,062***
R2	***0.1379***	***……..***	***0.1086***	***……..***	***0.1336***	***……..***	***0.0467***	***……..***
Pseudo R2	***……..***	***0.0517***	***……..***	***……..***	***……..***	***0.0496***	***……..***	***……..***

Standard errors in brackets
**** p<0.01, ** p<0.05, * p<0.1*

Table 6.22: Average Marginal Effects (Overall Job Satisfaction Models) – OPROBIT/MLE (Complete Labour Sample):

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
			OPROBIT					**MLE**		
Variables	**Outcome (1)**	**Outcome (2)**	**Outcome (3)**	**Outcome (4)**	**Outcome (5)**	**Outcome (1)**	**Outcome (2)**	**Outcome (3)**	**Outcome (4)**	**Outcome (5)**
LOG (WAGES/HR)	-0.032***	-0.014***	-0.009***	0.011***	0.044***	-0.148***	-0.052***	-0.030***	0.045***	0.184***
	(0.005)	*(0.002)*	*(0.002)*	*(0.002)*	*(0.007)*	*(0.049)*	*(0.009)*	*(0.005)*	*(0.010)*	*(0.053)*
Individual Characteristics										
AGE	0.008***	0.004***	0.002***	-0.003***	-0.011***	0.008**	0.003**	0.002*	-0.003**	-0.010**
	(0.002)	*(0.001)*	*(0.001)*	*(0.001)*	*(0.003)*	*(0.004)*	*(0.001)*	*(0.001)*	*(0.001)*	*(0.005)*
AGE SQUARED	-0.0001***	-0.00005***	-0.00003***	0.00004***	0.0002***	-0.0001*	-0.00003*	-0.00002	0.00003**	0.0001*
	(0.00003)	*(0.00001)*	*(8.03e-06)*	*(9.88e-06)*	*(0.00004)*	*(0.0001)*	*(0.00002)*	*(0.00001)*	*(0.00001)*	*(0.0001)*
MALE	0.064***	0.029***	0.019***	-0.023***	-0.089***	0.098***	0.034***	0.020***	-0.030***	-0.122***
	(0.018)	*(0.008)*	*(0.005)*	*(0.006)*	*(0.025)*	*(0.029)*	*(0.009)*	*(0.007)*	*(0.007)*	*(0.036)*
*Marital Status*Gender:*										
MARRIED*MALE	-0.033***	-0.015***	-0.010***	0.012***	0.046***	-0.028**	-0.010**	-0.006**	0.009*	0.035**
	(0.008)	*(0.004)*	*(0.003)*	*(0.003)*	*(0.012)*	*(0.013)*	*(0.005)*	*(0.003)*	*(0.005)*	*(0.016)*
MARRIED*FEMALE	-0.020	-0.009	-0.006	0.007	0.028	0.014	0.005	0.003	-0.004	-0.017
	(0.026)	*(0.012)*	*(0.007)*	*(0.009)*	*(0.035)*	*(0.033)*	*(0.011)*	*(0.006)*	*(0.010)*	*(0.041)*
Region:										
RURAL LOWER	0.006	0.003	0.002	-0.003	-0.008	-0.010	-0.003	-0.002	0.003	0.011
	(0.009)	*(0.004)*	*(0.002)*	*(0.004)*	*(0.011)*	*(0.012)*	*(0.004)*	*(0.002)*	*(0.004)*	*(0.013)*
URBAN UPPER	-0.028***	-0.013***	-0.009**	0.010***	0.041***	-0.039***	-0.014***	-0.008***	0.012***	0.050***
	(0.010)	*(0.005)*	*(0.004)*	*(0.003)*	*(0.015)*	*(0.012)*	*(0.004)*	*(0.003)*	*(0.004)*	*(0.015)*
URBAN LOWER	-0.014	-0.006	-0.004	0.005	0.018	-0.028**	-0.010**	-0.005**	0.009**	0.034**
	(0.012)	*(0.005)*	*(0.003)*	*(0.004)*	*(0.016)*	*(0.014)*	*(0.004)*	*(0.003)*	*(0.004)*	*(0.017)*
ALEX/SUEZ CAN	-0.038***	-0.018***	-0.013***	0.012***	0.057***	-0.047***	-0.017***	-0.011***	0.014***	0.061***
	(0.012)	*(0.006)*	*(0.005)*	*(0.004)*	*(0.020)*	*(0.014)*	*(0.006)*	*(0.004)*	*(0.004)*	*(0.019)*
GREATER CAIRO	-0.030***	-0.014**	-0.010**	0.010***	0.044**	-0.028**	-0.010*	-0.005	0.009*	0.034**
	(0.012)	*(0.006)*	*(0.004)*	*(0.004)*	*(0.017)*	*(0.013)*	*(0.005)*	*(0.003)*	*(0.005)*	*(0.017)*
Parents' Education:										
FATHER EDUC	0.006	0.003	0.002	-0.002	-0.009	0.011	0.004	0.002	-0.003	-0.013
	(0.009)	*(0.004)*	*(0.002)*	*(0.003)*	*(0.012)*	*(0.010)*	*(0.003)*	*(0.002)*	*(0.003)*	*(0.011)*
MOTHER EDUC	0.002	0.001	0.001	-0.001	-0.003	0.011	0.004	0.002	-0.004	-0.013
	(0.011)	*(0.005)*	*(0.003)*	*(0.004)*	*(0.015)*	*(0.012)*	*(0.004)*	*(0.002)*	*(0.004)*	*(0.014)*

Table 6.22 (Continued):

Variables	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
Human Capital Characteristics										
Education:										
LIT/NO DIP	0.029**	0.015**	0.012**	-0.007	-0.049**	0.029*	0.012*	0.009*	-0.006	-0.044**
	(0.015)	*(0.007)*	*(0.005)*	*(0.004)*	*(0.023)*	*(0.016)*	*(0.006)*	*(0.004)*	*(0.004)*	*(0.022)*
ELEMENTARY	0.029***	0.015***	0.012***	-0.007***	-0.049***	0.032***	0.013***	0.009***	-0.007**	-0.047***
	(0.010)	*(0.005)*	*(0.004)*	*(0.003)*	*(0.016)*	*(0.011)*	*(0.005)*	*(0.003)*	*(0.003)*	*(0.016)*
MIDDLE SCHOOL	0.015	0.008	0.007	-0.003	-0.027	0.019	0.008	0.006	-0.003	-0.029
	(0.011)	*(0.006)*	*(0.005)*	*(0.003)*	*(0.020)*	*(0.014)*	*(0.006)*	*(0.004)*	*(0.003)*	*(0.020)*
GENERAL HIGH	0.091***	0.040***	0.025***	-0.033***	-0.123***	0.119***	0.038***	0.020***	-0.038***	-0.137***
	(0.023)	*(0.008)*	*(0.004)*	*(0.011)*	*(0.024)*	*(0.030)*	*(0.007)*	*(0.005)*	*(0.013)*	*(0.023)*
VOCATIONAL	0.058***	0.028***	0.019***	-0.018***	-0.087***	0.062***	0.023***	0.015***	-0.016***	-0.084***
	(0.008)	*(0.004)*	*(0.003)*	*(0.003)*	*(0.013)*	*(0.009)*	*(0.005)*	*(0.004)*	*(0.003)*	*(0.014)*
POST-SEC	0.051**	0.025***	0.018***	-0.014*	-0.079***	0.063***	0.024***	0.015***	-0.017**	-0.085***
	(0.020)	*(0.009)*	*(0.006)*	*(0.008)*	*(0.027)*	*(0.023)*	*(0.008)*	*(0.005)*	*(0.007)*	*(0.027)*
UNIVERSITY	0.071***	0.033***	0.022***	-0.024***	-0.103***	0.091***	0.032***	0.018***	-0.027***	-0.114***
	(0.014)	*(0.006)*	*(0.004)*	*(0.005)*	*(0.018)*	*(0.017)*	*(0.006)*	*(0.004)*	*(0.005)*	*(0.019)*
POST-GRAD	0.073	0.034	0.022	-0.025	-0.105*	0.084	0.030*	0.018**	-0.024	-0.107*
	(0.057)	*(0.021)*	*(0.010)*	*(0.026)*	*(0.062)*	*(0.061)*	*(0.017)*	*(0.007)*	*(0.023)*	*(0.060)*
TRAINING	0.040**	0.016**	0.009***	-0.016*	-0.048**	0.057**	0.017***	0.008***	-0.021**	-0.061***
	(0.019)	*(0.007)*	*(0.003)*	*(0.009)*	*(0.021)*	*(0.022)*	*(0.005)*	*(0.002)*	*(0.009)*	*(0.020)*
Job Characteristics										
LOG (HRS/WEEK)	-0.035***	-0.016***	-0.010***	0.013***	0.049***	-0.036***	-0.013***	-0.007***	0.011***	0.045***
	(0.007)	*(0.003)*	*(0.002)*	*(0.003)*	*(0.010)*	*(0.007)*	*(0.003)*	*(0.002)*	*(0.003)*	(0.009)
Stability:										
TEMPORARY	0.067***	0.038***	0.029***	-0.021***	-0.113***	0.050***	0.024***	0.018***	-0.009	-0.083***
	(0.010)	*(0.005)*	*(0.004)*	*(0.005)*	*(0.014)*	*(0.012)*	*(0.008)*	*(0.006)*	*(0.006)*	*(0.020)*
SEASONAL	0.056	0.033**	0.026**	-0.016	-0.099**	0.096**	0.040***	0.027***	-0.026	-0.137**
	(0.034)	*(0.016)*	*(0.010)*	*(0.015)*	*(0.046)*	*(0.043)*	*(0.012)*	*(0.006)*	*(0.017)*	*(0.043)*
CASUAL	0.104***	0.052***	0.036***	-0.039***	-0.152***	0.135***	0.050***	0.030***	-0.043***	-0.172***
	(0.008)	*(0.004)*	*(0.003)*	*(0.004)*	*(0.012)*	*(0.015)*	*(0.006)*	*(0.006)*	*(0.006)*	*(0.013)*
UNION	-0.031***	-0.016**	-0.011**	0.009**	0.049**	-0.013	-0.005	-0.003	0.004	0.017
	(0.011)	*(0.006)*	*(0.005)*	*(0.003)*	*(0.019)*	*(0.016)*	*(0.006)*	*(0.004)*	*(0.005)*	*(0.022)*

Table 6.22 (Continued):

Variables	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
SUPERVISOR	-0.021*	-0.010*	-0.007*	0.007**	0.032*	0.0001	0.00003	0.00002	-0.00003	-0.0001
	(0.011)	*(0.006)*	*(0.004)*	*(0.003)*	*(0.018)*	*(0.016)*	*(0.006)*	*(0.003)*	*(0.005)*	*(0.020)*
NIGHT	0.011*	0.005*	0.003*	-0.004*	-0.015*	0.001	0.0005	0.0003	-0.0004	-0.002
	(0.007)	*(0.003)*	*(0.002)*	*(0.002)*	*(0.009)*	*(0.008)*	*(0.003)*	*(0.002)*	*(0.003)*	*(0.010)*
FORMAL	-0.072***	-0.040***	-0.032***	0.019***	0.126***	-0.065***	-0.027***	-0.019***	0.016***	0.094***
	(0.008)	*(0.005)*	*(0.005)*	*(0.002)*	*(0.016)*	*(0.010)*	*(0.008)*	*(0.007)*	*(0.004)*	*(0.020)*
SKILL	-0.021***	-0.010***	-0.007***	0.008***	0.030***	-0.015**	-0.005*	-0.003*	0.005*	0.019**
	(0.006)	*(0.003)*	*(0.002)*	*(0.002)*	*(0.009)*	*(0.007)*	*(0.003)*	*(0.002)*	*(0.002)*	*(0.009)*
LOG (TRAVEL)	-0.003	-0.001	-0.001	0.001	0.004	-0.002	-0.001	-0.0004	0.001	0.003
	(0.004)	*(0.002)*	*(0.001)*	*(0.001)*	*(0.005)*	*(0.004)*	*(0.001)*	*(0.001)*	*(0.001)*	*(0.005)*
Firm Size:										
MEDIUM	-0.006	-0.003	-0.002	0.002	0.008	0.003	0.001	0.001	-0.001	-0.004
	(0.017)	*(0.008)*	*(0.005)*	*(0.006)*	*(0.024)*	*(0.019)*	*(0.007)*	*(0.004)*	*(0.006)*	*(0.024)*
LARGE	-0.001	-0.0004	-0.0002	0.0003	0.001	0.006	0.002	0.001	-0.002	-0.007
	(0.012)	*(0.005)*	*(0.003)*	*(0.004)*	*(0.016)*	*(0.013)*	*(0.004)*	*(0.003)*	*(0.004)*	*(0.016)*
UNKNOWN	0.004	0.002	0.001	-0.001	-0.005	0.003	0.001	0.001	-0.001	-0.004
	(0.016)	*(0.007)*	*(0.005)*	*(0.006)*	*(0.023)*	*(0.018)*	*(0.006)*	*(0.004)*	*(0.005)*	*(0.022)*
N	***5,396***	***5,396***	***5,396***	***5,396***	***5,396***	***5,396***	***5,396***	***5,396***	***5,396***	***5,396***

Standard errors in brackets
**** p<0.01, ** p<0.05, * p<0.1*

Table 6.23: Average Marginal Effects (Overall Job Satisfaction Models) – OPROBIT/MLE (Male Labour Sample):

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
			OPROBIT					**MLE**		
Variables	**Outcome (1)**	**Outcome (2)**	**Outcome (3)**	**Outcome (4)**	**Outcome (5)**	**Outcome (1)**	**Outcome (2)**	**Outcome (3)**	**Outcome (4)**	**Outcome (5)**
LOG (WAGES/HR)	-0.032***	-0.015***	-0.009***	0.012***	0.044***	-0.213***	-0.057***	-0.029***	0.059***	0.241***
	(0.006)	*(0.003)*	*(0.002)*	*(0.002)*	*(0.007)*	*(0.045)*	*(0.004)*	*(0.003)*	*(0.005)*	*(0.044)*
Individual Characteristics										
AGE	0.008***	0.004***	0.002***	-0.003***	-0.011***	0.004	0.001	0.001	-0.001	-0.005
	(0.002)	*(0.001)*	*(0.001)*	*(0.001)*	*(0.003)*	*(0.005)*	*(0.001)*	*(0.001)*	*(0.001)*	*(0.005)*
AGE SQUARED	-0.0001***	-0.0001***	-0.00003***	0.00004***	0.0002***	-0.00004	-0.00001	-5.08e-06	0.00001	0.00004
	(0.00003)	*(0.00001)*	*(8.08e-06)*	*(0.00001)*	*(0.00004)*	*(0.0001)*	*(0.00002)*	*(8.91e-06)*	*(0.00002)*	*(0.0001)*
*Marital Status*Gender:*										
MARRIED*MALE	-0.034***	-0.015***	-0.010***	0.013***	0.046***	-0.026**	-0.007*	-0.004*	0.007*	0.029**
	(0.009)	*(0.004)*	*(0.003)*	*(0.003)*	*(0.012)*	*(0.012)*	*(0.004)*	*(0.002)*	*(0.004)*	*(0.013)*
Region:										
RURAL LOWER	0.003	0.001	0.001	-0.001	-0.004	-0.018	-0.005*	-0.002*	0.006*	0.019
	(0.009)	*(0.004)*	*(0.002)*	*(0.004)*	*(0.011)*	*(0.012)*	*(0.003)*	*(0.001)*	*(0.003)*	*(0.012)*
URBAN UPPER	-0.030***	-0.014***	-0.009***	0.011***	0.042***	-0.047**	-0.013***	-0.007***	0.013***	0.054***
	(0.011)	*(0.005)*	*(0.003)*	*(0.004)*	*(0.015)*	*(0.013)*	*(0.004)*	*(0.002)*	*(0.003)*	*(0.015)*
URBAN LOWER	-0.011	-0.005	-0.003	0.004	0.014	-0.032**	-0.008**	-0.004**	0.009**	0.035**
	(0.012)	*(0.005)*	*(0.003)*	*(0.005)*	*(0.016)*	*(0.014)*	*(0.004)*	*(0.002)*	*(0.004)*	*(0.016)*
ALEX/SUEZ CAN	-0.039***	-0.019***	-0.013***	0.014***	0.057***	-0.053***	-0.015***	-0.008**	0.014***	0.061***
	(0.013)	*(0.007)*	*(0.005)*	*(0.004)*	*(0.020)*	*(0.015)*	*(0.005)*	*(0.003)*	*(0.004)*	*(0.019)*
GREATER CAIRO	-0.029**	-0.014**	-0.009**	0.011**	0.041**	-0.029**	-0.008*	-0.004	0.009*	0.032*
	(0.012)	*(0.006)*	*(0.004)*	*(0.004)*	*(0.018)*	*(0.015)*	*(0.004)*	*(0.002)*	*(0.005)*	*(0.017)*
Parents' Education:										
FATHER EDUC	0.006	0.003	0.002	-0.002	-0.008	0.014	0.004	0.002	-0.004	-0.016
	(0.009)	*(0.004)*	*(0.002)*	*(0.004)*	*(0.012)*	*(0.011)*	*(0.003)*	*(0.001)*	*(0.003)*	*(0.011)*
MOTHER EDUC	-0.007	-0.003	-0.002	0.002	0.009	0.010	0.003	0.001	-0.003	-0.011
	(0.011)	*(0.005)*	*(0.003)*	*(0.004)*	*(0.016)*	*(0.014)*	*(0.003)*	*(0.002)*	*(0.004)*	*(0.015)*

Table 6.23 (Continued):

Variables	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
Human Capital Characteristics										
Education:										
LIT/NO DIP	0.028*	0.015**	0.011**	-0.008	-0.047**	0.031*	0.010*	0.007*	-0.006	-0.042*
	(0.015)	*(0.007)*	*(0.005)*	*(0.005)*	*(0.023)*	*(0.017)*	*(0.006)*	*(0.004)*	*(0.004)*	*(0.022)*
ELEMENTARY	0.030***	0.016***	0.012***	-0.008***	-0.049***	0.036***	0.012***	0.008**	-0.007**	-0.048***
	(0.010)	*(0.005)*	*(0.004)*	*(0.003)*	*(0.016)*	*(0.012)*	*(0.004)*	*(0.003)*	*(0.003)*	*(0.016)*
MIDDLE SCHOOL	0.013	0.007	0.006	-0.003	-0.023	0.026*	0.009*	0.006*	-0.005	-0.036*
	(0.012)	*(0.006)*	*(0.005)*	*(0.003)*	*(0.020)*	*(0.016)*	*(0.005)*	*(0.003)*	*(0.004)*	*(0.021)*
GENERAL HIGH	0.103***	0.043***	0.025***	-0.041***	-0.131***	0.161***	0.036***	0.013***	-0.049***	-0.160***
	(0.025)	*(0.008)*	*(0.004)*	*(0.012)*	*(0.024)*	*(0.034)*	*(0.007)*	*(0.004)*	*(0.014)*	*(0.023)*
VOCATIONAL	0.059***	0.028***	0.019***	-0.020***	-0.087***	0.070***	0.021***	0.012***	-0.017***	-0.086***
	(0.009)	*(0.004)*	*(0.003)*	*(0.003)*	*(0.014)*	*(0.010)*	*(0.004)*	*(0.003)*	*(0.004)*	*(0.013)*
POST-SEC	0.046**	0.023**	0.016***	-0.014*	-0.071**	0.073***	0.021***	0.012***	-0.017**	-0.088***
	(0.021)	*(0.009)*	*(0.006)*	*(0.008)*	*(0.028)*	*(0.025)*	*(0.007)*	*(0.003)*	*(0.008)*	*(0.026)*
UNIVERSITY	0.070***	0.032***	0.021***	-0.025***	-0.098***	0.100***	0.027***	0.014***	-0.027***	-0.114***
	(0.014)	*(0.006)*	*(0.004)*	*(0.006)*	*(0.019)*	*(0.017)*	*(0.005)*	*(0.003)*	*(0.006)*	*(0.017)*
POST-GRAD	0.117	0.047**	0.026***	-0.048	-0.142**	0.119	0.030**	0.014***	-0.033	-0.130**
	(0.073)	*(0.020)*	*(0.004)*	*(0.038)*	*(0.060)*	*(0.075)*	*(0.014)*	*(0.004)*	*(0.028)*	*(0.061)*
TRAINING	0.047**	0.018**	0.009***	-0.020**	-0.054**	0.081***	0.017***	0.005***	-0.027***	-0.076***
	(0.022)	*(0.007)*	*(0.003)*	*(0.010)*	*(0.021)*	*(0.026)*	*(0.004)*	*(0.002)*	*(0.009)*	*(0.020)*
Job Characteristics										
LOG (HRS/WEEK)	-0.036***	-0.016***	-0.010***	0.014***	0.048***	-0.037***	-0.010***	-0.005**	0.010***	0.042***
	(0.007)	*(0.003)*	*(0.002)*	*(0.003)*	*(0.010)*	*(0.007)*	*(0.003)*	*(0.002)*	*(0.003)*	*(0.009)*
Stability:										
TEMPORARY	0.067***	0.037***	0.028***	-0.022***	-0.110***	0.046***	0.017**	0.013***	-0.007	-0.069***
	(0.011)	*(0.005)*	*(0.004)*	*(0.005)*	*(0.015)*	*(0.012)*	*(0.006)*	*(0.005)*	*(0.004)*	*(0.019)*
SEASONAL	0.061*	0.034**	0.027***	-0.019	-0.102**	0.115**	0.036***	0.021***	-0.028*	-0.144***
	(0.036)	*(0.017)*	*(0.010)*	*(0.017)*	*(0.046)*	*(0.045)*	*(0.010)*	*(0.005)*	*(0.016)*	*(0.041)*
CASUAL	0.104***	0.052***	0.035***	-0.042***	-0.149***	0.149***	0.042***	0.022***	-0.041***	-0.172***
	(0.008)	*(0.005)*	*(0.003)*	*(0.004)*	*(0.012)*	*(0.013)*	*(0.007)*	*(0.005)*	*(0.006)*	*(0.012)*
UNION	-0.028**	-0.014**	-0.010*	0.009***	0.042**	0.003	0.001	0.0004	-0.001	-0.0003
	(0.012)	*(0.006)*	*(0.005)*	*(0.003)*	*(0.020)*	*(0.018)*	*(0.005)*	*(0.002)*	*(0.005)*	*(0.020)*
SUPERVISOR	-0.019	-0.009	-0.006	0.007*	0.028	0.023	0.006	0.003	-0.007	-0.024
	(0.012)	*(0.006)*	*(0.004)*	*(0.004)*	*(0.018)*	*(0.019)*	*(0.004)*	*(0.002)*	*(0.005)*	*(0.020)*

Table 6.23 (Continued):

Variables	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
NIGHT	0.014**	0.006**	0.004**	-0.005**	-0.019**	-0.0001	-0.0002	-0.00001	0.00002	0.0001
	(0.007)	*(0.003)*	*(0.002)*	*(0.003)*	*(0.009)*	*(0.009)*	*(0.002)*	*(0.001)*	*(0.002)*	*(0.010)*
FORMAL	-0.073***	-0.041***	-0.032***	0.021***	0.125***	-0.063***	-0.020***	-0.012**	0.015***	0.081***
	(0.008)	*(0.005)*	*(0.005)*	*(0.002)*	*(0.017)*	*(0.012)*	*(0.007)*	*(0.005)*	*(0.004)*	*(0.019)*
SKILL	-0.023***	-0.011***	-0.007***	0.009***	0.032***	-0.013*	-0.004	-0.002	0.004	0.015*
	(0.007)	*(0.003)*	*(0.002)*	*(0.002)*	*(0.009)*	*(0.007)*	*(0.002)*	*(0.001)*	*(0.002)*	*(0.009)*
LOG (TRAVEL)	-0.003	-0.001	-0.001	0.001	0.004	-0.002	-0.001	-0.0003	0.001	0.002
	(0.004)	*(0.002)*	*(0.001)*	*(0.001)*	*(0.005)*	*(0.004)*	*(0.001)*	*(0.001)*	*(0.001)*	*(0.004)*
Firm Size:										
MEDIUM	-0.006	-0.003	-0.002	0.002	0.008	0.008	0.002	0.001	-0.002	-0.009
	(0.019)	*(0.009)*	*(0.005)*	*(0.007)*	*(0.026)*	*(0.022)*	*(0.006)*	*(0.003)*	*(0.006)*	*(0.025)*
LARGE	-0.002	-0.001	-0.0004	0.001	0.002	0.008	0.002	0.001	-0.002	-0.009
	(0.012)	*(0.006)*	*(0.003)*	*(0.005)*	*(0.017)*	*(0.014)*	*(0.004)*	*(0.002)*	*(0.004)*	*(0.016)*
UNKNOWN	0.001	0.001	0.0003	-0.0005	-0.002	0.001	0.0001	0.0001	-0.0001	-0.001
	(0.017)	*(0.008)*	*(0.005)*	*(0.006)*	*(0.023)*	*(0.019)*	*(0.005)*	*(0.003)*	*(0.005)*	*(0.022)*
N	***5,062***	***5,062***	***5,062***	***5,062***	***5,062***	***5,062***	***5,062***	***5,062***	***5,062***	***5,062***

Standard errors in brackets
**** p<0.01, ** p<0.05, * p<0.1*

Table 6.24: Components of Job Satisfaction Equation Results[82] (Complete/Male Labour Samples):

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
	DEPENDENT VARIABLE: COMPONENTS OF JOB SATISFACTION (Derived Variable)					
	COMPLETE LABOUR SAMPLE			**MALE LABOUR SAMPLE**		
	OLS	**2SLS**	**MLE**	**OLS**	**2SLS**	**MLE**
LOG (WAGES/HR)	0.313*** *(0.048)*	0.791* *(0.475)*	2.309*** *(0.627)*	0.316*** *(0.050)*	1.419*** *(0.455)*	2.434*** *(0.511)*
Individual Characteristics						
AGE	-0.075*** *(0.019)*	-0.067** *(0.033)*	-0.076** *(0.038)*	-0.076*** *(0.020)*	-0.020 *(0.045)*	-0.051 *(0.042)*
AGE SQUARED	0.001*** *(0.0002)*	0.001* *(0.0005)*	0.001 *(0.001)*	0.001*** *(0.0003)*	0.0002 *(0.001)*	0.0005 *(0.001)*
MALE	-0.617*** *(0.156)*	-0.728*** *(0.259)*	-1.240*** *(0.325)*	…….	…….	…….
*Marital Status*Gender:*						
MARRIED*MALE	0.369*** *(0.078)*	0.369*** *(0.112)*	0.263** *(0.128)*	0.371*** *(0.080)*	0.355*** *(0.100)*	0.245** *(0.110)*
MARRIED*FEMALE	0.616*** *(0.229)*	0.450* *(0.264)*	0.023 *(0.339)*	…….	…….	…….
Region:						
RURAL LOWER	-0.001 *(0.081)*	0.082 *(0.113)*	0.301** *(0.131)*	0.006 *(0.083)*	0.168 *(0.111)*	0.296** *(0.120)*
URBAN UPPER	0.278*** *(0.099)*	0.321*** *(0.111)*	0.455*** *(0.128)*	0.274*** *(0.100)*	0.379*** *(0.119)*	0.472*** *(0.128)*
URBAN LOWER	0.280** *(0.109)*	0.346*** *(0.125)*	0.535*** *(0.149)*	0.270** *(0.113)*	0.415*** *(0.129)*	0.520*** *(0.146)*
ALEX/SUEZ CAN	0.440*** *(0.122)*	0.475*** *(0.127)*	0.591*** *(0.150)*	0.453*** *(0.128)*	0.535*** *(0.136)*	0.616*** *(0.157)*
GREATER CAIRO	0.458*** *(0.110)*	0.448*** *(0.116)*	0.396*** *(0.133)*	0.470*** *(0.115)*	0.489*** *(0.124)*	0.467*** *(0.137)*
Parents' Education:						
FATHER EDUC	-0.032 *(0.077)*	-0.048 *(0.082)*	-0.109 *(0.094)*	-0.020 *(0.081)*	-0.068 *(0.087)*	-0.104 *(0.098)*
MOTHER EDUC	0.080 *(0.095)*	0.041 *(0.100)*	-0.065 *(0.121)*	0.115 *(0.101)*	-0.003 *(0.114)*	-0.057 *(0.127)*
Human Capital Characteristics						
Education:						
LIT/NO DIP	-0.241* *(0.146)*	-0.223 *(0.141)*	-0.216 *(0.173)*	-0.263* *(0.150)*	-0.249 *(0.153)*	-0.259 *(0.180)*
ELEMENTARY	-0.222** *(0.104)*	-0.225** *(0.102)*	-0.229* *(0.122)*	-0.224** *(0.107)*	-0.271** *(0.111)*	-0.253* *(0.129)*
MIDDLE SCHOOL	-0.247** *(0.124)*	-0.262** *(0.130)*	-0.260* *(0.153)*	-0.234* *(0.127)*	-0.357** *(0.146)*	-0.311* *(0.163)*
GENERAL HIGH	-0.622*** *(0.179)*	-0.702*** *(0.196)*	-0.929*** *(0.237)*	-0.686*** *(0.186)*	-1.026*** *(0.233)*	-1.107*** *(0.255)*
VOCATIONAL	-0.617*** *(0.086)*	-0.606*** *(0.091)*	-0.636*** *(0.107)*	-0.640*** *(0.089)*	-0.677*** *(0.095)*	-0.716*** *(0.108)*
POST-SEC	-0.682*** *(0.184)*	-0.701*** *(0.199)*	-0.856*** *(0.228)*	-0.625*** *(0.194)*	-0.756*** *(0.225)*	-0.919*** *(0.242)*
UNIVERSITY	-0.693*** *(0.121)*	-0.742*** *(0.155)*	-0.994*** *(0.183)*	-0.703*** *(0.127)*	-0.873*** *(0.158)*	-1.030*** *(0.170)*
POST-GRAD	-0.174 *(0.434)*	-0.169 *(0.293)*	-0.381 *(0.519)*	-0.386 *(0.484)*	-0.330 *(0.343)*	-0.399 *(0.578)*
TRAINING	-0.215 *(0.146)*	-0.258* *(0.145)*	-0.466** *(0.190)*	-0.195 *(0.159)*	-0.335** *(0.166)*	-0.532** *(0.207)*

[82] 2SLS models: bootstrapped standard errors.

Table 6.24 (Continued):

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Job Characteristics						
LOG (HRS/WEEK)	0.191*** *(0.065)*	0.365* *(0.189)*	0.197*** *(0.064)*	0.213*** *(0.066)*	0.612*** *(0.185)*	0.219*** *(0.066)*
Stability:						
TEMPORARY	-0.598*** *(0.089)*	-0.522*** *(0.120)*	-0.281* *(0.145)*	-0.589*** *(0.095)*	-0.446*** *(0.121)*	-0.305** *(0.133)*
SEASONAL	-0.675** *(0.314)*	-0.813** *(0.347)*	-1.634*** *(0.475)*	-0.670** *(0.324)*	-0.950*** *(0.356)*	-1.617*** *(0.447)*
CASUAL	-0.988*** *(0.076)*	-1.048*** *(0.102)*	-1.455*** *(0.172)*	-0.963*** *(0.078)*	-1.097*** *(0.102)*	-1.449*** *(0.149)*
UNION	0.213* *(0.111)*	0.134 *(0.136)*	-0.153 *(0.176)*	0.188 *(0.119)*	-0.001 *(0.147)*	-0.217 *(0.173)*
SUPERVISOR	0.041 *(0.107)*	-0.060 *(0.142)*	-0.381** *(0.185)*	-0.004 *(0.114)*	-0.284* *(0.159)*	-0.543*** *(0.189)*
NIGHT	-0.201*** *(0.060)*	-0.186*** *(0.065)*	-0.038 *(0.087)*	-0.214*** *(0.062)*	-0.181*** *(0.067)*	-0.051 *(0.083)*
FORMAL	0.745*** *(0.088)*	0.681*** *(0.106)*	0.463*** *(0.137)*	0.750*** *(0.093)*	0.625*** *(0.106)*	0.495*** *(0.127)*
SKILL	0.144** *(0.060)*	0.100 *(0.074)*	0.047 *(0.063)*	0.179*** *(0.062)*	0.078 *(0.078)*	0.069 *(0.065)*
LOG (TRAVEL)	-0.081** *(0.033)*	-0.093** *(0.037)*	-0.088*** *(0.033)*	-0.073** *(0.034)*	-0.095** *(0.039)*	-0.084** *(0.034)*
Firm Size:						
MEDIUM	-0.074 *(0.153)*	-0.118 *(0.158)*	-0.252 *(0.189)*	0.035 *(0.167)*	-0.071 *(0.179)*	-0.161 *(0.204)*
LARGE	0.027 *(0.102)*	-0.003 *(0.106)*	-0.100 *(0.125)*	0.056 *(0.108)*	-0.001 *(0.111)*	-0.054 *(0.131)*
UNKNOWN	0.101 *(0.153)*	0.090 *(0.136)*	0.103 *(0.181)*	0.139 *(0.159)*	0.111 *(0.147)*	0.134 *(0.189)*
IMR	…….	0.132 *(0.188)*	…….	…….	0.490** *(0.223)*	…….
Constant	1.226*** *(0.448)*	-0.039 *(1.238)*	-0.534 *(0.990)*	0.481 *(0.441)*	-3.333** *(1.382)*	-2.455** *(0.947)*
N	***4,747***	***4,747***	***4,747***	***4,443***	***4,443***	***4,443***
R2	***0.1720***	***0.1544***	***…….***	***0.1618***	***0.0707***	***…….***

Standard errors in brackets
**** p<0.01, ** p<0.05, * p<0.1*

Table 6.25: Wage Equation Results[83] - Overall Job Satisfaction Models (Complete/Male Labour Samples):

	(1)	*(2)*	*(3)*	*(4)*
	DEPENDENT VARIABLE: WAGES			
	COMPLETE LABOUR SAMPLE		**MALE LABOUR SAMPLE**	
Variables	**2SLS**	**MLE**	**2SLS**	**MLE**
Wage Identifiers				
WAGE REF	0.0003*** *(0.0001)*	0.0003*** *(0.0001)*	0.0003*** *(0.0001)*	0.0002*** *(0.0001)*
TENURE	0.007** *(0.003)*	0.009*** *(0.003)*	0.005 *(0.003)*	0.006** *(0.003)*
TENURE SQUARED	-0.0002** *(0.0001)*	-0.0002*** *(0.0001)*	-0.0001* *(0.0001)*	-0.0002** *(0.0001)*
Occupation:				
PROFESSIONAL	-0.053 *(0.085)*	0.020 *(0.084)*	0.006 *(0.087)*	0.083 *(0.082)*
TECHNICIAN	-0.152* *(0.089)*	-0.128 *(0.088)*	-0.175* *(0.092)*	-0.146* *(0.087)*
CLERICAL	-0.212** *(0.100)*	-0.182* *(0.099)*	-0.286*** *(0.104)*	-0.255** *(0.098)*
SERVICE/SALES	-0.148* *(0.085)*	-0.189** *(0.085)*	-0.199** *(0.085)*	-0.244*** *(0.081)*
AGR/FOR/FISH	-0.102 *(0.088)*	-0.158* *(0.090)*	-0.172* *(0.089)*	-0.237*** *(0.085)*
CRAFT/TRADE	-0.010 *(0.085)*	-0.046 *(0.088)*	-0.065 *(0.086)*	-0.125 *(0.083)*
MACHINE OP	-0.116 *(0.085)*	-0.161* *(0.086)*	-0.163* *(0.086)*	-0.210** *(0.082)*
ELEMENTARY OC	-0.235*** *(0.089)*	-0.292** *(0.090)*	-0.286*** *(0.090)*	-0.353*** *(0.085)*
Individual Characteristics				
AGE	0.006 *(0.010)*	0.007 *(0.008)*	-0.008 *(0.012)*	0.005 *(0.009)*
AGE SQUARED	8.38e-06 *(0.0001)*	-4.60e-06 *(0.0001)*	0.0002 *(0.0002)*	0.00003 *(0.0001)*
MALE	0.305*** *(0.061)*	0.329*** *(0.057)*	…….	…….
*Marital Status*Gender:*				
MARRIED*MALE	0.074** *(0.029)*	0.087*** *(0.027)*	0.070*** *(0.025)*	0.086*** *(0.024)*
MARRIED*FEMALE	0.215*** *(0.075)*	0.221*** *(0.073)*	…….	…….
Region:				
RURAL LOWER	-0.124*** *(0.023)*	-0.109*** *(0.024)*	-0.117*** *(0.023)*	-0.106*** *(0.023)*
URBAN UPPER	-0.080*** *(0.029)*	-0.082*** *(0.029)*	-0.089*** *(0.028)*	-0.089*** *(0.029)*
URBAN LOWER	-0.117*** *(0.031)*	-0.111*** *(0.032)*	-0.121*** *(0.031)*	-0.108*** *(0.032)*
ALEX/SUEZ CAN	-0.042 *(0.035)*	-0.050 *(0.036)*	-0.044 *(0.036)*	-0.051 *(0.037)*
GREATER CAIRO	0.050 *(0.032)*	0.056* *(0.032)*	0.012 *(0.033)*	0.023 *(0.033)*
Parents' Education:				
FATHER EDUC	0.036 *(0.022)*	0.035 *(0.023)*	0.034 *(0.023)*	0.028 *(0.024)*
MOTHER EDUC	0.075*** *(0.028)*	0.069** *(0.029)*	0.078*** *(0.030)*	0.063** *(0.030)*
Human Capital Characteristics				
Education:				
LIT/NO DIP	-0.022 *(0.042)*	-0.009 *(0.043)*	-0.015 *(0.042)*	-0.006 *(0.043)*
ELEMENTARY	0.002 *(0.029)*	0.008 *(0.030)*	0.008 *(0.030)*	0.004 *(0.031)*
MIDDLE SCHOOL	0.0002 *(0.037)*	-0.004 *(0.038)*	0.029 *(0.040)*	0.002 *(0.039)*
GENERAL HIGH	0.130** *(0.057)*	0.144** *(0.057)*	0.174*** *(0.064)*	0.137** *(0.060)*
VOCATIONAL	0.025 *(0.026)*	0.039 *(0.026)*	0.038 *(0.025)*	0.043* *(0.026)*
POST-SEC	0.087 *(0.054)*	0.106* *(0.055)*	0.109** *(0.055)*	0.120** *(0.057)*
UNIVERSITY	0.135*** *(0.041)*	0.119*** *(0.041)*	0.096** *(0.040)*	0.059 *(0.041)*
POST-GRAD	-0.027 *(0.132)*	-0.0005 *(0.136)*	-0.172 *(0.147)*	-0.174 *(0.151)*
TRAINING	0.079* *(0.044)*	0.108** *(0.045)*	0.117** *(0.046)*	0.141*** *(0.048)*
Job Characteristics				
LOG (HRS/WEEK)	-0.356*** *(0.018)*	…….	-0.350*** *(0.018)*	…….
Stability:				
TEMPORARY	-0.134*** *(0.026)*	-0.133*** *(0.027)*	-0.106*** *(0.027)*	-0.109*** *(0.028)*
SEASONAL	0.113 *(0.087)*	0.314*** *(0.089)*	0.085 *(0.088)*	0.284*** *(0.090)*
CASUAL	0.083 *(0.022)*	0.194*** *(0.023)*	0.088*** *(0.022)*	0.200*** *(0.023)*
UNION	0.141*** *(0.034)*	0.146*** *(0.035)*	0.130*** *(0.036)*	0.134*** *(0.037)*
SUPERVISOR	0.190*** *(0.032)*	0.181*** *(0.033)*	0.221*** *(0.033)*	0.214*** *(0.034)*
NIGHT	-0.024 *(0.018)*	-0.067*** *(0.018)*	-0.021 *(0.018)*	-0.064*** *(0.018)*
FORMAL	0.132*** *(0.026)*	0.133*** *(0.027)*	0.109*** *(0.027)*	0.104*** *(0.028)*
SKILL	0.029 *(0.019)*	…….	0.023 *(0.019)*	…….
LOG (TRAVEL)	0.026*** *(0.009)*	…….	0.019** *(0.010)*	…….
Firm Size:				
MEDIUM	0.106** *(0.045)*	0.094** *(0.046)*	0.103** *(0.048)*	0.089* *(0.049)*
LARGE	0.078** *(0.030)*	0.079*** *(0.031)*	0.069** *(0.032)*	0.069** *(0.032)*
UNKNOWN	0.008 *(0.043)*	-0.004 *(0.045)*	0.006 *(0.044)*	-0.006 *(0.045)*
IMR	-0.082 *(0.054)*	…….	-0.167*** *(0.062)*	…….
Constant	2.029*** *(0.244)*	0.700*** *(0.201)*	2.641*** *(0.242)*	1.161*** *(0.179)*
N	***5,396***	***5,396***	***5,062***	***5,062***
R2	***0.2366***	***……..***	***0.2175***	***……..***

Standard errors in brackets
**** p<0.01, ** p<0.05, * p<0.1*

[83] 2SLS models: results without bootstrapping standard errors.

Table 6.26: Wage Equation Results[84] – Components of Job Satisfaction Models (Complete/Male Labour Samples):

	(1)	*(2)*	*(3)*	*(4)*
	DEPENDENT VARIABLE: WAGES			
	COMPLETE LABOUR SAMPLE		**MALE LABOUR SAMPLE**	
Variables	**2SLS**	**MLE**	**2SLS**	**MLE**
Wage Identifiers				
WAGE REF	0.0003*** *(0.0001)*	0.0002** *(0.0001)*	0.0003*** *(0.0001)*	0.0002** *(0.0001)*
TENURE	0.010*** *(0.003)*	0.009*** *(0.003)*	0.007** *(0.003)*	0.007*** *(0.003)*
TENURE SQUARED	-0.0002*** *(0.0001)*	-0.0002*** *(0.0001)*	-0.0002** *(0.0001)*	-0.0002*** *(0.0001)*
Occupation:				
PROFESSIONAL	-0.055 *(0.086)*	0.009 *(0.075)*	0.010 *(0.088)*	0.063 *(0.076)*
TECHNICIAN	-0.129 *(0.091)*	-0.136* *(0.079)*	-0.144 *(0.093)*	-0.148* *(0.080)*
CLERICAL	-0.215** *(0.101)*	-0.181** *(0.090)*	-0.295*** *(0.105)*	-0.252*** *(0.093)*
SERVICE/SALES	-0.117 *(0.087)*	-0.224*** *(0.076)*	-0.168* *(0.088)*	-0.263*** *(0.075)*
AGR/FOR/FISH	-0.070 *(0.090)*	-0.220*** *(0.081)*	-0.139 *(0.092)*	-0.264*** *(0.079)*
CRAFT/TRADE	0.005 *(0.087)*	-0.130 *(0.080)*	-0.049 *(0.088)*	-0.170** *(0.077)*
MACHINE OP	-0.089 *(0.087)*	-0.221*** *(0.077)*	-0.138 *(0.088)*	-0.247*** *(0.076)*
ELEMENTARY OC	-0.219** *(0.091)*	-0.358*** *(0.079)*	-0.266*** *(0.092)*	-0.389*** *(0.079)*
Individual Characteristics				
AGE	0.005 *(0.010)*	0.006 *(0.009)*	-0.010 *(0.013)*	0.002 *(0.010)*
AGE SQUARED	0.00002 *(0.0001)*	0.00001 *(0.0001)*	0.0002 *(0.0002)*	0.0001 *(0.0001)*
MALE	0.313*** *(0.063)*	0.360*** *(0.060)*	…….	…….
*Marital Status*Gender:*				
MARRIED*MALE	0.071** *(0.031)*	0.085*** *(0.030)*	0.062** *(0.026)*	0.080*** *(0.026)*
MARRIED*FEMALE	0.224*** *(0.079)*	0.235*** *(0.078)*	…….	…….
Region:				
RURAL LOWER	-0.145*** *(0.025)*	-0.132*** *(0.026)*	-0.139*** *(0.025)*	-0.129*** *(0.025)*
URBAN UPPER	-0.078** *(0.030)*	-0.085*** *(0.031)*	-0.090*** *(0.030)*	-0.092*** *(0.031)*
URBAN LOWER	-0.117*** *(0.034)*	-0.120*** *(0.035)*	-0.123*** *(0.034)*	-0.117*** *(0.035)*
ALEX/SUEZ CAN	-0.053 *(0.038)*	-0.066* *(0.038)*	-0.058 *(0.038)*	-0.069* *(0.039)*
GREATER CAIRO	0.044 *(0.034)*	0.038 *(0.034)*	0.003 *(0.035)*	0.005 *(0.035)*
Parents' Education:				
FATHER EDUC	0.036 *(0.024)*	0.033 *(0.024)*	0.032 *(0.024)*	0.027 *(0.025)*
MOTHER EDUC	0.072** *(0.029)*	0.062** *(0.030)*	0.075** *(0.031)*	0.060* *(0.032)*
Human Capital Characteristics				
Education:				
LIT/NO DIP	-0.033 *(0.045)*	-0.014 *(0.046)*	-0.026 *(0.045)*	-0.011 *(0.046)*
ELEMENTARY	-0.002 *(0.032)*	-0.001 *(0.033)*	0.007 *(0.033)*	-0.003 *(0.034)*
MIDDLE SCHOOL	-0.014 *(0.040)*	-0.016 *(0.040)*	0.017 *(0.043)*	-0.006 *(0.042)*
GENERAL HIGH	0.104* *(0.059)*	0.114* *(0.059)*	0.147** *(0.067)*	0.115* *(0.063)*
VOCATIONAL	0.012 *(0.029)*	0.021 *(0.029)*	0.027 *(0.027)*	0.030 *(0.028)*
POST-SEC	0.085 *(0.058)*	0.087 *(0.059)*	0.113* *(0.059)*	0.117* *(0.061)*
UNIVERSITY	0.149*** *(0.044)*	0.098** *(0.044)*	0.106** *(0.043)*	0.052 *(0.043)*
POST-GRAD	0.020 *(0.136)*	-0.013 *(0.140)*	-0.165 *(0.148)*	-0.193 *(0.152)*
TRAINING	0.076* *(0.045)*	0.106** *(0.046)*	0.115** *(0.047)*	0.142*** *(0.049)*
Job Characteristics				
LOG (HRS/WEEK)	-0.360*** *(0.019)*	…….	-0.354*** *(0.019)*	…….
Stability:				
TEMPORARY	-0.132*** *(0.027)*	-0.138*** *(0.028)*	-0.107*** *(0.029)*	-0.114*** *(0.030)*
SEASONAL	0.281*** *(0.095)*	0.479*** *(0.098)*	0.254*** *(0.097)*	0.447*** *(0.099)*
CASUAL	0.094*** *(0.024)*	0.218*** *(0.025)*	0.095*** *(0.024)*	0.216*** *(0.025)*
UNION	0.140*** *(0.035)*	0.145*** *(0.036)*	0.128*** *(0.037)*	0.138*** *(0.038)*
SUPERVISOR	0.198*** *(0.034)*	0.181*** *(0.034)*	0.235*** *(0.035)*	0.221*** *(0.036)*
NIGHT	-0.020 *(0.019)*	-0.064*** *(0.019)*	-0.016 *(0.019)*	-0.058*** *(0.019)*
FORMAL	0.141*** *(0.028)*	0.140*** *(0.028)*	0.118*** *(0.029)*	0.115*** *(0.029)*
SKILL	0.036* *(0.020)*	…….	0.030 *(0.021)*	…….
LOG (TRAVEL)	0.025** *(0.010)*	…….	0.017* *(0.010)*	…….
Firm Size:				
MEDIUM	0.119** *(0.047)*	0.099** *(0.048)*	0.119** *(0.050)*	0.099* *(0.051)*
LARGE	0.088*** *(0.031)*	0.079** *(0.032)*	0.077** *(0.033)*	0.064* *(0.033)*
UNKNOWN	0.032 *(0.047)*	0.006 *(0.048)*	0.029 *(0.048)*	0.003 *(0.050)*
IMR	-0.074 *(0.057)*	…….	-0.163** *(0.066)*	…….
Constant	2.009*** *(0.261)*	0.787*** *(0.219)*	2.655*** *(0.265)*	1.269*** *(0.194)*
N	***4,747***	***4,747***	***4,443***	***4,443***
R2	***0.2474***	***……..***	***0.2277***	***……..***

Standard errors in brackets
**** p<0.01, ** p<0.05, * p<0.1*

[84] 2SLS models: results without bootstrapping standard errors.

Chapter VII
Conclusion

7.1 Summary

This thesis has addressed two major outcomes of labour market activities in Egypt, wages and job satisfaction. According to Classical Microeconomic theory, labour productivity is likely to impact wages earned, while higher wages are also likely to enhance workers' motivation and job satisfaction levels, leading to an increase in labour productivity levels, which in turn may feed back into wages earned. We used data from the 2012 round of the ELMPS, which provides a wide range of labour market information at the individual level in Egypt. While there are three rounds of the ELMPS, we were confined to the 2012 round because data relating to two of our main variables of interest, health and job satisfaction, were only available in that round.

We began with a discussion of the Egyptian labour market in chapter II. This was followed by a review of statistical data in chapter III, covering the labour sample we utilise in our analyses in the chapters that followed. We found that men largely dominate the labour force, and it is therefore not surprising that our sample is also largely male. We focused our research explicitly on the private sector workers, because the wage determination processes are different in the private and public sectors, as we discussed in chapter II.

Our main research questions focused on three major factors in relation to wage levels in the Egyptian labour market, which include the sector of employment, productivity, and job satisfaction. In chapter IV, we inspected the effect of labour characteristics on selection into the formal sector of employment. In addition, we analysed the factors influencing wages in the formal vs. the informal sectors, and we corrected for the sample selection bias arising from individuals whose wages were not observed in a specific sector due to their employment in the alternative sector. Our findings highlighted the factors that increase the probability of formal employment in Egypt, which include a history of formal employment in the family (fathers who were employed in the governmental or public sectors in the past), educated fathers, as well as higher educational degrees and receiving training. We also found that selection into formal sector employment is significant for wage determination in this sector, and that the factors influencing wages in the formal sector are different from the informal sector, such as age, region, educational levels, training, tenure, union member, and size of firm.

In chapter V, we turned to an analysis of the impact of productivity on wages. Since we cannot observe individual labour productivity levels, we used a measure of health to proxy for productivity, assuming that healthier individuals would perform better and exert more effort on the job. Since there is a possibility of reverse causality, with productivity influencing wages and vice versa, we corrected for the potential endogeneity bias by utilising methods that instrument health with a variety of variables that impact the health of individuals, but not their wages. Furthermore, we corrected for the sample selection bias that is likely to prevail due to the unaccounted proportion of the sample that may have chosen to opt out of the labour force completely due to severe bad health states. Correcting for both biases entailed the identification of a health equation and a selection equation to incorporate in our models. In this context, we found that productivity (as proxied by health) significantly increases private sector wages, indicating potential improvements of labour market outcomes through the improvement of the population's health.

Finally, in chapter VI, we inspected the effect of various labour characteristics on overall job satisfaction and satisfaction with certain job aspects, which include job security, type of work, working hours, working schedule, working conditions, commuting to work, and matching between qualifications and job. We focused our analysis on the impact of wages on job satisfaction. Again and similar to chapter V's analysis, we expected an endogeneity bias and a sample selection bias. Thus, we used methods to correct for both biases and found that wages play a major role in enhancing job satisfaction levels in Egypt.

There are a number of notes worth making here. First, our findings equally apply to the complete sample of the Egyptian labour market and the male labour sample separately, with some minor differences, which is sensible given that men comprise the majority of our complete labour sample. Second, while our research does not explicitly address the superiority of the formal sector in Egypt, we found an informal sector wage penalty as well as lower job satisfaction in the informal sector. Third, we identified the significant role of education in improving labour market outcomes, whether in terms of formal employment, labour force participation, or wages. Accordingly, policy-makers are urged to target channels that enhance human capital, such as educational and training institutions. Fourth, union membership proved to be highly significant for improving wages. Finally, we found significant differentials with respect to labour market outcomes in favour of urban regions, indicating a requirement for policy-makers to improve labour market outcomes in the rural areas.

7.2 Policy Implications

According to our findings, formality improves labour market outcomes, whether wages or job satisfaction. Accordingly, policies that address and deal with the informal labour market should be of top priority. While it is unrealistic to claim that policies should target the complete formalisation of the informal labour market, since this sector is still beneficial for accommodating a significant proportion of the labour force and absorbing some of the effects of unemployment shocks, it is important for policymakers to consider how they can minimise the negative outcomes of informal sector employment. This might relate to minimum wage legislation or harnessing the power of unions in working for improved wages and working conditions in this sector. It might also be useful to reformulate the social security system (see chapter IV) to enhance its outcomes and make it more attractive for the labour and the employers. Two particular aspects of the social security system could aid in achieving this objective. First, policies that address unemployment benefits could be of great benefit for lowering the individuals' cost of unemployment and should be put in place to ensure that the reservation wage is sufficiently high that unemployed workers do not take on whatever jobs are available. Second, pension reforms could also be targeted and policymakers should ensure that future returns and pensions are enough to lead a decent standard of living and improve the labour's preference for jobs that are covered and provide them with pensions.

In addition to the above, there could be incentives for employers as well as stricter punishment to complement the above policies and motivate employers to cut back their share in informal job offerings. For instance, the government could offer tax cuts for employers who increase their share of formal employment. Also, the government could increase its social security contributions whilst also improving its monitoring systems to ensure employers are abiding by the laws.

Our results also highlight the importance of health in influencing labour market outcomes. Thus, it is clear that human capital (both in terms of education and health) is crucial determinants of labour market outcomes. Attempts to consider policies that might improve the health of labour, either through health insurance or subsidised healthcare, are clearly important in this context.

7.3 Areas for Future Research

Our analyses in this thesis has analysed a number of labour market outcomes, however, much more could be done in this area. To begin with, our research was limited by the scope of data available to us. Explicit labour productivity data measures were unavailable, leading us to use a proxy (health) for productivity. One way of overcoming this difficulty is to collect primary data, however, it may not be optimal, as primary data collection is usually limited in coverage and hardly covers a sample that can be deemed representative of the national labour market. Accordingly, data accumulation institutions should consider the requirement of such data and develop methods of their collection in order to allow for more direct and explicit empirical research. Examples of such labour productivity data may include output/labour ratio at individuals' firms, industry- or firm-level labour turnover, supervisors' appraisal of individuals' performance, or frequency of breaks and workday interruptions. In addition, we were unable to conduct analyses utilising explicitly the female sample. This is another factor that can be addressed more thoroughly if data accumulation efforts were expanded to account for a larger sample of the female labour.

Similarly, while the ELMPS is a panel dataset, we were unable to make use of this aspect since two of our variables, health and job satisfaction, appeared only in the 2012 round. As more rounds of data for these variables become available, it will be possible to consider changes over time and across individuals. This would allow us to control for individual variation, which is extremely important in controlling for individual characteristics like ability. Thus, as the dataset expands and more rounds containing the required data are added, it would be worthwhile to expand on the analyses of the topics of this thesis.

Additionally, we have highlighted certain aspects in the labour market, which may be deserving of further thorough analysis, such as regional differences in terms of labour market outcomes, which we control for but do not explicitly address. Further research could explicitly address the differences with respect to regional effects on wages and job satisfaction in order to better understand how the labour market is different across regions and perhaps even improve on policies that may differ according to regions. Finally, our study is limited to waged employed workers, leaving out a significant proportion of the labour, which could be considered in future analyses.

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