

INFORMAL SECTOR WAGE GAP IN TURKEY

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## **ABSTRACT**

### **INFORMAL SECTOR WAGE GAP IN TURKEY**

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Informality has been a widespread fact in most of developing countries. Especially after the implementation of liberalization policies in the 1980s, informal sector has expanded, and informal employment has been more attractive in the Turkish economy. The aim of this thesis is to examine whether there is wage gap between formal and informal employment in Turkey for the years 2007 and 2008. In order to test if the determinants of wages are different, selection corrected wage equations are estimated for manufacturing and service sectors for men and women separately by using the Household Labor Force Survey micro level data of TURKSTAT. We also estimated Multinomial Logit model in order to be able to take the sector selection process into account. According to our estimation results, there was a significant wage gap between formal and informal employment in Turkey for the years 2007 and 2008, even after controlling for a number of individual-specific characteristics. This indicates the existence of the segmented labor market in terms of wages in Turkey, as

it is asserted by the number of researchers arguing against the neo-classical labor market theory.

Keywords: Informal Sector, Informal Employment, Wage Gap, Turkish Economy

## ÖZ

### TÜRKİYE’DE KAYITDIŞI SEKTÖR ÜCRET FARKLILIĞI

Tuç Mis, Sine

Yüksek Lisans, İktisat Bölümü

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Kayıt dışılık, gelişmekte olan birçok ülkenin yaygın bir gerçeğidir. Özellikle 1980’lerde uygulanmaya başlanan liberalizasyon politikaları sonrasında kayıt dışı sektör genişlemiş ve kayıt dışı istihdam Türkiye ekonomisinde daha cazip hale gelmiştir. Bu tezin amacı 2007 ve 2008 yılları için Türkiye’de kayıtlı ve kayıt dışı istihdam arasında ücret farklılığı olup olmadığını incelemektir. Ücretleri belirleyen faktörlerin farklı olduğunu test etmek için, Türkiye İstatistik Kurumu 2007 ve 2008 Hane Halkı İşgücü Anket mikro veri seti kullanılarak imalat ve hizmet sektörleri için seçim süreci düzeltilmiş ücret denklemleri kadınlar ve erkekler için ayrı ayrı tahmin edilmiştir. Ayrıca, sektör seçim sürecini göz önünde bulundurabilmek için Multinomial Logit model tahmin edilmiştir. Tahmin sonuçlarımıza göre, çalışanların bireysel özellikleri kontrol altında tutulsa dahi Türkiye’de 2007 ve 2008 yıllarında kayıtlı ve kayıt dışı istihdam arasında önemli ölçüde ücret farklılığı bulunmaktadır. Bu durum, neo klasik emek piyasası teorisine karşı çıkan birçok araştırmacı

tarafından iddia edildiđi üzere, Türkiye’de ücretler açısından katmanlaşmış emek piyasasının varlığına işaret etmektedir.

Anahtar Kelimeler: Kayıt Dışı Sektör, Kayıt Dışı istihdam, Ücret Farklılığı, Türkiye Ekonomisi

*To My Beloved Parents*

*and*

*To Living for Freedom*



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## **CHAPTER 1**

### **INTRODUCTION**

Informal sector has become one of the most debated and popular issues in economics. Although policy makers tend to assert that there would be no informal employment, recent research indicates the existence of informal sector and informal employment.

After the collapse of the planned economy in Turkey in the 1980s, the liberalization process encouraged small enterprises to employ workers informally in order to be more competitive. Castells and Portes (1989) suggest that the best-known economic effect of the informalization process is to reduce the costs of labor. Among the informalization practices, employing workers without social security coverage has become the most popular and preferable one for employers. In addition, employers hire workers at lower wage rates in the informal sector even if individual characteristics of these workers are the same as the workers in the formal sector. Hence there could be a substantial wage gap between informal and formal employment.

Neo-classical labor market theory assumes that workers can freely choose a job in the labor market, based upon their personal preferences, abilities and skills. Marginal productivity of workers determines their wage level in the competitive market. Segmented Labor Market Theory, however, argues that labor market is not a single competitive market; it consists of non-competing segments. There are barriers to enter these segmented markets. Thus, the returns to human capital differ because barriers prohibit all parts of the population from benefiting equally (Leontaridi, 1998). There exist wage gap between those segments, i.e. formal and informal sectors, even if the individual characteristics of those workers are the same. The existence of a wage gap between formal and informal sectors is an important

indicator for productivity differences between those sectors (Taymaz, 2009). Since productivity is one of the most essential factors for sustainable long term growth, examining whether there is a wage gap between formal and informal sectors is crucial.

The aim of this thesis is to investigate whether there is a wage gap between formal and informal sectors, both in manufacturing and services, in 2007 and 2008, after controlling the individual characteristics of workers. For this aim, multinomial participation decision corrected wage equations are estimated for both males and females, separately. Data come from the 2007 and 2008 Household Labor Force Surveys. Since the employment dynamics are different in rural and urban areas, only urban area is taken into account.

There is not a common definition of informal sector in economics. In this thesis, informal employment is defined as employees who work without social security coverage. Informal sector, thus, is defined as the sector in which workers are employed without social security coverage. Since there are significant differences between manufacturing and services in terms of skill requirements and job characteristics, we analyze these two sectors separately. Thus, the wage gap is examined for four categories, namely informal manufacturing sector, informal service sector, formal manufacturing sector and formal service sector.

The wage rate is observable only for the employed people; we define regular and casual employees as “wage earners”. Unpaid family workers, self-employed and employers are not considered as “wage earners”. Individuals are assumed to choose one of the seven employment outcomes: working in the formal manufacturing or service sector, working in the informal manufacturing or service sector, being self-employed, being employer or non-employment. Selection among the employment outcomes is estimated by multinomial logit model in which the non-employment is taken as base category, the results of the estimation indicate the probability of an individual to choose one of these seven outcomes. Heckman (1974) asserts that if the



selection process is ignored, then OLS estimation of the wage equation will be biased and estimations will not be consistent. In order to prevent inconsistency, first the multinomial logit model is estimated and the selection correction terms as suggested by Dubin and McFadden (1984) are calculated. Then a Mincerian wage equation is estimated by including these multiple selection correction terms for formal/informal manufacturing and service sectors for both males and females, separately. Estimation results show that selection terms are statistically significant; meaning that selection process significantly affects wages. Furthermore, according to estimation results there is a wage gap between formal and informal sectors, i.e. employees who work informally neither have social security coverage nor get higher wages.

The structure of the thesis is as follows: Chapter 2 presents a brief literature review on the concept of informal sector and informal employment and discusses Segmented Labor Market Theory. Also summarizes empirical studies conducted on the wage gap between formal and informal sectors.

In Chapter 3, the data source (Household Labor Force Survey, HLFS) is presented. Descriptive statistics on 2007 and 2008 HLFS are also presented in this section.

In Chapter 4, the methodology used in the thesis is explained. This chapter is divided into two sub-sections: methodology on multinomial logit model and Mincerian selection corrected wage equation. Estimation results of multinomial logit equation and wage equations are discussed in Chapter 5 and Chapter 6, respectively. In each chapter, the determinants of relevant model are presented for formal and informal sectors for each gender. The determinants of wage gap differentials are presented in Chapter 6.

Finally, Chapter 7 summarizes the study and provides the concluding remarks.

## CHAPTER 2

### LITERATURE SURVEY

There are various definitions of “informality” in the literature that cover various aspects of economic activities and employment. Some of these definitions are quite narrow and specifically define “informality” by legal registration of activities, and some definitions include almost all types of illegal activities.

This chapter is divided into two sub-sections. In the first sub-section, the concepts of “informal sector” and “informal employment” will be discussed with a special emphasis on “official” definitions provided by international organizations and statistical offices such as ILO, World Bank, OECD and TURKSTAT. In the second sub-section, empirical studies on the wage gap between formal and informal sectors are reviewed.

#### **2.1. Definition of Informal Sector**

Informality is one of the most important and complex issues today’s economies. It is the major problem for developing countries, especially Turkey. Existence of liberalization and the phenomenon of free market economy in labor market cause to increase informality and informal employment.

World Bank states that the reasons of existing informality are deep structural and institutional factors. It is possible to collect these reasons under three headings. First, Turkey has large agricultural sector and it includes high number of informal employees not registered with the social security system. Second, because of the possibility of early retirement, older workers may prefer to work informally after retirement. Third, since the Turkish employment protection legislation is the most rigid one in OECD countries, many firms prefer to employ informal workers. (World Bank, 2010)

In Castells and Portes words “self-employment is growing more rapidly than salaried employment. The process of institutionalization of economic activities is slowing down the horizontal networks, not vertical bureaucracies; seem to be the new models of efficient organizations. Subcontracting prevails over union contracts in various industrial sectors.” (Castells, et al., 1989 p. 11) According to World Bank, informality in Turkey is widespread. “While firm non-registration is not very common, underreporting of revenues and wages and non-registration of workers with the social security system are more prevalent.” (World Bank, 2010)

In the literature, there are many concepts related to the informal-type economic activity, namely “black”, “clandestine”, “grey”, “hidden”, “informal”, “shadow”, “subterranean”, “uncovered”, “underground”, “unreported”.<sup>1</sup> (Taymaz, 2009) These concepts are used as if they had same meaning. According to Feige (1990), however, these concepts are differentiated from each other. Each of them is characterized by particular institutional set of rules that is violated. Four of these concepts are described below<sup>2</sup>:

- Illegal Economy refers to all of the economic activities pursued in violation of legal norms. The agents in the illegal economy produce prohibited goods and services. Drug production, for instance, is a kind of illegal economic activity.
- Unreported Economy refers to economic activities that evade tax burden and fiscal rules in the tax code.
- Unrecorded Economy refers to economic activities evading the institutional rules, which is defined by the reporting requirements of government statistical agencies. The income that comes from the unrecorded economic activities, for instance, is not recorded in national accounting system.

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<sup>1</sup> For detailed information see Perry et al.(2007)

<sup>2</sup> These four concepts are based on Feige (1990)

- As for the Informal Economy, Feige (1990) defines it as “economic activities that avoid costs and are excluded from the benefits and rights constituted by the laws and administrative rules, namely labor contracts, social security systems.” ILO also emphasize that “Informal enterprises create unfair competition for formal enterprises by not paying taxes or social security contributions for workers or avoiding other business costs incurred in the formal economy.” (ILO, 2002)

Even though informality is an important fact for developing countries, there is no single internationally accepted definition in the literature. Researchers and some international organizations use different criteria to define the informal sector. It is convenient to divide different definitions of informality into two groups. Some researchers take the characteristics of enterprises and working conditions of employed people into account when defining informality. Some others, however, emphasize legal status of the economic activity. (Taymaz, 2009)

Although, informal sector has become attractive for the economists at 1950's and 1960's, it was the first time when ILO used the name “informal sector” at 1972 in Kenya Report (Gerxhani, 2004) ILO, also declares that the concept of informal sector was first used at International Labor Conference by ILO itself in 2002:

“It was exactly 30 years ago that the ILO first used the term ‘informal sector’ to describe the activities of the working poor who were working very hard but who were not recognized, recorded, protected, or regulated by the public authorities.” (ILO, 2002)

Therefore, it would be more convenient to analyze the concept of “informal sector” from two points of view as the ILO mentioned. It can be defined in terms of characteristics of the enterprises, production units or occupational characteristics of workers involved in jobs. These are called “enterprise approach” and labor approach”, respectively. Indeed, ILO prefers “enterprise approach” in defining informal sector. (Hussmanns, 2004)

ILO uses two concepts in terms of employment related to the informal sector: “Employment in the informal sector” and “Informal Employment” (Taymaz, 2009)

“Employment in the informal sector” is defined as all jobs in informal sector enterprises, or all persons who were employed in at least one informal sector enterprise. Informal sector enterprises are private unincorporated enterprises. In other words, these enterprises owned by individuals or households are not constituted as separate legal entities independently of their owners. They, also, do not have complete accounts that would permit a financial separation of the production activities from the other activities of its owners. (Husmanns, 2004) In brief, according to ILO’s definition, informal sector enterprises include two basic characteristics: not separate legal entities and not financial separation from their owners.

All jobs in the informal sector enterprises or all persons, who work in this kind of enterprises, constitute “employment in the informal sector.” According to OECD, this definition misses informal workers outside of informal enterprises. By this context, ILO provided a broader definition, namely “Informal Employment”. (Jütting, et al., 2008) “Informal Employment”, was defined by the 17<sup>th</sup> International Conference of Labor Statisticians, as “the total number of informal jobs, whether carried out in formal sector enterprises, informal sector enterprises, or households.” (Husmanns, 2004) It includes,

- i.** Own-account workers and employers working in their own informal sector enterprises
- ii.** Contributing family workers working in the formal and the informal sector enterprises.
- iii.** Employees holding informal jobs whether they work in informal sector enterprises or formal sector enterprises or paid domestic workers by households.
- iv.** Members of informal producers’ cooperatives.
- v.** Own-account workers engaged in the production of goods exclusively for own final use by their household. (Husmanns, 2004)

In general, informality refers to the legal activities which are not monitored by the government as stated by OECD. In other words, “informal activities” is not meaning the illegal activities. In fact, informal activities are subject to taxation or other legal rules. Informal employment, more specifically refers to the economic activities which are legal but not legally registered. In this context, informal employment includes employees not registered with social security system (World Bank, 2010)

TURKSTAT also defines informal employment as workers employ in all five employment categories legally but not registered with social security system (World Bank, 2010). From the empirical point of view, Marcouiller et al. (1997) states that there are two types of definitions of informal sector, which are commonly used in empirical works. Some researchers emphasize “firm size” criterion. Some others use “coverage by social security system.” Those researchers, who use “firm size” criterion, are categorized in the “traditional view” by Henley et al. (2006). Traditional view assumes that informal sector consists of small or micro enterprises and own account workers working at those enterprises. (Henley, et al., 2006)

Some researchers prefer using establishment size in defining and measuring informality. Maloney (1999), for example, bases his research on the definition of informality in terms of establishment size. (Maloney, 1999)

Establishments which have less than six employees are included informal sector by Maloney (1999). Pradhan & Van Soest (1995), also defines informal sector as firms which have less than six employees. Furthermore Marcouiller et al. (1997), uses firm size criterion form firms with five or fewer employees in Mexico and Peru, four or fewer workers in El Salvador.

As stated above, however, some researchers define the informality and informal employment in using “coverage by social security system” criterion. Henley et al. (2006), argue that informality should be defined in terms of contract status i.e. worker’s legal status rather than the establishment size. Sometimes it is difficult to reach the data on contract status since employers do not indicate to worker’s legal

status truly. In fact they pretend to have legally registered employment relationships even if they do not have. These kinds of shortcomings cause not to get accurate information and data on informality. Therefore, it is more appropriate to use “social protection status” in defining informality. (Henley, et al., 2006)

Lund (2009) states about informal employment that “Informal workers, whether self-employed or wage workers, cannot usually afford to purchase private insurance against risk, they live in poor communities and are excluded from contributory schemas such as unemployment insurance, and workers compensation against accidents at work”. (Lund, 2009 p. 73) In Lund’s words, working in the informal economy is working with no social protection. OECD states that

“Informal jobs refer to work outside the regulatory framework because they are not subject to labor legislation, social protection, taxes or employment benefits.” (Jütting, et al., 2008)

In other words, it is possible to define the informal employment as working unregulated legal or social environment. ILO also emphasizes that the lack of social protection is a key defining characteristic of the informal economy.

“The growth of the informal economy means that millions of people worldwide either have never had access to formal mechanisms of social protection or are losing the comprehensive forms of protection they once had, through their place of employment or from the State or combination of the two.” (ILO, 2002)

Of the important researchers who have conducted studies on the informal sector, Castells and Portes (1989) state that the fundamental feature of informal economy is that it is unregulated by the institutions of society, in a legal and social environment in which similar activities are regulated.

According to Gerxhani (2004), status of labor is the most essential criterion in defining the informal sector. Exclusion of the contractual and legally regulated employment refers directly to the informal sector.

Tansel (1999) and Taymaz (2009) also use “social security coverage” criterion for defining the informal sector. Tansel (1999) makes the definition of informality by

taking wage earners into account. According to this definition formal sector workers are those who are not covered by any social security program (Tansel, 1999). Taymaz (2009) prefers to use the term “informal employment” in his study. Informal employment refers to wage earner, self-employed and entrepreneurs who are not registered in any social security organizations. (Taymaz, 2009)

As mentioned above, in the literature on informal sector, most of researchers prefer to use “social security coverage” in their empirical and non-empirical studies when defining the informal sector and informal employment. Furthermore, it is possible to get data on social security coverage from Household Labor Force Surveys. Therefore, it would be more convenient to use the criterion “social security coverage” when defining informal employment, and to conduct research based on this criterion.

## **2.2. Literature on Wage Gap between Formal and Informal Sector**

Many researchers have studied whether there is a wage gap between formal and informal sectors. In other words, the hypothesis that wages are different in these two sectors as a result of labor market segmentation has received in a great attention.

Neo-classical labor market theory assumes that workers can freely choose a job in the labor market, based upon their personal preferences, abilities and skills. Thus, they get rewards on the basis of their human capital endowments (Leontaridi, 1998). Marginal productivity of workers determines their wage level in the competitive market. Segmented Labor Market Theory, however, argues that labor market is not a single competitive market. Indeed, it is composed of non-competing segments. Between these segments, the returns to human capital differ because barriers prohibit all parts of the population from benefiting equally from education and training (Leontaridi, 1998). As a result, possible entry barriers to formal sector lead to a wage gap between formal and informal wage earners.



Labor market segmentation theory usually considers that the labor market consists of two segments: “Primary Sector” and “Secondary Sector”. These segments are differentiated by the stability characteristics. Primary jobs require and develop stable working habits; skills are often acquired on the job; wages are relatively high; and job ladders exist (Reich, et al., 1973). Primary sector is also characterized by the permanent jobs in large-scale enterprises which ensure the social security coverage, labor law protection. Secondary sector is characterized by jobs not requiring stability and often discourage stable working habits; wage are low; turnover is high; job ladders are few; access to social security coverage is limited. Secondary jobs are generally filled by minority workers, women and youth workers (Reich, et al., 1973).

According to Piore (1975), workers tend to have more job control with individual economic situations more closely related to formal education, personal achievements, and personalities in primary sector. The secondary labor market is characterized by a class of employers whose labor-intensive technologies and lack of market power restrict their ability to pay high wages. (Vietorisz, et al., 1973)

Vietorisz, et al. (1973) employ the following nonstandard conceptions about the economic system in order to prove that labor market segmentation is inherent in the core institutions of a modern market economy.

- i.** In some key sub systems, negative feedback dominates.
- ii.** Mechanization and automation are not marginal adjustments along the capital-labor isoquants of a changeless production function.
- iii.** The level of real wages is set by the money-wage bargain. The labor market does not “clear” at marginally determined real wage levels (Leontaridi, 1998 p. 367).

Reich, et al. (1993) defines the labor market segmentation as the historical process whereby political-economic forces encourage the division of the labor market into separate segments. These segments are distinguished by different labor market

characteristics and behavioral rules (Reich, et al., 1973, p. 359). Labor Market segmentation is defined by Gindling (1991) as a situation where a worker in the lower sector has less access to a job than in the upper sector, even if workers in these sectors are observationally identical.

“If there were no barriers, workers in the low wage sector would enter the high wage sector and force the wages in that sector down until wages across sectors were equalized.” (Gindling, 1991 s. 585)

According to Gindling (1991), workers involuntarily choose the informal sector due to the barriers to enter the formal sector. Moreover, labor market segmentation implies wages are different for observationally identical workers. Hence, segmented labor market theory states that segmentation exists because institutional rules are substitute for market processes; skill differential in the labor market does not lead to segmentation (Leontaridi, 1998 p. 64). Because of these institutional rules and entry barriers, workers would not freely enter the high wage sector thereby wage differentials between high and low wage sectors (formal and informal sectors) occur, even if skills and individual characteristics of workers are identical.

Empirical studies analyzing wage differentials bases on different categorical measures to define the segments. Most of the empirical studies use the informal and formal sectors to examine the wage gap. Heckman and Hotz (1986), Gindling(1991), Marcouiller et al.(1997), Tansel (1999), Monsted (2000), Taymaz (2009), Pages and Stampini (2009) are the researchers who base their wage gap analysis on segmented labor market approach. These researchers use the wage equation suggested by the Human Capital Approach. Indeed human capital approach is the most utilized one for constructing the wage equation.

In empirical literature, models of labor earnings can be divided into two main groups: Mincer-Becker’s “Human Capital Model”, and “Hedonic Model” (Heckman, et al., 1986). Hedonic Model is developed by Tinbergen (1951, 1956), Rosen (1974) and Sattinger (1980). Heckman and Hotz (1986), Hill (1989), Gindling (1991),

Marcouiller et al. (1997), Tansel (1999), Monsted (2000), Taymaz (2009) provide estimates for the Human Capital earning function.

“The principal view of the human capital approach is that an individual incurs costs when he decides to have additional education.” (Bulutay, 1995 p. 162). The reason of incurring costs is that the person is in expectation that he will earn higher money in his future life. Mincer (1958) emphasizes the importance of human capital approach on the wage differentials by stating that “Probably the oldest theory of this type is the one that relates the distribution of income to the distribution of individual abilities.” (Mincer, 1958, p.281)

Mincer’s method is commonly used in calculation wages and, in parallel, wage gap between formal and informal sector. While simple Mincerian (1958) wage equation includes only “schooling”, later work by Mincer (1974) takes into account “schooling”, “experience” and “experience-square” (Heckman, et al., 1986). The following equation is the human capital wage equation is developed by Mincer (1974):

$$\ln y = b_0 + b_1s + b_2t + b_3t^2 + u$$

where  $\ln y$  indicates the log hourly wage and  $s$  is the schooling or number of years of education,  $t$  is work experience and  $t^2$  is the experience-square. The coefficient  $b_1$  gives an estimate of the rate of return to education;  $b_2$  and  $b_3$  indicates an estimate of the rate of return to work experience and experience-square, respectively. “Observed annual earnings profiles show concavity. This concavity is captured by the quadratic work experience terms,  $t$  and  $t^2$ . Thus  $b_3$  estimates rate of change in time in the rate of return to work experience.” (Bulutay, 1995, p.163)

According to Human Capital Theory, the signs of coefficients of education and experience variables should be positive while the signs of the coefficient of experience-square should be negative (Gindling, 1991). In other words, as education and experience increases, wages also should rise, while expected sign of experience-

square which is negative, shows the trend of decline in the rate of return to work experience. (Bulutay, 1995, p.163)

Related to the Human Capital Theory, Monsted (2000) states that:

“Traditional human capital theory predicts that education and training are the main determinants of earnings and thereby of poverty, which explains their importance as policy variables. A higher level of schooling and experience implies a higher level of income.” (Monsted, 2000 p. 2)

Of the important studies on the estimation of wage equation, Heckman et al. (1986) estimate earnings equations for Panama and compare them between other countries which are at different economic development stages. Heckman et al. (1986) use both simple and later versions of Mincerian-type earning equations for Panamian males who were heads of households between the ages of 25 and 64 in 1983. Emphasizing the importance of family background in Panama, they examine two issues: Labor Market Segmentation and Social Stratification. Heckman et al. (1986) first estimate the simple version of Mincerian-type wage equations for economically more developed and less developed countries, separately. They find from the estimation of simple version of Mincerian wage equation that rates of return to schooling, which is represented by the value of the coefficient of schooling variable is higher in less developed countries. Also, rates of return to schooling are higher in Panama as a whole than Panama City.

Heckman et al. (1986), second estimate the later version of Mincerian-type wage equation by including experience and experience-square. They use proxy for experience such that age minus schooling minus six, where six is the age where schooling starts. They conclude that the rate of return to schooling is inversely related to the level of economic development, which means that the rate of return to schooling is higher for economically less developed countries than that of economically more developed countries.

Heckman et al. (1986) also add regional dummy variables receiving technical training variables, intensity of labor supply and family background variables. They find that all of these variables are statistically significant. As labor supply increases, earnings also increase. Regional differences strongly affect the wage equations. In other words, labor markets are geographically segmented. In addition, parental education has strong effect on wage equations. Mother's education is more dominant than father's education in the wage equations.

Dividing the data into two sectors, namely low income sector and high income sector, Heckman et al. (1986) estimate separately wage equations of these two sectors and test the hypothesis that there exists dual labor market. According to results, the coefficients of these two wage equations are significantly different from each other. This implies that there exists labor market segmentation.

Hill (1989) also contributes to the literature on informal sector. Hill (1989) examines labor supply decisions for married women aged between 20 and 59 living in Tokyo Metropolitan Area, Japan. She uses 1975 survey conducted by National Institute for vocational and occupational research. Furthermore, annual hours and wage equations are estimated for informal and formal sectors, separately. Trichotomous participation model, which is Multinomial Logit Model with three dependent variables, is used for estimation. Model assumes that an individual may select among three alternatives such as working as an employee, working as a family worker and not working by taking this outcome as the base category. Hill (1989) includes age, age-square, years of schooling, experience and husband's income as explanatory variables. She finds that experience positively affects the formal employment while husband's income and having children under six negatively affect the probability of choosing formal sector. Furthermore, age, schooling and experience positively affect the probability of choosing informal sector while husband's income and having children under six negatively affect it. In the formal sector, wages increase as years of schooling increases. In the informal sector, however, it increases as experience increases.

One of the most important contributions to the literature comes from Gindling (1991). Gindling (1991) examines whether there is labor market segmentation between private-formal and informal sector, and also between the public and private-formal sectors in San Jose, which is the capital of Costa Rica. Data comes from a survey conducted by the Costa Rican Ministry of Planning in April 1982, considering only employed workers with a positive monthly income. Workers are divided into two sub-groups: protected and unprotected workers. Workers, who are paid higher wages, are protected from competition while others, who are paid lower wages, are not protected. He categorizes sectors such that workers who have post-graduate education and who belong to cooperative, union or professional organization are in the formal sector. On the contrary, workers, who work in a non-service with no machinery or work with manual machinery or work in the street, are in the informal sector.

Gindling (1991) uses two-step procedure which is developed by Lee. First step is to estimate the sector selection equations by using Multinomial Logit Model. Second step is to estimate wage equations by adding selection term,  $\lambda$  (lambda), as an explanatory variable. Gindling (1991) finds that the coefficient of sector selection equations as a whole group is significantly different from zero. Since the base category is "private-formal sector", the sector selection equations show the propensity of workers being in the informal or public sectors rather than private-formal sector. According to estimation results of sector assignment equations, the coefficients of Education and coefficients of dummies related to whether person is socialized outside of the city are positive and significantly different from zero for the informal and public sectors. Also the coefficient of Sex is significant. The coefficient of Marital Status, however, is significant only for public sector.

Including sample selection correction term,  $\lambda$ , Gindling (1991) estimates the wage equations and finds that the coefficients of Education, Experience and Experience-

square are statistically significant in all wage equations and they have Human Capital Theory consistent signs. Calculating the wage differential between sectors, Gindling (1991) concludes that there is a wage differential between public and private- formal sectors and between the informal and private-formal sectors.

Marcouiller, Ruiz de Castilla and Woodruff (1997) analyze wage gap between informal and formal sectors using the individual level and household data based on labor force survey in urban areas for Mexico, El Salvador and Peru. Domestic servants and unpaid workers are excluded from the data. For sector selection, they use reduced form of probit model. The form of wage equation, however, is quite standard. Marcouiller et al. (1997) estimate the wage equations for men and women separately in each sector. Explanatory variables differ for women and men. For men, they regress log hourly wage on schooling, experience, experience-square, six industry dummies and dummy for residence. Experience variable is calculated as a proxy that age minus schooling minus six. They replace age and age-square for the experience variables for women. According to estimated coefficients, for both women and men, returns to schooling are substantial for both sectors. Applying the Chow Test, Marcouiller et al. (1997) test whether there is wage gap between two sectors or not. They find that all coefficients across sectors are not equal to each other. In other words, there is wage difference between formal and informal sectors. In Salvador, for instance, women in the formal sector earn more money than women in the informal sector. In Mexico, identical workers earn more in the informal sector than in the formal sector.

According to Tansel (1999) wage differential between formal and informal sector workers could be thought as an evidence of wage dualism and labor market segmentation. Tansel (1999) examines sector selection and wage differential between formal and informal sector in Turkey using 1994 data which comes from Household Expenditure Survey. She uses the Heckman's two-step procedure. First, she examines how individuals are selected into nonparticipation and employment in different sectors, namely non-participation, covered wage work, uncovered wage

work, and other employment. Second, she estimates the selectivity corrected wage equations, for covered and uncovered sector for both men and women. Informal sector is defined as sector in which employers work without social security coverage. On the other hand, formal sector consists of employers working with social security coverage. For sectoral selection, she assumes that an individual faces four mutually choices. Experience, education, unearned income, unearned household income, urban location, region are included in the multinomial logit model for sectoral selection. Wage equation is established in accordance with the Human Capital Theory. Log wages are determined by personal and human capital characteristics such as education, experience and also locational factors such as urban location and region.

The results indicate that as education increases, the probability of having social security coverage also increases. In other words, more education leads to being in the covered sector and less education leads to being in the uncovered sector. Experience and experience-square are statistically significant and they have positive and negative signs, respectively.

Another important contribution to the literature comes from the Monsted (2000). In this study, wage gap between the formal and informal sector in Bolivia is examined. Monsted (2000) estimates wage equations in accordance with the human capital theory by using Mincerian type wage equation. He uses household survey data for Bolivia in 8 rounds, between 1989 and 1995. He considers only working population as the sample by taking into account respondents aged between 12 and 66 having strictly positive income. There are seven occupations in the data: worker, employed, employer, professional independent, self-employed, domestic worker and family worker. Of these occupation types, domestic workers and family workers are considered to constitute informal sector, and the others are included in the formal sector.

Monsted (2000) estimated wage equations in accordance with the human capital model. He used Heckman's two-step procedure for correcting the selection bias.



Firstly the probit selection equation is estimated using Maximum Likelihood. This determined the probability of choosing formal sector, which is called lambda. Second, including lambda, wage equations for each sector are estimated.

In the selection equation, education, age, age-square, altitude, altitude-square variables are included. Experience is calculated as age minus years of schooling minus six. Additionally, dummy variables related to whether a person is “household head”, “female”, “married”, “migrant” are included. According to results, there is positively relationship between education and selection decision. As education level increases, the probability of choosing the formal sector also increases. Age, used as a proxy for experience, has a hump-shaped relation with the probability of choosing formal sector. Furthermore, altitude has hump-shaped relation. Monsted (2000) also find that indigenous people have higher probability of choosing to work in the informal sector than non-indigenous people and female have higher probability of being in the formal sector than men.

As for the wage equations, Monsted (2000) add variables education, experience, experience-square, job experience, job experience square, Lambda which is the variable for selection correction bias, altitude, ethnicity, illiteracy, gender, being household head are included.

Another important contribution to the literature comes from Taymaz (2009). He examines the productivity and wage gap between the informal and formal sectors. Taymaz (2009) defines “informal employment” as those who are not covered by any social security program. Taymaz (2009) asserts that wage gap implies the productivity gap because the wage rate will be equal to the marginal product of labor on the condition that the labor market is competitive. Thus any difference in the wage rates indicates productivity differences. Therefore he uses two approaches to analyze productivity differentials: firm-level analysis and individual-level analysis. For individual-level analysis, he uses Mincerian-type wage equation by taking sample selection bias into account. Data comes from Household Labor Force Survey

conducted by TURKSTAT for the years 2005 and 2006. He analyses only urban regions and estimate the multinomial logit model for men and women aged 15 or more. According to 2006 data, there seems significant wage gap between sectors controlling for gender and firm size. Indeed, wage differential higher in services than in manufacturing.

Taymaz (2009) includes following explanatory variables: age dummies, child dummy, education, marital status, household size, and dummies related whether social security benefit is available. In addition, dummy variable for household members whose “household head” is unemployed is included. This dummy measures the incentives of household members’ decisions about choosing formal sector or informal sector.

Taymaz (2009) finds from the estimation of multinomial logit model that marginal effect of education is the most important factor that determines the sectoral selection decision. As the level of education increases, the probability of choosing formal sector is also increasing. As for the wage equation, it is estimated for four categories, namely formal manufacturing, formal service, informal manufacturing and informal service, by taking the selection terms,  $\lambda$ 's, into account. As an explanatory variable, age dummies, educational level dummies, firm size dummies are included. Also, dummy measuring fulltime working and selection correction terms are added.

According to results, educational level and firm size have great impact on the wages. More educated persons and individuals working in large firms have higher wages. Taymaz (2009) concludes that there are significant wage gap between informal and formal sectors even after controlling for selection and individual characteristics.

## CHAPTER 3

### DATA

In this study micro level data from Household Labor Force Survey (HLFS) conducted in 2007 and 2008 is used in order to estimate the multinomial logit equations of labor market participation and Mincerian-type wage equation.<sup>3</sup> The sample contains both female and male individuals between the ages 15-65 who live in urban areas.

Household Labor Force Survey has been conducted by State Institute of Statistics (TURKSTAT) since 1966. The main purpose of the Household Labor Force Survey is to obtain information on the structure of labor force including economic activity, occupation, employment status and hours of work for employed people, and the occupations looked for and duration of unemployment for unemployed people. Until 1988, however, due to the lack of consistency in covered geographical areas, definitions, concepts, variables and classifications, the data were not comparable to each other. The survey was redesigned in accordance with the international standards determined by International Labor Organization (ILO) in 1988 so that it became comparable with the international data. From 1988 to 1999, the survey was conducted two times a year – in April and in October. The year 2000 can be described as the landmark for HLFS. Since 2000, it has been implemented monthly while the estimations were given quarterly for urban and rural areas during 2000-2004. Moreover, in 2000 new questions were added to the questionnaire. Finally, until 2000, individuals aged 12 and above were included in the sample where as from 2000 sample is restricted to the individuals aged 15 and above.

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<sup>3</sup> In this study, cross section analyses are conducted for two years, 2007 and 2008, separately. The reason of using two years cross section data is to be able to eliminate possible problems caused by data. Conducting analysis for each year allows us to make a comparison for the estimation results, which ensures us to reach more robust conclusions. Otherwise, it would not be possible to compare estimation results. When we started to conduct analysis, the 2009 Household Labor Force Survey micro level data was not published. Therefore, the latest micro level data, namely 2007 and 2008 was used in analyses.

In 2002, HLFS was revised in terms of alignment with The European Union. In line with this revision, new questionnaire requested by EUROSTAT was developed. In the revised questionnaire, the number of questions was increased from 47 to 98 in 2004 and finally to 110, in 2005. Since January 2005, Household Labor Force Survey results are announced every month based on the moving averages of three months which are called with the name of month in the middle.

From April 1988 to 1994, in each implementation 11,160 households were included in the sample of HLFS. However, in October 1994 the sample size was enlarged to 15,000 households. In 2000, application frequency, sample size, estimation dimension and questionnaire were changed. Sample size was increased to 23,000 household for a quarterly period. Finally, it was increased to 37,000 in January 2004.

In this thesis, 2007 HLFS and 2008 HLFS micro level data are used. All information was collected by interviewers on a face-to-face basis with household members of age 15 years and over. These surveys cover the all the settlements in Turkey as a sample choice. Settlements with a population of 20,001 and over are defined as urban, while settlements with a population of 20,000 or less are defined as rural. Household is the statistical unit used in labor force surveys. In 2007 HLFS, total number of household is 128,036 and number of observation is 481,605; 325,713 of which are from urban areas and 155,892 of which are from rural areas. In 2008 HLFS, total number of household is 129,266 and number of observation is 481,154; 329,686 of which are from urban areas and 151,468 of which are from rural areas.

There are two different questionnaires which are called Form 1 and Form 2. In Form 1, there are questions about demographic characteristics of households such as gender, age, educational and marital status. In Form 2, there are questions about labor force status. There are six sections in Form 2: Demographic characteristics of household members (questions 1- 24); questions on employment (questions 25-76); questions on income (questions 77-85); questions on unemployment and inactivity

(questions 86-101); questions on past work experience (questions 102-107); questions on situation one year before the survey (questions 108-110).

In questionnaire, definitions were redesigned in accordance with the international standards. Some modifications were made in order to reflect possible changes in labor force status in Turkey. These are also beneficial for creating internationally comparable data. According to TURKSTAT, population, of age 15 or above, is divided into two main groups: “population in the labor force” and “population not in the labor force”. Labor force is composed of employed people and unemployed people. Until 2004, people, who work as a regular or casual employee, had been regarded as “*employed*”. However, in 2004 this was changed in accordance with the norms and standards of EUROSTAT. Since 2004, self-employed and employers who have job but did not work in the reference week<sup>4</sup> for various reasons are also accepted as “*employed*”. In case that a regular employee who has job did not work in the reference week and she/he will return to her/his job in three months or she/he will receive at least 50% of his wage or salary during absence period, then he is considered as “*employed*”. TURKSTAT has been using ILO criteria for unpaid family workers such that if unpaid family workers did not work even for 1 hour in the reference week, then they are not considered as employed without taking into account the duration of absence from work.

Individuals of age 15 years and above, who are not employed during the reference period, but have used a channel for seeking a job during the last three months and are ready to start to work within two weeks are regarded as unemployed. Moreover, people who have found a job and will start to work within three months or established their own job and are waiting to complete necessary documents to start working, are included in the unemployment category.

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<sup>4</sup> Reference week is the first week of each month starting with Monday and ending with Sunday.

Out of labor force includes people who are neither employed nor unemployed. Discouraged workers, seasonal workers, students, retired, disabled, ill, old persons, and people engaged in household chores are included in the out of labor force category. Also, persons, who are aged 15 or above and not seeking a job, are classified in the out of labor force.

Employed people can be divided also into two groups with respect to whether they are working formally or not. The question “*Are you registered with any social security institution related to your main job?*” indicates whether employee works in the formal or informal sector. If the employee replies to the question as “Yes”, then she/he is included in the formal sector. Similarly, if she answers the question as “No”, then she/he is included in the informal sector. In this study, informal sector is defined as a sector in which employees work without social security scheme. Indeed, informal employment can be described as employees who are not registered with any social security institution. Table 3.1 shows the number of people working formally and informally in urban with respect to years.<sup>5</sup>

Table 3.1: Sample Size of Employees in the Formal and Informal Sector <sup>6</sup>

Number of Observations	Years	
	2007	2008
Informal	30,436	29,417
Formal	56,913	59,868
<b>Total</b>	<b>87,349</b>	<b>89,285</b>

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<sup>5</sup> In this thesis, all analyses are restricted with urban areas for years 2007 and 2008. Data which include the rural areas are not used. From now on, all subsequent tables will contain information on only urban areas.

<sup>6</sup> Source: 2007 and 2008 Household Labor Force Survey Micro Level Data, Turkish Statistical Institute

### 3.1 Education

According to Human Capital Theory, “education” is one of the most effective factors for labor market status. In the HLFS, the Question-14, which is “Highest level of education successfully completed” measures the education level of people. In 2007 HLFS and 2008 HLFS, the education levels are classified as “Smaller than six years old or illiterate”, “Literate but not completed any educational institution”, “Primary school”, “Secondary school, vocational school at secondary school level or primary education”, “High school”, “Vocational or technical high school”, “Higher education (university, faculty or upper)” In this study, primary school graduates and literates who are not graduated from any educational institution are combined since the number of observations of latter is not enough for the year 2007 and 2008.

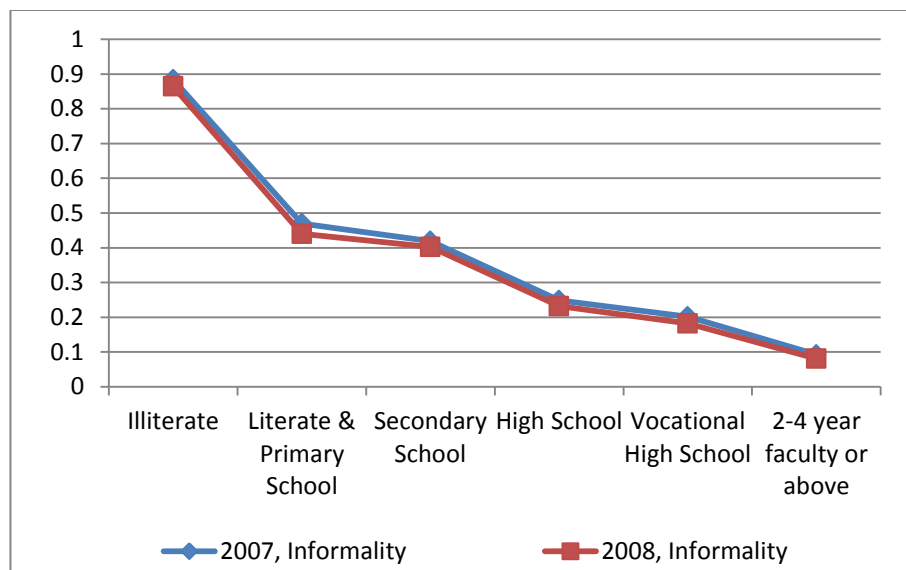


Figure 3.1.1: Share of Informality by Education Levels

Figure 3.1.1 shows the relationship between education and informality without taking gender differences into account. As seen from the Figure 3.1.1, as the employees’ education level increases, the informality decreases.

On the contrary, there is a positive relationship between education level and formality, which means that as the employees’ education level increases, formality

level also increases. Illiterates are more likely to work in the informal sector, while university graduates are more likely to work in the formal sector for both years 2007 and 2008.

Share of education levels of men and women who lives in the urban in 2007 and 2008 are presented in the Figure 3.1.2 and Figure 3.1.3, respectively. Figure 3.1.2 indicates that the shares of illiterates in the informal sector are higher than the employees with higher education.

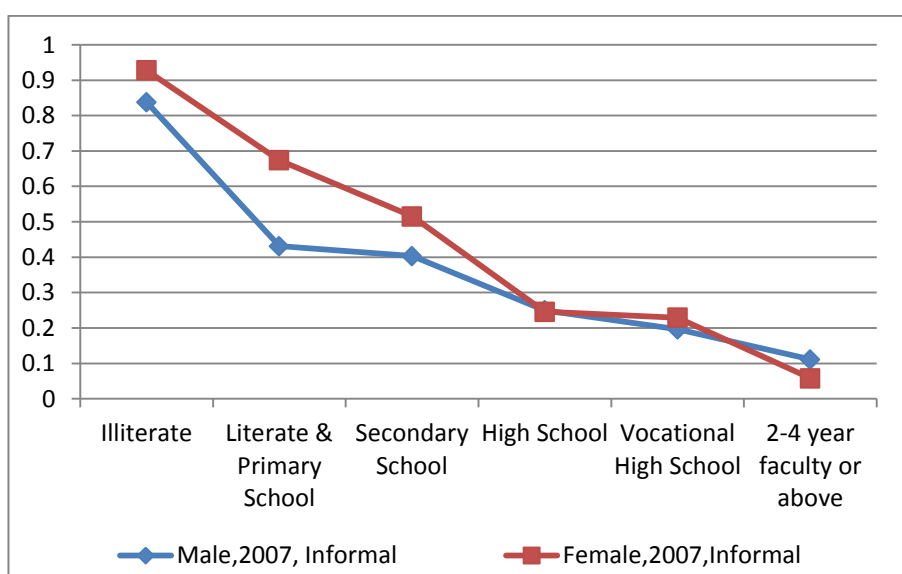


Figure 3.1.2: Share of Informality by Education Levels and Gender, 2007

The least share of informal employment belongs to the 2-4 year faculty or college graduates for men and women in both years. The share of males in the informal sector graduated from college, however, is higher than that of females in both years. On the contrary, illiterate women are more likely to work in the informal sector when it is compared to the illiterate men for both years.



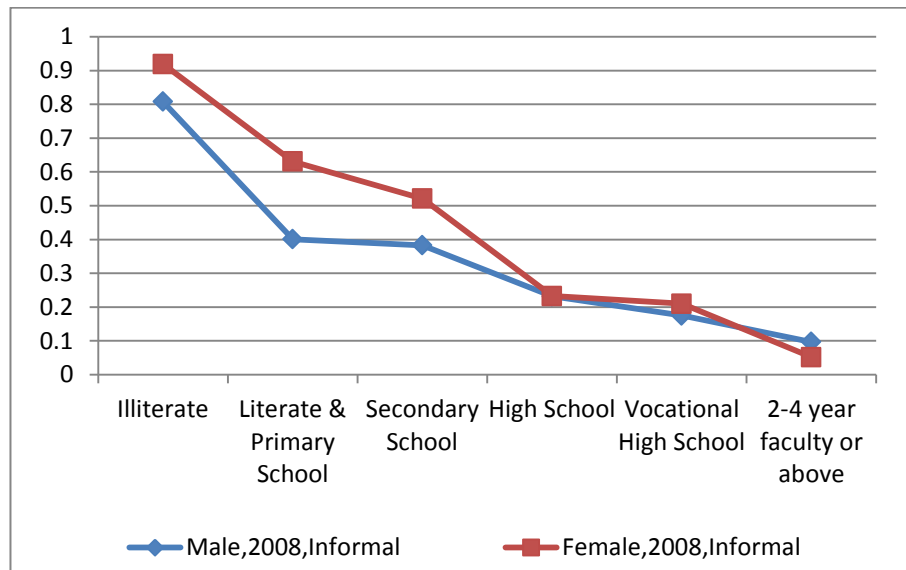


Figure 3.1.3: Share of Informality by Education Levels and Gender, 2008

### 3.2 Age

Another important factor in determining the labor market status is the “age” as stated in the Human Capital Theory. In this thesis, analyses are conducted by taking age of employees into account. Labor Force Surveys include the question about the participants’ age. There exist fourteen groups of age for the years 2007 and 2008.

Table 3.2.1: Number of Observations for Age Groups With Respect To Years

Age Groups	Years	
	2007	2008
00-04	39,554	40,261
05-11	66,386	64,939
12-14	28,263	27,574
15-19	42,176	41,743
20-24	34,777	34,282
25-29	39,239	38,887
30-34	36,141	36,113
35-39	33,431	34,389
40-44	33,350	32,874
45-49	29,003	29,816
50-54	26,817	26,174
55-59	20,805	21,203
60-64	15,063	15,881
65+	36,600	37,018

Since people, under age 15, are not included into the labor force, analysis are conducted for the employees aged 15 and above in this thesis. Figure 3.2.1 shows the relationship between age and formality for male workers.

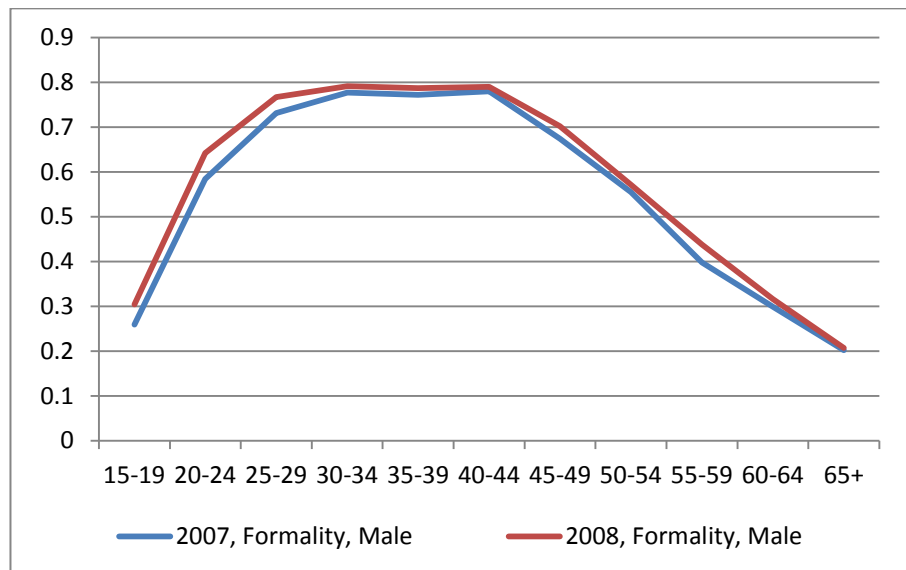


Figure 3.2.1: Share of Formality by Age Groups and Years for Men

As seen from the Figure 3.2.1, there is a hump-shaped relationship between age and formality for males. As age increases, the share of employees in the formal sector increases at first, and then it falls. At middle ages, it reaches to the maximum level. Since middle ages are the most productive years for employees, they reach the maximum professional level at those years. Thus, those employees probably prefer to work in a job that ensures the social security scheme.

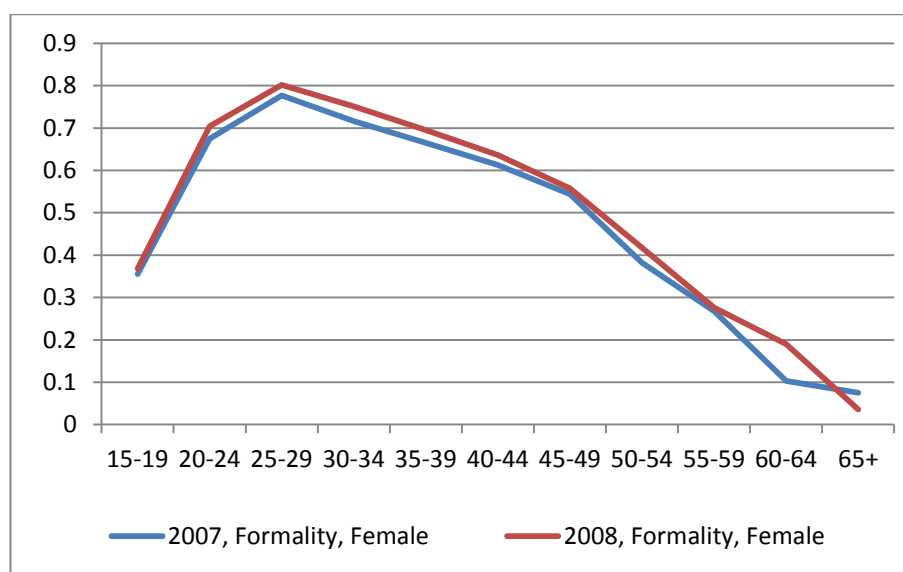


Figure 3.2.2: Share of Formality by Age Groups and Years for Women

Similar pattern can be observed for female workers. As seen from the Figure 3.2.2, there is also hump-shaped relationship between formality and age for female workers. While the highest level of formality is reached at the ages 25-29 for females, it is reached at the ages 30-44 for males.

The relationship between ages and informality can be seen from the Figure 3.2.3 there is U-shaped relationship for males. As expected that there is an inverse relationship between formality and informality. Indeed, the maximum points of the formality curve corresponds the minimum points of the informality curve in Figure 3.2.3. In other words, the share of male workers at age 30-44 is the least among other age groups in the informal sector.

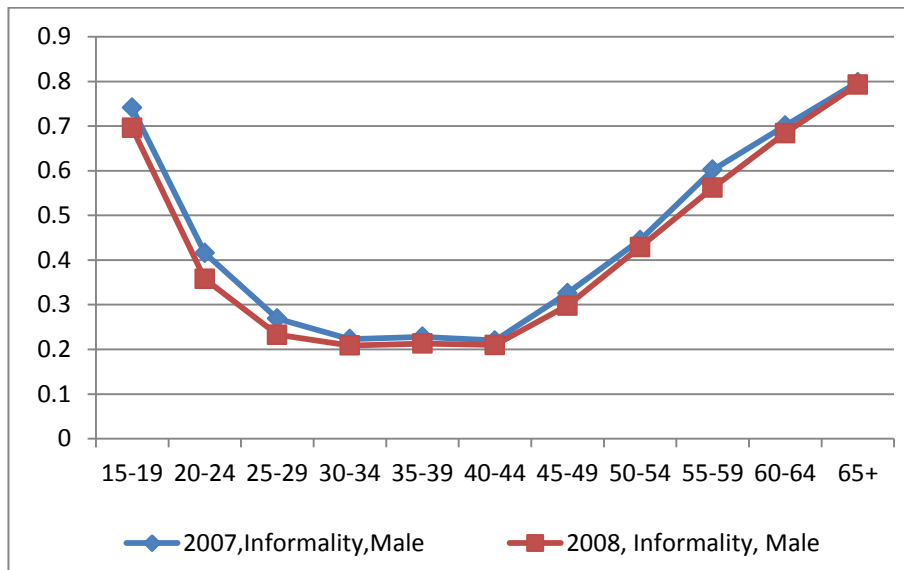


Figure 3.2.3: Share of Informality by Age Groups and Years for Men

Similar pattern is also valid for females. There is U-shaped relationship between age groups and informality. Tendency of working without social security insurance is high for younger and older female workers. The share of female workers in the formal sector is the least for the women aged 25-29 among other age groups as seen from the Figure 3.2.4.

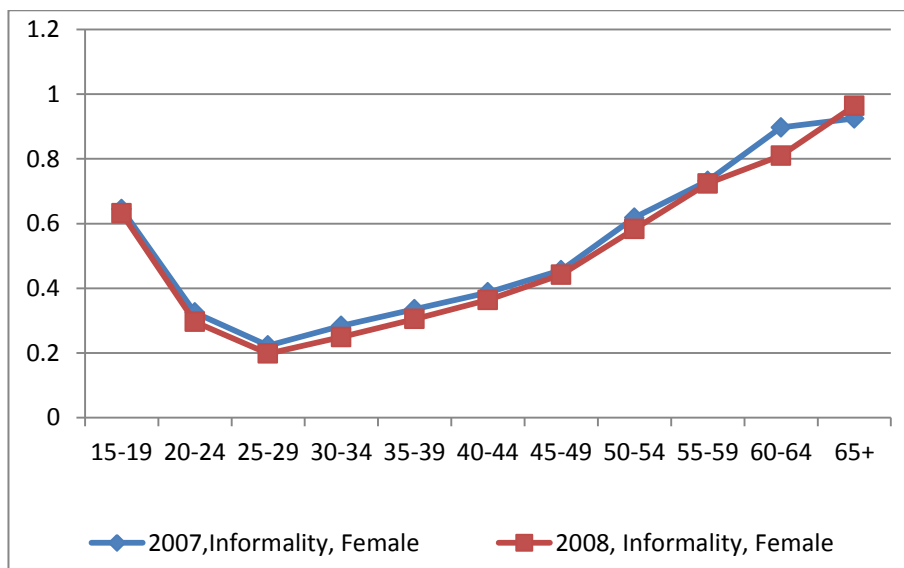


Figure 3.2.4: Share of Informality by Age Groups and Years for Women

Table 3.2.2 and Table 3.2.4 show the share of informal employment with respect to the age groups and employment status for years 2007 and 2008, respectively. As can be seen from the tables, among male employees working in the informal manufacturing and service sector, the shares of casual workers are higher than the others in 2007 and 2008; the share of regular workers is less than the others. Among female employees, the share of casual workers is higher than that of others in the informal manufacturing and service sectors. Compared the shares of male and female workers in the informal sector, middle-aged regular and casual female workers are more likely to work informally in the manufacturing sector than middle-aged male workers. In the informal service sector, however, the share of male workers between 15-39 are higher than the share of female workers, while the share of female workers, 40-64 years old, are higher than the share of male workers.

Shares of formal employment with respect to the age groups and employment status for 2007 and 2008 are shown in the Table 3.2.3 and Table 3.2.5, respectively. In the formal manufacturing sector, the share of middle-aged regular and casual male workers is higher than the shares of female workers. In the formal service sector, the share of females 15-34 years old is higher than that of males, while the share of males 35-64 years old is higher than that of females. Among male workers in the formal manufacturing sector, regular workers have the biggest share, while casual workers have the least share in both years. Among female workers working in the formal manufacturing sector, regular workers have the highest share, too. As for the service sector, the share of regular workers is higher than the share of others for both males and females. In other words, in the manufacturing sector, however, regular and casual male workers are more likely to work in formally; while regular and casual female workers aged 15-34 are more likely to work informally in service sector than males.

Table 3.2.2: Share of Informal Employment by Age Group and Employment Status  
in Urban Areas, 2007

Age Group	Regular	Casual	Employer	Self-Employed	Unpaid Family
<i>Manufacturing, male</i>					
15-19	0.652	0.88	0.394	0.882	0.886
20-24	0.292	0.878	0.259	0.595	0.762
25-29	0.176	0.892	0.339	0.601	0.637
30-34	0.134	0.887	0.199	0.505	0.705
35-39	0.132	0.849	0.16	0.492	0.629
40-44	0.113	0.803	0.155	0.459	0.543
45-49	0.236	0.84	0.316	0.559	1
50-54	0.322	0.867	0.495	0.604	1
55-59	0.495	0.958	0.518	0.675	1
60-64	0.647	0.978	0.636	0.774	1
65+	0.815	1	0.585	0.73	
<i>Service, male</i>					
15-19	0.698	0.952	0.659	0.963	0.934
20-24	0.334	0.911	0.32	0.671	0.854
25-29	0.166	0.87	0.205	0.501	0.716
30-34	0.12	0.872	0.142	0.464	0.662
35-39	0.11	0.844	0.128	0.421	0.683
40-44	0.091	0.874	0.126	0.425	0.488
45-49	0.163	0.913	0.294	0.494	0.7
50-54	0.239	0.933	0.42	0.627	1
55-59	0.392	0.956	0.542	0.745	1
60-64	0.462	1	0.697	0.758	1
65+	0.712	1	0.65	0.755	0.849
<i>Manufacturing, female</i>					
15-19	0.638	0.678		1	1
20-24	0.332	0.97	1	1	1
25-29	0.2	1	0.712	0.925	0.919
30-34	0.209	1	0.243	0.953	0.735
35-39	0.23	0.943	0.187	0.924	0.779
40-44	0.271	1	0.331	0.899	0.905
45-49	0.34	0.949	0.417	0.882	0.866
50-54	0.222	0.87	0.288	0.838	0.696
55-59	0.313	1	0.32	1	1
60-64	0.5	0.796		1	1
65+	0	1	1	1	1
<i>Service, female</i>					
15-19	0.551	0.775		1	0.969
20-24	0.233	0.617	0.137	0.49	0.898
25-29	0.121	0.777	0.032	0.586	0.884
30-34	0.117	0.932	0.086	0.611	0.892
35-39	0.129	0.94	0.043	0.633	0.796
40-44	0.164	0.927	0.231	0.56	0.798
45-49	0.194	0.957	0.172	0.68	0.885
50-54	0.32	0.97	0.671	0.843	0.886
55-59	0.421	0.869	0.684	0.802	1
60-64	0.537	1		0.848	0.871
65+	0.517	1	0.582	1	1

Source: 2007 Household Labor Force Survey Micro Level Data, Turkish Statistical Institute

Table 3.2.3: Share of Formal Employment by Age Group and Employment Status in Urban Areas, 2007

Age Group	Regular	Casual	Employer	Self-Employed	Unpaid Family
<i>Manufacturing, male</i>					
15-19	0.348	0.12	0.606	0.118	0.114
20-24	0.708	0.122	0.741	0.405	0.238
25-29	0.824	0.108	0.661	0.399	0.363
30-34	0.866	0.113	0.801	0.495	0.295
35-39	0.868	0.151	0.84	0.508	0.371
40-44	0.887	0.197	0.845	0.541	0.457
45-49	0.764	0.16	0.684	0.441	0
50-54	0.678	0.133	0.505	0.396	0
55-59	0.505	0.042	0.482	0.325	0
60-64	0.353	0.022	0.364	0.226	0
65+	0.185	0	0.415	0.27	
<i>Service, male</i>					
15-19	0.302	0.048	0.341	0.037	0.066
20-24	0.666	0.089	0.68	0.329	0.146
25-29	0.834	0.13	0.795	0.499	0.284
30-34	0.88	0.128	0.858	0.536	0.338
35-39	0.89	0.156	0.872	0.579	0.317
40-44	0.909	0.126	0.874	0.575	0.512
45-49	0.837	0.087	0.706	0.506	0.3
50-54	0.761	0.067	0.58	0.373	0
55-59	0.608	0.044	0.458	0.255	0
60-64	0.538	0	0.303	0.242	0
65+	0.288	0	0.35	0.245	0.151
<i>Manufacturing, female</i>					
15-19	0.362	0.322		0	0
20-24	0.668	0.03	0	0	0
25-29	0.8	0	0.288	0.075	0.081
30-34	0.791	0	0.757	0.047	0.265
35-39	0.77	0.057	0.813	0.076	0.221
40-44	0.729	0	0.669	0.101	0.095
45-49	0.66	0.051	0.583	0.118	0.134
50-54	0.778	0.13	0.712	0.162	0.304
55-59	0.687	0	0.68	0	0
60-64	0.5	0.204		0	0
65+	1	0	0	0	0
<i>Service, female</i>					
15-19	0.449	0.225		0	0.031
20-24	0.767	0.383	0.863	0.51	0.102
25-29	0.879	0.223	0.968	0.414	0.116
30-34	0.883	0.068	0.914	0.389	0.108
35-39	0.871	0.06	0.957	0.367	0.204
40-44	0.836	0.073	0.769	0.44	0.202
45-49	0.806	0.043	0.828	0.32	0.115
50-54	0.68	0.03	0.329	0.157	0.114
55-59	0.579	0.131	0.316	0.198	0
60-64	0.463	0		0.152	0.129
65+	0.483	0	0.418	0	0

Source: 2007 Household Labor Force Survey Micro Level Data, Turkish Statistical Institute

Table 3.2.4: Share of Informal Employment by Age Group and Employment Status  
in Urban Areas, 2008

Age Group	Regular	Casual	Employer	Self-Employed	Unpaid Family
<i>Manufacturing, male</i>					
15-19	0.57	0.926	0	0.533	0.861
20-24	0.234	0.849	0.243	0.693	0.749
25-29	0.134	0.839	0.251	0.518	0.645
30-34	0.112	0.887	0.166	0.551	0.467
35-39	0.114	0.87	0.135	0.552	1
40-44	0.08	0.812	0.093	0.458	
45-49	0.212	0.88	0.319	0.514	1
50-54	0.298	0.853	0.495	0.631	1
55-59	0.472	0.926	0.485	0.733	1
60-64	0.577	0.957	0.623	0.842	0.494
65+	0.672	0.906	0.615	0.762	0.274
<i>Service, male</i>					
15-19	0.653	0.937	0.511	0.922	0.938
20-24	0.27	0.882	0.375	0.616	0.831
25-29	0.14	0.858	0.213	0.526	0.697
30-34	0.112	0.862	0.125	0.467	0.575
35-39	0.107	0.888	0.116	0.437	0.622
40-44	0.102	0.912	0.114	0.451	0.829
45-49	0.135	0.887	0.234	0.503	0.847
50-54	0.211	0.906	0.46	0.633	0.919
55-59	0.335	0.976	0.494	0.707	0.771
60-64	0.457	0.976	0.601	0.793	1
65+	0.685	1	0.692	0.796	1
<i>Manufacturing, female</i>					
15-19	0.598	0.972		1	0.647
20-24	0.266	0.905	0	0.977	0.783
25-29	0.141	0.953	0.668	1	0.608
30-34	0.114	0.977	0.225	0.964	0.692
35-39	0.19	0.971	0.106	0.967	0.633
40-44	0.16	0.953	0.291	0.894	0.687
45-49	0.2	0.965	0.24	0.943	0.788
50-54	0.263	1	0.311	0.896	0.279
55-59	0.225	1	0	0.922	
60-64	0.896	1	1	1	1
65+	1	1		1	
<i>Service, female</i>					
15-19	0.523	0.868	0	0.883	0.923
20-24	0.214	0.712	0.201	0.669	0.87
25-29	0.095	0.746	0.187	0.503	0.814
30-34	0.098	0.916	0.051	0.624	0.823
35-39	0.119	0.935	0.038	0.58	0.742
40-44	0.157	0.907	0.155	0.645	0.868
45-49	0.181	0.987	0.241	0.676	0.888
50-54	0.297	1	0.531	0.722	0.905
55-59	0.276	1	0.603	0.885	0.896
60-64	0.426	1	0.664	0.613	1
65+	0.734	1	1	0.933	0.79

Source: 2008 Household Labor Force Survey Micro Level Data, Turkish Statistical Institute



Table 3.2.5: Share of Formal Employment by Age Group and Employment Status in Urban Areas, 2008

Age Group	Regular	Casual	Employer	Self-Employed	Unpaid Family
<i>Manufacturing, male</i>					
15-19	0.43	0.074	1	0.467	0.139
20-24	0.766	0.151	0.757	0.307	0.251
25-29	0.866	0.161	0.749	0.482	0.355
30-34	0.888	0.113	0.834	0.449	0.533
35-39	0.886	0.13	0.865	0.448	0
40-44	0.92	0.188	0.907	0.542	
45-49	0.788	0.12	0.681	0.486	0
50-54	0.702	0.147	0.505	0.369	0
55-59	0.528	0.074	0.515	0.267	0
60-64	0.423	0.043	0.377	0.158	0.506
65+	0.328	0.094	0.385	0.238	0.726
<i>Service, male</i>					
15-19	0.347	0.063	0.489	0.078	0.062
20-24	0.73	0.118	0.625	0.384	0.169
25-29	0.86	0.142	0.787	0.474	0.303
30-34	0.888	0.138	0.875	0.533	0.425
35-39	0.893	0.112	0.884	0.563	0.378
40-44	0.898	0.088	0.886	0.549	0.171
45-49	0.865	0.113	0.766	0.497	0.153
50-54	0.789	0.094	0.54	0.367	0.081
55-59	0.665	0.024	0.506	0.293	0.229
60-64	0.543	0.024	0.399	0.207	0
65+	0.315	0	0.308	0.204	0
<i>Manufacturing, female</i>					
15-19	0.402	0.028		0	0.353
20-24	0.734	0.095	1	0.023	0.217
25-29	0.859	0.047	0.332	0	0.392
30-34	0.886	0.023	0.775	0.036	0.308
35-39	0.81	0.029	0.894	0.033	0.367
40-44	0.84	0.047	0.709	0.106	0.313
45-49	0.8	0.035	0.76	0.057	0.212
50-54	0.737	0	0.689	0.104	0.721
55-59	0.775	0	1	0.078	
60-64	0.104	0	0	0	0
65+	0	0		0	
<i>Service, female</i>					
15-19	0.477	0.132	1	0.117	0.077
20-24	0.786	0.288	0.799	0.331	0.13
25-29	0.905	0.254	0.813	0.497	0.186
30-34	0.902	0.084	0.949	0.376	0.177
35-39	0.881	0.065	0.962	0.42	0.258
40-44	0.843	0.093	0.845	0.355	0.132
45-49	0.819	0.013	0.759	0.324	0.112
50-54	0.703	0	0.469	0.278	0.095
55-59	0.724	0	0.397	0.115	0.104
60-64	0.574	0	0.336	0.387	0
65+	0.266	0	0	0.067	0.21

Source: 2008 Household Labor Force Survey Micro Level Data, Turkish Statistical Institute

### 3.3 Firm Size

Firm size is another significant factor that determines whether an employee work formally or not. Indeed, large firms are more likely to present social security insurance and hire workers formally. The number of workers is a kind of indicator that measures the firm size. Thus, it is expected that as the number of workers increases, formality level also increases. In other words, large firms employ workers ensuring the social security coverage.

In 2007 and 2008 HLFS, there is a question about the number of persons employed in the workplace. There are six categories which refers the number of employees, namely “less than 10”, “between 10-24 workers”, “between 25-49 workers”, “between 50-240 workers”, “between 250-499 workers”, “500 and more workers”. In this study, the last three subcategories are merged because of the lack of sufficient number of observations. Figure 3.3.1 and Figure 3.3.2 show the relationship between firm size and informality for men and women, respectively.

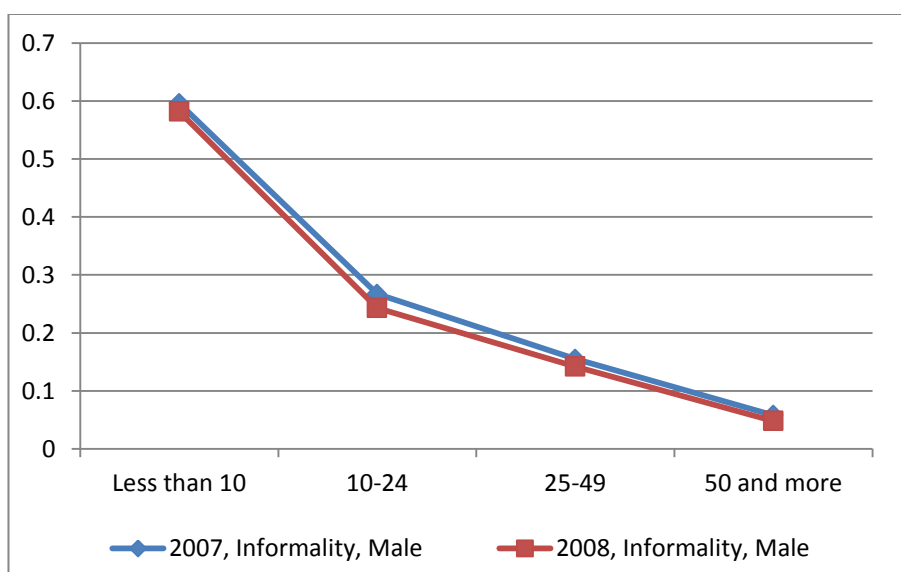


Figure 3.3.1: Share of Male Informality by Firm Size and Years

According to the data which comes from the 2007 and 2008 HLFS, as the firm size increases, the level of informality decreases for men and women. In other words, large

firms are more likely to employ workers by ensuring social security insurance than small firms.

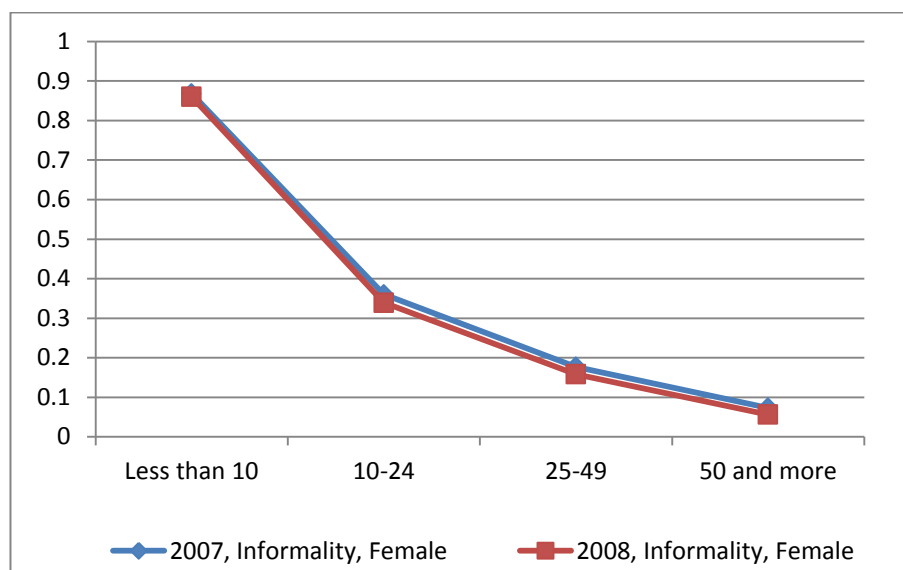


Figure 3.3.2: Share of Female Informality by Firm Size and Years

Shares of informal employment by firm size and employment status for 2007 and 2008 are shown in Table 3.3.1 and Table 3.3.3, respectively. According to these tables, the share of females who work informally in the manufacturing sector is higher than that of males. In the service sector, however, the share of regular female workers working in the large firms is less than that of males. In other words, regular male workers in the service sector are more likely to work informally in the large firms than regular female workers in the service sector.

It is shown in Table 3.3.2 and Table 3.3.4 that share of regular male workers are higher than the share of regular female workers in the formal manufacturing sector. In service sector, regular female employees are more likely to work formally in the large firms than male employees.

Table 3.3.1: Share of Informal Employment by Firm Size and Employment Status in Urban Areas, 2007

Firm Size	Regular	Casual	Employer	Self-Employed	Unpaid Family
<i>Manufacturing, male</i>					
Less than 10	0.508	0.9	0.307	0.548	0.802
10-24	0.337	0.805	0.233		0.402
25-49	0.205	0.668	0.194		0.691
50+	0.067	0.469	0.17		
<i>Service, male</i>					
Less than 10	0.443	0.947	0.244	0.523	0.848
10-24	0.156	0.797	0.22	0	0.48
25-49	0.094	0.647	0.138		0.764
50+	0.035	0.387	0.208		0.429
<i>Manufacturing, female</i>					
Less than 10	0.633	0.997	0.382	0.925	0.872
10-24	0.606	0.904	0		0.833
25-49	0.353	0.925	0.494		0.603
50+	0.123	0.499	0.192		
<i>Service, female</i>					
Less than 10	0.487	0.966	0.17	0.634	0.866
10-24	0.139	0.558	0.13		0.788
25-49	0.075	0.683	0.218		1
50+	0.024	0.33	0		1

Source: 2007 Household Labor Force Survey Micro Level Data, Turkish Statistical Institute

Table 3.3.2: Share of Formal Employment by Firm Size and Employment Status in Urban Areas, 2007

Firm Size	Regular	Casual	Employer	Self-Employed	Unpaid Family
<i>Manufacturing, male</i>					
Less than 10	0.492	0.1	0.693	0.452	0.198
10-24	0.663	0.195	0.767		0.598
25-49	0.795	0.332	0.806		0.309
50+	0.933	0.531	0.83		
<i>Service, male</i>					
Less than 10	0.557	0.053	0.756	0.477	0.152
10-24	0.844	0.203	0.78	1	0.52
25-49	0.906	0.353	0.862		0.236
50+	0.965	0.613	0.792		0.571
<i>Manufacturing, female</i>					
Less than 10	0.367	0.003	0.618	0.075	0.128
10-24	0.394	0.096	1		0.167
25-49	0.647	0.075	0.506		0.397
50+	0.877	0.501	0.808		
<i>Service, female</i>					
Less than 10	0.513	0.034	0.83	0.366	0.134
10-24	0.861	0.442	0.87		0.212
25-49	0.925	0.317	0.782		0
50+	0.976	0.67	1		0

Source: 2007 Household Labor Force Survey Micro Level Data, Turkish Statistical Institute

Table 3.3.3: Share of Informal Employment by Firm Size and Employment Status in Urban Areas, 2008

Age Group	Regular	Casual	Employer	Self-Employed	Unpaid Family
<i>Manufacturing, male</i>					
Less than 10	0.444	0.892	0.267	0.555	0.779
10-24	0.287	0.832	0.221		0.492
25-49	0.172	0.692	0.168		1
50+	0.048	0.48	0.136		0.665
<i>Service, male</i>					
Less than 10	0.402	0.953	0.244	0.532	0.837
10-24	0.135	0.722	0.195		0.46
25-49	0.086	0.798	0.183		0.614
50+	0.03	0.262	0.234		
<i>Manufacturing, female</i>					
Less than 10	0.576	1	0.304	0.955	0.721
10-24	0.48	0.922	0		0.466
25-49	0.287	0.73	0		0
50+	0.079	0.336	0		1
<i>Service, female</i>					
Less than 10	0.449	0.962	0.171	0.632	0.845
10-24	0.112	0.655	0		0.488
25-49	0.07	0.631	0.667		0.431
50+	0.029	0.415	0.205		1

Source: 2008 Household Labor Force Survey Micro Level Data, Turkish Statistical Institute

Table 3.3.4: Share of Formal Employment by Firm Size and Employment Status in Urban Areas, 2008

Age Group	Regular	Casual	Employer	Self-Employed	Unpaid Family
<i>Manufacturing, male</i>					
Less than 10	0.556	0.108	0.733	0.445	0.221
10-24	0.713	0.168	0.779		0.508
25-49	0.828	0.308	0.832		0
50+	0.952	0.52	0.864		0.335
<i>Service, male</i>					
Less than 10	0.598	0.047	0.756	0.468	0.163
10-24	0.865	0.278	0.805		0.54
25-49	0.914	0.202	0.817		0.386
50+	0.97	0.738	0.766		
<i>Manufacturing, female</i>					
Less than 10	0.424	0	0.696	0.045	0.279
10-24	0.52	0.078	1		0.534
25-49	0.713	0.27	1		1
50+	0.921	0.664	1		0
<i>Service, female</i>					
Less than 10	0.551	0.038	0.829	0.368	0.155
10-24	0.888	0.345	1		0.512
25-49	0.93	0.369	0.333		0.569
50+	0.971	0.585	0.795		0

Source: 2008 Household Labor Force Survey Micro Level Data, Turkish Statistical Institute

### **3.4 Average Wages**

Table 3.4.1 and Table 3.4.2 show the shares of formal and informal average wages in manufacturing and service sector for the years 2007 and 2008, respectively. Both tables indicate that there is significant wage difference between formal and informal sector. In manufacturing sector, wage difference is higher in the small sized firms. It is about 46 percent for female workers and it is about 24 percent for male workers in 2007. As the firm size increases, wage differential decreases in manufacturing and service sector for men. Moreover, in service sector, it is about 43 percent for males and 67 percent for female workers in 2007. In 2008, wage difference is about 29 percent for male workers and 51 percent for female workers in manufacturing sector. In service sector, it is about 46 percent for male workers and 62 percent for female workers. Although wage gap decreases as the firm size increases for female workers in the manufacturing sector, the situation is different for women who work in the service sector. For the women working in the service sector, as the firm size increases, wage gap increases, as well. Despite the fact that wage gap between formal and informal sector is higher for female workers for both service and manufacturing sector, it is much more in the service sector than in the manufacturing sector in both years. Indeed, wage gap is about 54 percent in service sector and 34 percent in manufacturing sector in 2007; 54 percent in service sector and 40 percent in manufacturing sector in 2008.

Table 3.4.1: Formal and Informal Average Wages In Manufacturing and Services,  
2007 (Mean Log Wages)

Firm Size	Manufacturing			Services		
	Informal	Formal	Wage diff (%)	Informal	Formal	Wage diff (%)
<i>Male workers</i>						
<10	6.103	6.415	0.312	5.999	6.452	0.453
10-24	6.249	6.477	0.228	6.205	6.66	0.455
25-49	6.271	6.478	0.207	6.315	6.724	0.409
50+	6.397	6.591	0.194	6.485	6.878	0.393
<i>Female workers</i>						
<10	5.393	6.299	0.906	5.76	6.365	0.605
10-24	6.05	6.344	0.294	6.036	6.648	0.612
25-49	6.082	6.374	0.292	6.084	6.7	0.616
50+	6.024	6.378	0.354	6.046	6.84	0.794

Source: 2007 Household Labor Force Survey Micro Level Data, Turkish Statistical Institute

Table 3.4.2: Formal and Informal Average Wages In Manufacturing and Services,  
2008 (Mean Log Wages)

Firm Size	Manufacturing			Services		
	Informal	Formal	Wage diff (%)	Informal	Formal	Wage diff (%)
<i>Male workers</i>						
<10	6.18	6.531	0.351	6.072	6.561	0.489
10-24	6.367	6.592	0.225	6.315	6.764	0.449
25-49	6.333	6.612	0.279	6.414	6.858	0.444
50+	6.417	6.721	0.304	6.545	7.004	0.459
<i>Female workers</i>						
<10	5.494	6.492	0.998	5.827	6.496	0.669
10-24	6.156	6.466	0.31	6.075	6.751	0.676
25-49	6.167	6.498	0.331	6.231	6.817	0.586
50+	6.144	6.539	0.395	6.417	6.969	0.552

Source: 2008 Household Labor Force Survey Micro Level Data, Turkish Statistical Institute

## CHAPTER 4

### METHODOLOGY

In this study, joint model of sectoral selection process and wage equation are estimated. While the Multinomial Logit Model (MNL) is utilized for the construction of sectoral selection process, Mincerian wage equation is estimated for the wage determination. Since wages are determined with respect to the chosen sectors, the selection process should be taken into account.

Seven alternative outcomes are defined: Non-employment (n), working in the formal-manufacturing sector (fm), working in the formal service sector (fs), working in the informal- manufacturing sector (im), working in the informal service sector (is), working as an employer (e), working as self-employed (se).

Assuming one of the wage employment alternative (fm, fs, im, is) is chosen by an individual, the wage equation is estimated taking the sectoral selection into account. Indeed, Mincer-type wage equation includes the selection correction terms in addition to Human Capital wage determinants. Since the division of individuals into seven alternative outcomes may not be random, such a situation can create bias so that OLS estimation of the wage equation may not be consistent (Monsted, 2000). According to Gindling (1991), when selectivity occurs, the conventional estimation methods such as OLS do not provide consistent estimates of the wage equation parameters (Gindling, 1991 p. 588). Heckman et al. (1976) states that the bias arising due to the use of OLS in estimating such models is characterized as a simple specification error or omitted variable problem (Heckman, 1976, p. 475). In order to eliminate such a problem, selectivity correction terms should be included to the wage equations. Marcouiller et al. (1997) states that inclusion of selectivity correction term as an additional regressor in the wage equation avoids the OLS estimation results to be biased (Marcouiller, et al., 1997 p. 384).



On this ground, whole model can be examined in two sections: Multinomial Logit Model, which is used for sector selection decision and Mincer-type wage equation which includes the sector selection correction term.

#### **4.1 Multinomial Logit Model for Sector Selection Decision**

Logit and probit models are models which are generally used for binary choice problems. The multinomial logit model is used for problems involving the choice among two or more categories. Long (1997) defines the multinomial logit models such that

“The multinomial logit model (MNL) can be thought of as simultaneously estimating binary logits for all possible comparisons among the outcome categories.” (Long, 1997 p. 149)

Multinomial Logit Model has more than two unordered outcomes. In each case, an individual chooses one alternative and labels this choice, arbitrarily (Wooldridge, 2002 p. 497). In other words, multinomial logit model is used to analyze the choice of an individual among a set of  $J$  alternatives. It focuses on the individual as the unit of analysis and uses the individual’s characteristics as explanatory variables. (Hoffman, et al., 1988)

Multinomial logit selection model is a discrete choice model, based on the rule that the individual is rational and try to maximize his/her utility. Indeed, individual chooses the outcome, which maximizes his/her utility gained from that choice (Long, 1997). Assuming that there are two alternative outcomes  $m$  and  $k$ , creating the choice set  $C = \{m, k\}$ . The probability of selecting the alternative  $m$  by an individual  $i$  can be represented as the following<sup>7</sup>:

$$Pr_i(m) = Pr_i(U_{im} > U_{ik}) \quad (4.1.1)$$

It can be inferred from the equation (4.1.1) that the probability of selecting one alternative- $m$  is equal to the probability of gathering higher utility from the

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<sup>7</sup> For details see Bartels, et al., 1999 p. 2

alternative- $m$  than the other alternatives. Assume that  $U_{im}$  stands for the utility of alternative- $m$  to individual  $i$ , and also assume that  $U_{im}$  depends on the attributes of the alternative outcomes, namely  $X_m$  (Hoffman, et al., 1988). When there are  $J$  choices, the probability of choosing alternative- $m$  can be represented as the following

$$U_{im} = f(X_{im}),$$

$$Pr_i(m) = Pr_i(U_{im} > U_{ij}, \text{ for all } j \neq m) \quad (4.1.2)$$

Let us assume that  $y$  is the dependent variable which takes nominal outcomes  $\{0, 1, \dots, J\}$  for  $J$  a positive integer. These outcomes are not ordered. Also,  $X$  is the  $(1 \times K)$  vector of explanatory variables of which the first element is unity. We are searching how changes in the elements of  $X$  affect the response probabilities,  $P(y = j | X)$  where  $j=0, 1, 2, \dots, J$ , ceteris paribus.  $Pr(y = m | X)$  indicates that the probability of realizing outcome  $m$  given  $X$ .

In the construction of MNLM, the first assumption is that  $Pr(y = m | X)$  is a function of  $X\beta_m$ , where  $\beta$  is a  $(1 \times K)$  coefficient vector indicating the effect of  $X$  on outcomes. (Long, 1997). For example,  $\beta_m = (\beta_{0m} \dots \beta_{km} \dots \beta_{Km})$  is the coefficient vector of outcome  $m$ .  $\beta_{0m}$  is the intercept term, and  $\beta_{km}$  indicates the effect of  $X_k$  on outcome  $m$ . In order to be sure that probabilities are nonnegative, exponential of  $X\beta_m$  should be taken such that

$$\exp(X\beta_m)$$

In order to make the probabilities sum to 1, some normalization should be applied. Indeed,  $\exp(X\beta_m)$  should be divided by  $\sum_{j=0}^J \exp(X\beta_j)$  (Long, 1997 p. 152). Then probability of outcome  $m$  would be:

$$Pr(y = m | X) = \frac{\exp(X\beta_m)}{\sum_{j=0}^J \exp(X\beta_j)} \quad (4.1.3)$$

According to Greene (2003), since more than one set of parameters generate the same probabilities, they are not identified.<sup>8</sup> In order to make it identified, some restrictions should be imposed. A convenient normalization for MNLM would be  $\beta_0=0$  (Greene, 2003 p. 721). Imposing this restriction to the model in a way that  $\exp(X\beta_0) = \exp(X0)=1$ , the following equality occurs:

$$\Pr (y = 0| X) = \frac{\exp (X\beta_0)}{\sum_{j=0}^J \exp(X\beta_j)} = \frac{1}{1 + \sum_{j=1}^J \exp(X\beta_j)} \quad (4.1.4)$$

Generalizing the equation (4.1.4), the Multinomial Logit Model is defined as the following:

$$\Pr (y = m| X) = \frac{\exp (X\beta_m)}{1 + \sum_{j=1}^J \exp(X\beta_j)} \quad \text{where } \beta_0=0 \text{ and } j=1, 2 \dots J \quad (4.1.5)$$

To estimate the parameters of the multinomial logit model, one can use the *Maximum Likelihood Estimation* method, since it is the most generally applicable and the most satisfactory approach to estimation of parameters (McFadden, 1984 p. 1407). Let  $p_i$  be the probability of observing whatever value of y was observed for the  $i^{th}$  observation. Assuming the observations are independent, the likelihood function would be;

$$L (\beta_1 \dots \beta_J | y, X) = \prod_{i=1}^N p_i \quad (4.1.6)$$

Taking the natural logarithm of both sides, the following log-likelihood function is created;

$$\ln L = \sum_{i=1}^n \sum_{j=1}^J y_{ij} \ln p_{ij} \quad (4.1.7)$$

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<sup>8</sup> According to Greene (2003) this arises because the probabilities sum to one, so only J parameter vectors are needed to determine the J+1 probability.

where  $n$  is the number of observations, and  $y_{ij}$  is equal to “1” if individual is observed in state  $j$  and “0” otherwise.

Amemiya (1985) proved that the log-likelihood function is globally concave.<sup>9</sup> Indeed, the Hessian of the log-likelihood is Negative Definite, so that any stationary value is a global maximum (McFadden, 1984 p. 1413). Also, the fact that the maximum likelihood estimator is consistent and asymptotically normal is proved by McFadden (1984).<sup>10</sup>

Wooldridge (2002) and Greene (2003) state that the interpretation of coefficients of multinomial logit model is difficult. By differentiating equation (4.1.7), the partial effects can be found. For continuous  $X_k$ , partial effect is defined as<sup>11</sup>:

$$\frac{\partial P(y=m|X)}{\partial X_k} = P(y = m|X) [\beta_{km} - \sum_{j=1}^J \beta_{kj} P(y = j|X)] \quad (4.1.8)$$

After some manipulation, we can get the following<sup>12</sup>:

$$\frac{\partial P(y=m|X)}{\partial X_k} = P_m(\beta_m - \bar{\beta}) \quad (4.1.9)$$

Equation (4.1.9) shows that the direction of the effect is not determined entirely by  $\beta_{km}$  (Wooldridge, 2002 p. 498). In fact, the value of the marginal effect depends on the values of all independent variables and on the coefficients for each outcome. “Partial effects are computed when variables are held at their means, possibly with dummy variables held at 0 or 1.” (Long, 1997 p. 165)

In short, for continuous explanatory variables marginal effect indicates how the probability of the relevant outcome  $Pr(m)$  is affected by an infinitesimal change in

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<sup>9</sup> For details see Amemiya (1985), pp: 295-296

<sup>10</sup> For details see McFadden (1984), pp: 1407-1410

<sup>11</sup> For details, see Long (1997)

<sup>12</sup> For details, see Greene (2003), pp:722

the independent variable. Furthermore, for dummy variables, it indicates how much change occurs in the probability,  $Pr(m)$ , when the dummy variable changes from 0 to 1. (Taymaz, 2009 p. 29)

In this thesis, it is assumed that there exist seven types of wage sectors. In other words, there are seven different employment outcomes of multinomial logit model, namely non-employment, formal job in manufacturing sector, formal job in service sector, informal job in manufacturing sector, informal job in service sector, employer, and self-employed. “Non-employment” category is the base category. Table 4.1.1 indicates the sectors and corresponding outcome numbers.

Table 4.1.1: List of Alternative Sectors and Corresponding Outcomes of Multinomial Logit Model

<b>Wage Sectors</b>	<b>Outcome Number</b>
Non-employment	0
Informal-Manufacturing	1
Informal-Service	2
Formal-Manufacturing	3
Formal-Service	4
Employer	5
Self-Employed	6

Non-employment category includes the persons who are not in the labor force and unemployed persons. Unpaid family workers and individuals, who work in the agricultural and mining facilities in urban area, are also included in the non-employment category because those workers represent the rural facilities, and they do not have regular wage earnings. Indeed, they cannot be assumed to be “wage earners”. Thus, adding those workers into the non-employment category is thought to be as an appropriate way to analyze the wage earners’ choice decision.

For construction of the model, “wage earner” is defined before determination of the wage sectors. In 2007 and 2008 HLFS, there exist five employment statuses, namely

*regular employee, casual employee, employer, self-employed and unpaid family workers*, presented in the Question-s39. Since an individual who works as an employer, self-employed or unpaid family worker does not work for “wage”, she/he cannot be taken as a “wage earner”. Thus, wage earners include only taking “regular workers” and “casual workers”..

In 2007 and 2008 HLFS, nine economic activities are defined. These economic activities are classified into three categories in this study. Table 4.1.2 shows this classification:

Table 4.1.2: Classification of Economic Activities

<b>Economic Activities</b>	<b>Sector Categories</b>
Agriculture, forestry, hunting, and fishing	<b>Agriculture</b>
Mining and quarrying	
Manufacturing	<b>Manufacturing</b>
Electricity, gas and water	
Construction	
Wholesale and retail trade, restaurants and hotels	<b>Service</b>
Transportation, communication and storage	
Finance, insurance, real estate and business	
Community, social and personal services	

(Source: 2007 and 2008 HLFS, Question-s33kod)

In an attempt to construct the wage earning sectors, manufacturing and service sectors are defined in line with the classification presented in the Table 4.1.2. Wage equation is defined only for regular or casual employees working in the manufacturing and service sectors. Those workers are divided into two groups with respect to working with or without social security insurance. In case that a regular or casual employee occupied in the manufacturing, construction, electricity, gas and water sectors has a social security coverage, then she/he is defined to work in formal manufacturing (fm) sector. If this employee does not work under any social security

insurance, then she/he is included in the informal manufacturing (im) sector. Same definition is applied for the service sector i.e. if a regular or casual employee occupied in wholesale and retail trade, restaurants and hotels, transportation, communication and storage, finance, insurance, real estate and business service, community, social and personal services sectors has a social security coverage, then she/he is defined to work in the formal service sector (fs). If she/he does not work under any social security insurance, then she/he is included in informal service sector (is). Beside these four wage sectors, “employer” and “self-employed” are included in the model as dependent variables. As it is mentioned above, agricultural activities even in the rural area are not included in the definition of wage employment.

In multinomial logit model, following explanatory variables are included as dummy variables: Age, marital status, educational level, variables, unemployed household head, and child dummy. Also, there exist two household size explanatory variables: Parent size and child size.

#### **4.1.1 Age**

Age is included in the multinomial logit model as dummy variable. It can be thought that age represents the individual’s experience as suggested by Human Capital Theory. For men, there exist eleven age dummies referring the age groups, 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65 and over. When the model is estimated for women the categories: 55-59, 60-64, and 65 and over are merged because the number of observations are insufficient for these age groups.<sup>13</sup> The reference category of age dummies is 15-19, which means that the 15-19 age dummy is omitted while estimating the model.

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<sup>13</sup> At first, model was estimated for women by adding these three age groups, separately. However, the resulting variance matrix was non-symmetric or highly singular. Thus, merging these three groups would be more appropriate way for estimation of model.

The relationship between age and the probability of working in the formal sector is expected to be hump shaped. In Turkey, people are generally enrolled to an educational institution approximately until 21 years of age so that employers do not prefer to hire those individuals as formal employees. Since middle ages are more productive years after graduation, individuals who are 22-50 years old would prefer to work in the formal sector. Since individuals do not have many occupational opportunities after retirement or older ages, they would be more likely to work as informal workers than younger individuals. Thus, hump-shaped relationship is expected between the probability of choosing formal sector and age. Moreover, U-shaped relationship between age and the probability of non-employment is expected. Since people continue their educational life up to approximately 21 years of age, probability of non-employment up to these years of age would be high. After those years, however, people get started to work until their retirement, approximately up to 60 years of age. So between those years, the probability of non-employment would be low. After retirement, the probability of non-employment would be high. In other words, it is sensible to expect U-shaped relationship between age and probability of non-employment.

#### **4.1.2 Education**

Another important variable affecting the sector selection is the level of education. In multinomial logit model, five dummy variables which represent the completed education levels are included, namely, “Primary School”, “Secondary School”, “General High School”, “Vocational High School” and “University”.

In Turkey, primary education is obligatory as a governmental policy. Thus, workers who are illiterate or literate but did not complete any educational institution are included in the “Primary School” category. Of these dummy variables, “Primary School” is the base category. In other words, the educational level dummy variables give us the effect of corresponding education level on the sector selection probability with respect to the individuals who are graduated from “Primary School”.



It is expected that the relationship between education and non-employment would be negative. In other words, as the level of education increases, the probability of being non-employed would decrease.

#### **4.1.3 Marital Status**

Marital status is another variable included in the multinomial logit model. Since marital status is not a directly quantifiable variable, it is represented as three dummy variables, namely “Single”, “Married” and “Divorced”. “Single” refers to the never married persons. Both divorced and widowed persons are collected in the “Divorced” dummy variable, for simplicity. The base category is the “Married” dummy variable, which means that marital status dummy variables measure the effect of being divorced or single person on the probability of choosing the relevant outcome relative to the married persons. Since married people have more familial responsibilities such as ensuring the social security insurance or health insurance, they could be more likely to work in the formal sector. Therefore, it is expected that single or divorced individuals would be more likely to work in the informal sector than married individuals. Also, different tendencies between women and men might be observed for the sector selection decisions.

#### **4.1.4 Status in Household**

According to HLFS, there are eight statuses in the household: Reference person, spouse, child of reference person, bride or bridegroom, grandchild, mother or father in law, other relatives and non-relatives. For simplicity, those eight statuses are reduced into two groups: “Child” and “Parent”.<sup>14</sup> Of those eight statuses, child of reference person, bride or bridegroom, and grandchild are included into “Child” dummy variable. Also, other relatives and non-relatives, who are less than 30 years of age, are added into the “Child” dummy.

“Parent” dummy variable, however, includes reference person, spouse, mother or father in law. Furthermore, other relatives and non-relatives, who are older than 30

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<sup>14</sup> For detailed information about construction of the household status variables, see Appendix-A.

years of age, are also included into the “Parent” dummy. Hence, in the model there are two dummy variables which refer to the status in the household. Since the “Parent” dummy is the base category, only “Child” dummy exists in the multinomial logit model. It takes value 1 if the person is child, and takes value 0 otherwise.

#### **4.1.5 Household Size**

Household size is important factor for a person to decide which sector is chosen to work. It also determines the decision about being unemployed or not. People generally prefer working in the formal sector than working in the informal sector, if they have family in crowd. However, this argument may not be true all the time. Indeed, there might be different attitudes of women and men, in this regard. Thus, to be able to examine the effect of household size on the probability of choosing relevant sector, it is included into the multinomial logit model as two interaction variables: “Child\*Household Size” and “Parent\*Household Size”.

In order to take into account the effect of household size, the value of it should be greater than zero so that log value of household size is taken. It is interacted with the Child and Parent dummy variables.<sup>15</sup> It is expected that if in the family size is large; it would have negative effect on the probability of working in any sector for women. Since women are culturally engaged in house works and they care their children in Turkey, they would prefer being non-employed when household size increases. For men, however, it is expected to decrease being non-employed. In particular, they would prefer working in the formal sector in order to ensure social security insurance when household gets larger.

#### **4.1.6 Any Registered Family Member in Household**

The existence of a person, who provides social security benefits in the household, can affect other family member’s decision about working. In order to take this effect into account “any registered” dummy variable is added into the multinomial logit model. In order to create “Any registered” dummy variable, all registered persons in each

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<sup>15</sup> The method of creating these interaction variables is explained thoroughly in the Appendix-A.

household are counted and then corresponding registered person is subtracted from those cumulative registered persons. It takes value “1” if there exists any registered person, and takes “0” otherwise. In Appendix-A, the method of creation of “any registered” dummy variable is presented in detailed.

It is expected that “Any registered” would have negative effect on formal employment and thus positive effect on the informal employment. Assume that there exists a family member who works in the formal sector and provides social security benefit to the other family members in the household. Since other family members are able to benefit from the social security insurance, the marginal benefit of getting social security insurance and thus working formally would be low for other family members. Once one person provides social security insurance in the household, working in formal sector does not bring much additional non-wage benefits for other members. Thus, it is expected that “Any registered” would have negative effect on formal employment and thus positive effect on the informal employment.

Under the assumption that other family members do not provide any social security insurance, a family member has more incentive to work formally and getting social security benefits. In fact this person prefers working in the formal sector than working in the informal sector. Therefore, “Any Registered” dummy variable has probably negative effect on formal employment and positive effect on informal employment. Moreover, existence of the registered person in the household also would have positive effect on the probability of choosing to be non-employed.

#### **4.1.7 Unemployed Household Head**

The fact that household head is unemployed is an important factor for sector selection decision of other family members. In traditional Turkish family, household head is expected to provide minimum leaving conditions including social security benefits. Thus, if household head is unemployed, other family members are probably prefer to work in a job which ensures the social security insurance than being unemployed choose In other words, it is expected that existence of unemployed

household head would have negative effect on the probability of other family members' being unemployed. Furthermore, people whose household head is unemployed would be likely to work in the both informal and formal sector. In order to examine and measure this effect on the decisions of other family members, "Unemployed Household Head" dummy variable is included in the multinomial logit model. It takes "1" for other members if their household head is unemployed, and takes "0" otherwise. By definition, this dummy variable takes "0" also for the household heads because it measures the effect for other family members.<sup>16</sup>

#### **4.2 Mincerian Wage Equation with Selectivity Correction Term**

The main problematic of this thesis is to investigate whether there is wage gap between formal and informal sectors even after controlling the gender and occupational sectors i.e. manufacturing and service sector. For this purpose, Mincer-type wage equation is estimated in each sector for male and female in 2007 and 2008, separately.

Mincerian wage equation includes variables elaborated by human capital framework. When constructing the wage equation, the most critical thing to be cared is the fact that wage rate is observable only for people, who are working as wage earners. As stated in Section 4.1, employees are assumed to choose one of the six sectors so that they will get wage rate. Thus, while estimating the wage equation the most appropriate way is to take logarithm of wages ( $\ln w$ ) so that it guarantees that people, who earn "zero" wage, are excluded.

Except base category, i.e. non-employment, employees are expected to choose six situations: Formal job in manufacturing sector (fm), formal job in service sector (fs), informal job in manufacturing sector (im), informal job in service sector (is), employer (e), and self-employed (se). Wage rate is observable only those employees who are choosing to work formally or informally in manufacturing or service sector.

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<sup>16</sup> For detailed information about how to created "Unemployed Household Head" dummy variable, see Appendix-A.

As noted above, the division of the seven alternative outcomes may not be random; such a situation can create bias so that OLS estimation of the wage equation may not be consistent. Heckman (1976, 1979) developed a two-step procedure to correct self-selection bias (Wu, 2010). In order to eliminate the sector selection bias in the estimation of wage equation with OLS, sector selection term is included into the Mincer-type wage equation according to Heckman's two step procedure. Therefore, in the light of the human capital approach and also taking the sector selection process into account, following wage equation is defined:

$$\ln w_j = X_j\beta_j + u_j \quad j=1, 2, 3, 4 \quad (4.7)$$

where  $\beta$  is a vector of unknown parameters, and  $X$  is a vector of explanatory variables and  $u$  is the disturbance term.  $j$  indicates the selected sectors:

1. Informal Manufacturing Sector
2. Informal Formal Service Sector
3. Formal Manufacturing Sector
4. Formal Service Sector

Beside these human capital variables, selectivity correction term ( $\lambda$ ) is also included into the equation (4.7) such that

$$\ln w_j = X_j\beta_j + \lambda_j\theta_j + v_j \quad (4.8)$$

where  $\theta_j = p_j\sigma_j$  (Tansel, 1999 p. 9). Heckman (1976) defines the  $\lambda_j$  as the following

$$\lambda_j = \frac{\phi(Z_j)}{\Phi(-Z_j)}$$

where  $Z_j = \Phi^{-1}(P_j)$  and  $\phi$  and  $\Phi$  are the density and distribution function for a standard normal variable, respectively. (Heckman, 1976, p. 156)

Heckman's two-step procedure used in estimating Mincer-type wage equation is developed by Lee (1983), Dubin and McFadden (1984). It is also modified by Bourguignon et al. (2007) (Wu, 2010). Dubin and McFadden (1984) (hereby DMF) use indirect utility function which satisfies the necessary and sufficient properties to construct econometric forms of joint discrete choice (Dubin, et al., 1984 p. 348). Its method is based on the multinomial logit model including multiple correction terms, instead one selection term which is the case examined by Heckman (1976). The virtue of DMF's approach is that it identifies not only the direction of the selection bias, but also where bias stems from (Wu, 2010 p. 27).

DMF's approach can be explained by using indirect utility function such that

$$y_k = x\beta_k + u_k \quad (4.9)$$

$$y_j^* = z\gamma_j + \eta_j, \quad j=1\dots m \quad (4.10)$$

where the disturbance  $u_1$  is not parametrically specified and  $E(u_1 | x, z) = 0$  and  $V(u_1 | x, z) = \sigma^2$ . Assume that the model is non-parametrically identified from exclusion of some of the variables in  $z$  from the variables in  $x$ . (Bourguignon, et al., 2007 p. 175) The outcome is observed if and only if the utility getting from the outcome 1 is higher than the utility getting from choosing other alternatives. That is,

$$y_k^* > \max_{j \neq k} (y_j^*) \quad (4.11)$$

Assume the market wage in the  $k^{th}$  alternative is the following:

$$\ln w_k = X_k\beta_k + u_k \quad (4.12)$$

If there are unobserved characteristics that affect both individual's choices and their earnings, then the disturbance  $\eta_j$  in the equation (4.10) and the disturbance  $u_k$  in the equation (4.9) will be correlated such that:

$$\begin{aligned}
E(\ln w_k | y_k^* > \max_{j \neq k} y_j^*) &= X_k \beta_k + E(u_k | y_k^* > \max_{j \neq k} y_j^*) \quad (4.13) \\
&= X_k \beta_k + E(u_k | \max_{j \neq k} (z\gamma_j + \eta_j - z\gamma_k + \eta_k) < 0) \\
&\neq X_k \beta_k.
\end{aligned}$$

$E(u_k | \max_{j \neq k} (z\gamma_j + \eta_j - z\gamma_k + \eta_k) < 0)$  indicates unobservable characteristics and it is correlated with the wages (Wu, 2010 p. 26). Since estimating the wage equation by OLS by not including these unobservable characteristics create bias, Dubin and McFadden (1984) suggest to use multiple selection correction terms. Unobservable determinants of the choice of alternative  $k$  against any other alternative correlate with the unobservable determinants of the wage equation. (Wu, 2010) Correlation between them need not be in the same direction, according to Dubin and McFadden (1984).

Dubin and McFadden (1984) assumes that

$$E(u_k | \eta_1 \dots \eta_m) = \sigma \frac{\sqrt{6}}{\pi} \sum_{j=1 \dots m} r_j (\eta_j - E(\eta_j)) \quad (4.14)$$

where  $r_j$  is a correlation coefficient between  $u_k$  and  $\eta_j$ . Given this assumption, model (4.10) can be estimated by OLS on the basis of

$$y_k = x_k \beta_k + \sigma \frac{\sqrt{6}}{\pi} \left[ \sum r_j \left( \frac{P_j \ln P_j}{1 - P_j} \right) - r_k \ln P_k \right] + w_k \quad (4.15)$$

Under the assumption that  $\sum_{j=1 \dots m} r_j = 0$ , DMF estimate the following wage equation that includes the multiple correction terms and gives the unbiased estimates of coefficients<sup>17</sup>;

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<sup>17</sup> For details see Bourguignon, et al. (2007) and Dubin and McFadden (1984)

$$y_k = x_k \beta_k + \sigma \frac{\sqrt{6}}{\pi} \sum r_j \left( \frac{P_j \ln P_j}{1-P_j} + \ln P_k \right) + w_k \quad (4.16)$$

Bourguignon et al. (2007) asserts that DMF's method ensures more robust estimators so that in many cases DMF is to be preferred to Lee's and Heckman's method. Since DMF method gives more robust estimation results, in this study this method is utilized so that there are multiple selectivity correction terms in each wage equations.<sup>18</sup>

In the Mincer-type wage equation, following explanatory variables are added as determinants of the log wages: Age, firm size, education level, fulltime dummy variable, and work time dummy variable. Dependent variable is the log of wage rate. It is estimated for four different sector categories, namely formal manufacturing sector, formal service sector, informal manufacturing sector and informal service sector. Estimations are realized for men and women separately in each year.

#### **4.2.1 Age**

Like multinomial logit model, wage equations also include eleven age dummies for men: 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64 and 65 age and over. In the estimation of wage equation for women, however, age groups 50-54, 55-59, and 60-64 are merged because of insufficiency of number of observations. Thus nine age dummies are included in the estimation for women. The base category is "15-19" age group dummy variable. The estimated coefficients of age dummies indicate the effect of relevant age dummy variable on wages, with respect to the "15-19" age group.

#### **4.2.2 Education**

According to Human Capital Model, education is one of the most important factors that affect the wage rate. Therefore, similar to the multinomial logit model, four education dummy variables are included into the Mincerian-type wage equation,

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<sup>18</sup> While estimating the wage equations in the STATA, DMF (1) option is used with "selmlog" command.



namely “Secondary School”, “General High School”, “Vocational High School”, and “University”. The “Primary School” dummy variable is the reference category. It includes persons who are illiterate, primary school graduates, or who are literate but not complete any educational institution. Since the base category is “Primary School”, the coefficients of educational dummy variables indicate the effect of relevant educational level on log wages with respect to the being primary school graduate.

#### **4.2.3 Firm Size**

Firm size is an important factor that affects the workers’ wage. Since large firms have corporate identity, they are more likely to pay more wages to workers, as compared to the small size firms.

In this study, firm size is measured by the number of workers hired by the firm. In this context, four dummy variables are defined for Mincer-type wage equations. These dummies are classified by taking the number of workers hired into account. Firm size dummies are “Less than 10”, “10-24”, “25-49”, “50 or more”, which are called small sized, medium sized, large firm, respectively. “Less than 10” dummy indicates the firms which employ less than 10 workers; “10-24” dummy indicates the firms which employ 10-24 workers; “25-29” indicates the firms which employ 25-29 workers; “50 or more” dummy indicates the firms which employ 50 workers or more. The base category is the “Less than 10” dummy.

#### **4.2.4 Working Time**

Working time is another variable included in the wage equation. In the 2007 and 2008 HLFS, the statement about working hours in the main job during the reference week is directed to participants. To be able to examine the effect of working time on wages of formal and informal sectors, log of work time is taken because employees should have strictly positive working time. Otherwise, they do not get any wage rate. Thus, natural logarithm of work time per week, i.e.  $\ln(\text{worktime})$ , is inserted into the wage equations.

Since both dependent (wages) and independent variables (working time) are in the log form, the coefficient of working time variable gives the elasticity of wages with respect to the working time. In other words, it indicates the percentage change in the wages in response to a one percentage change in the working time, holding constant all other determinants of wages.

It is expected that working time would have positive effect on wages i.e. as working time increases wage rate per week also increases, in general. Thus, working time is expected to have positive sign.

#### **4.2.5 Fulltime**

Whether an employee works full-time or part-time is important factor affecting the wage rates. If an employee works fulltime, she is most probably earns higher wages than part-time worker. Consistency and continuity of workflow are important properties of the formal sector. Consistency and continuity requires experienced and qualified workers, which represents the full time employment. Consequently, employers most probably prefer to give fulltime workers higher wage rate.

Since being full-time worker or part-time worker affects the wage rates, “fulltime” dummy variable is included into the wage equations. It takes “1”, if employment type of the worker is full-time and it takes “0” otherwise.

In general sense, part time employment represents the informality. In the informal sector, employers do not prefer hiring qualified and experienced workers so that they are more likely to employ part-time workers and give them lower wage.

#### **4.2.6 Selection Variables**

Heckman (1976) states that omitted variable or specification error problem leads to OLS estimation results are biased. Similarly, omitting the selection corrected term in the wage equations also cause biased in the OLS estimation.

This study is based on the more developed method of Heckman's two step procedure, i.e. Dubin and Mc Fadden (DMF)'s method. In contrast to the traditional approach, it is employed the multiple selectivity correction terms which is developed by Dubin and McFadden (1984), in this thesis. This sophisticated method, based on the multinomial logit model including multiple correction terms, not only to attribute a selection bias in the estimation of wage equations, but also to link to where the bias stems from. (Wu, 2010 p. 25)

## CHAPTER 5

### DETERMINANTS OF LABOR MARKET PARTICIPATION DECISION

In this chapter, estimation results of multinomial logit equation with six alternative outcomes are presented. The determinants of the model are explained in the subtitles, by comparing the results of each formal and informal sector for males and females.

The coefficients, robust standard errors and marginal effects of multinomial logit model are shown in Table 5.1-Table 5.26. These tables are presented at the end of the chapter. For individual significance test Z-statistics of each variable are compared to the Z-Table. Also p-values of each variable are controlled. Results are explained in related sections. For joint significance test, Wald-statistics of the models are compared to the Chi-square ( $\chi^2$ ) tables so that all coefficients are jointly significant in each model.

#### 5.1 Age

Age is important factor for sectoral selection decision. Estimation results of multinomial logit model prove this argument. In addition to the base category (“15-19” age group), there exist 10 age dummy variables in the multinomial logit equation for men and 8 age dummies for women.

Table 5.3 and Table 5.4 show the p-values of age dummies and whether they are statistically significant at 1%, 5% and 10% significance levels in the formal-manufacturing sector for men in years 2007 and 2008, respectively. Estimation results of formal manufacturing sector for men suggest that all age dummy variables are statistically significant in 2007 and 2008. Table 5.1 and Table 5.2 indicate that the probability of working formally in manufacturing sector for men is affected positively until the 35 years old. Starting from the 35-39 years of age, it has negative marginal effect on the probability of selecting formal manufacturing sector in 2007 and 2008. Indeed, the probability of choosing formal manufacturing sector of men who are 25-39 years old is higher than that of 15-19 years old men. Starting from the

middle ages, the probability of choosing this sector decreases. The relationship between age and probability of working formally in manufacturing sector for men is represented in the Figure 5.1.1.

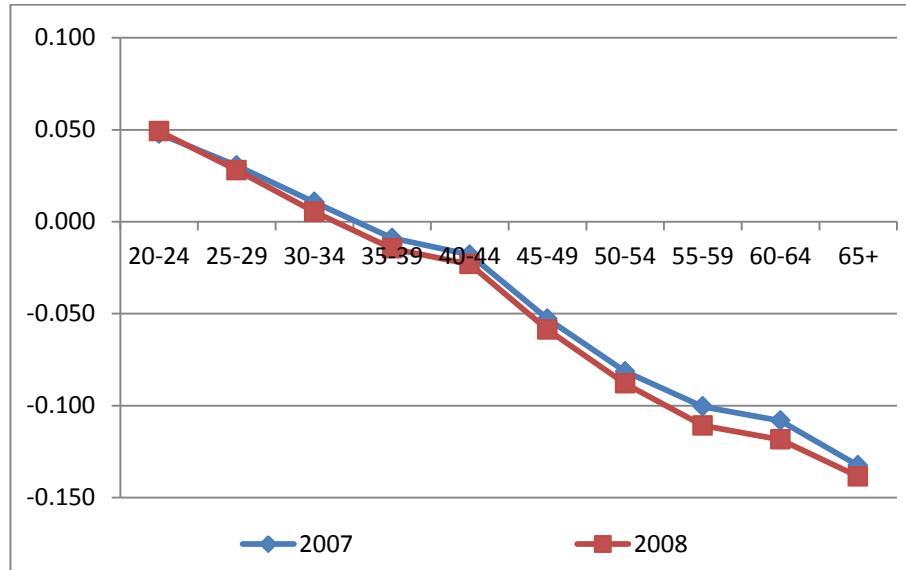


Figure 5.1.1: Relationship between Age and Probability of Selecting Formal Manufacturing Sector for Men, 2007 and 2008

It is apparent that there exists a negative relationship between the probability of selection of the formal manufacturing sector and age for men. However, until 35 years of age, men are likely to work in the formal manufacturing sector. As age increases, marginal effect of the probability of being selected the formal manufacturing sector decreases.

Table 5.5 and Table 5.6 indicate the estimation results of multinomial logit model of formal manufacturing sector for women in year 2007 and 2008, respectively. The only insignificant age dummy variable is “50-54” age group for women. Therefore, it can be asserted that age is significant factor also for the selection of formal manufacturing sector of women. Marginal effects shown in Table 5.1.1 indicate that the probability of choosing formal manufacturing sector for women is negatively affected by age in year 2007. Conversely, the sign of marginal effects of age dummy

variables are positive in 2008. As it can be seen from the Figure 5.1.2, there exists a hump shaped relationship between age and the selection probability of the formal manufacturing sector for women in 2008.

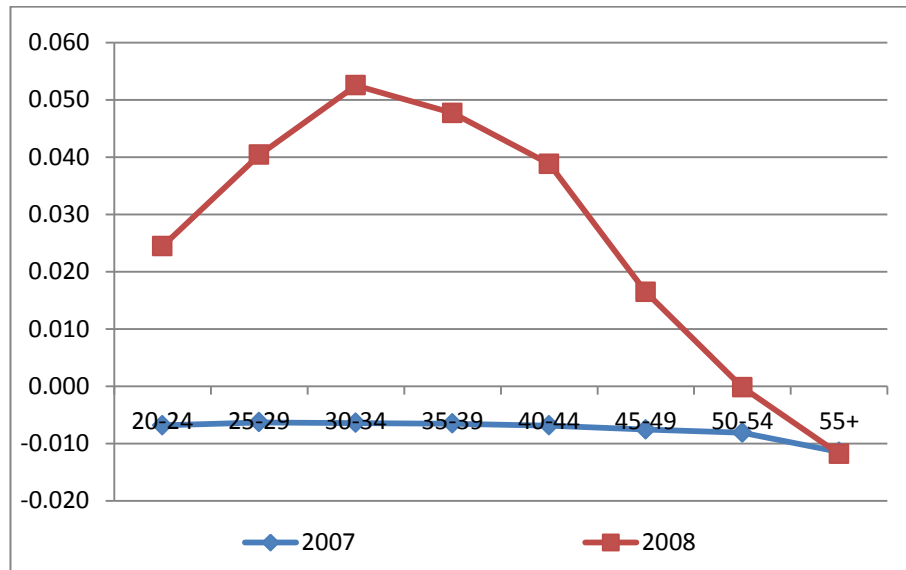


Figure 5.1.2: Relationship between Age and Probability of Selecting Formal Manufacturing Sector for Women, 2007 and 2008

As for the selection probability of informal manufacturing sector, the only insignificant variable is “35-39” age dummy variable for men ( $p$ -value = 0.274 > 0.10 for the year 2007;  $p$ -value = 0.799 > 0.10 for the year 2008). For women, except “40-44” age group dummy variable, others are statistically significant in 2007. In 2008, however, “25-29”, “30-34” age dummy variables are insignificant, as well.

Figure 5.1.3 indicates that as men’s age increases, the probability of working in the informal manufacturing sector is likely to decrease for both years in general sense. Unlike formal manufacturing sector, the probability of selecting the informal manufacturing sector is lower especially at younger ages -between “20-35- for men. Not surprisingly, there exists the inverse relationship between probability of working formal manufacturing and informal manufacturing sector between 20-35 ages for men.

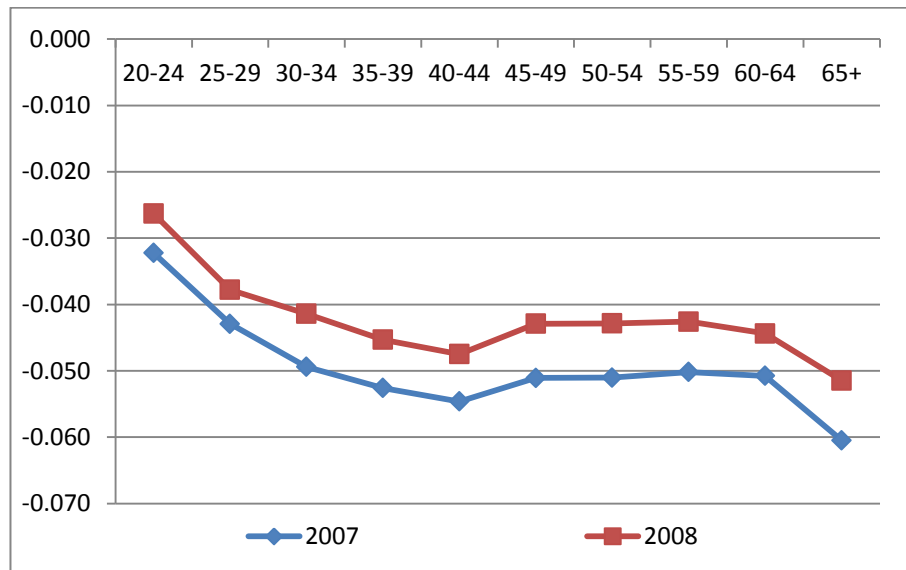


Figure 5.1.3: Relationship between Age and Probability of Selecting Informal Manufacturing Sector for Men, 2007 and 2008

Similar to the estimation results of formal-manufacturing sector of women, there exists negative relationship between probability of working in the informal manufacturing sector and age dummies in year 2007. In 2008, however, being young has positive effect on the probability of entering into informal manufacturing sector for females as presented in the Figure 5.1.4. However, at older ages, the probability of working in the informal manufacturing sector decreases for women. Indeed, the probability of working in the informal manufacturing sector for women, 40 years old or over, is less than that of 15-19 years old women.

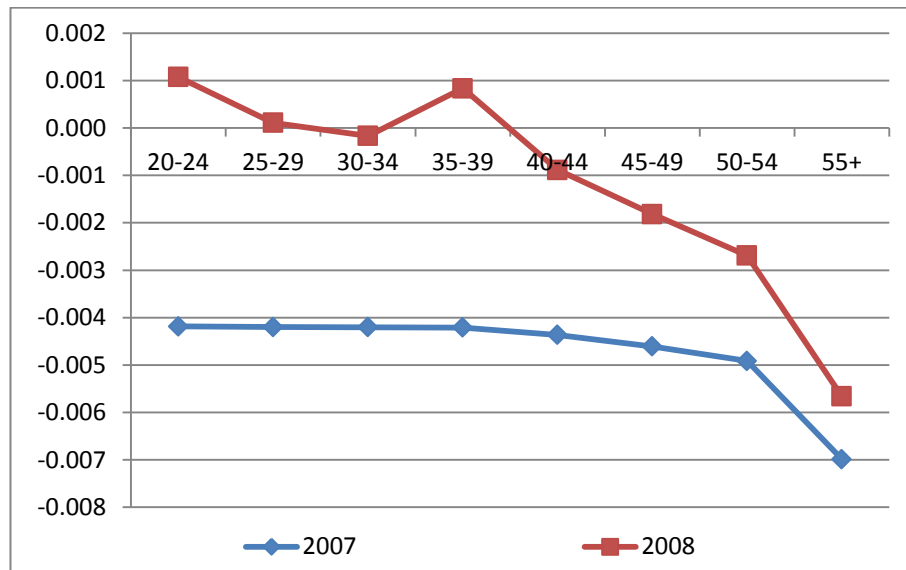


Figure 5.1.4: Relationship between Age and Probability of Selecting Informal Manufacturing Sector for Women, 2007 and 2008

Determinants of selection probability of formal service sector for men are indicated in Table 5.11 and Table 5.12, and for women Table 5.13 and Table 5.14. All age dummy variables are statistically significant in the equations of both women and men in year 2007 and 2008. For women, only “50-54” dummy variable is not significant in both years (For 2007,  $p\text{-value} = 0.101 > 0.10$ ; for 2008,  $p\text{-value} = 0.281 > 0.10$ ). Marginal effects of age dummies on the probability of selecting the formal service sector for both men and women are presented in the Table 5.1 and Table 5.2. As it can be inferred from those tables, until the 50 years old, men are likely to choose to work in the formal service sector, while their probability of selecting the formal service sector is decreasing after 50 years old in accordance with a-priori expectations. Indeed, men, who are less than 50 years old, are more likely to work in the formal service sector than 15-19 years old men. Those older than 50 years old do not prefer to work in that sector, holding other variables constant. Figure 5.1.5 shows this relationship for 2007 and 2008.



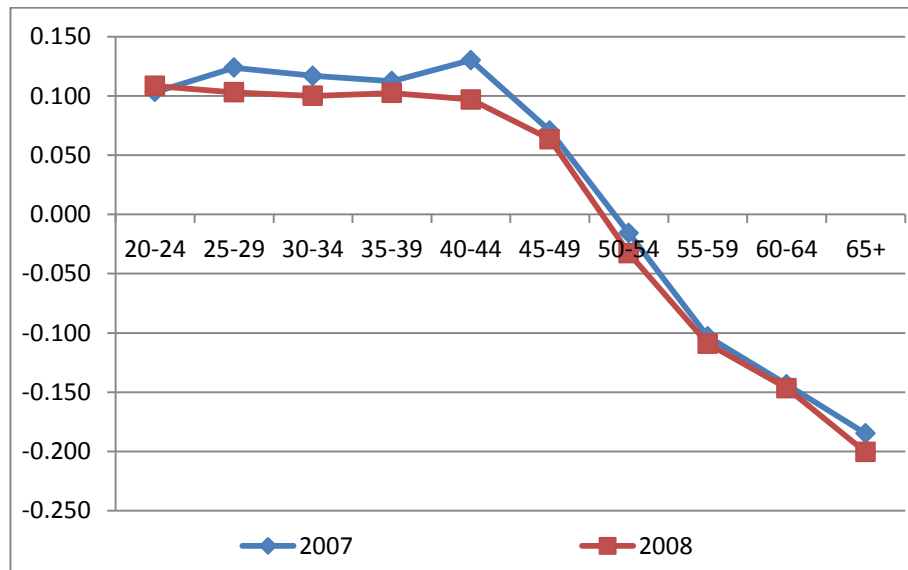


Figure 5.1.5: Relationship between Age and Probability of Selecting Formal Service Sector for Men, 2007 and 2008

The relationship between men's probability of choosing formal service sector and age is represented by concave curve. Until 50 years old, marginal effects are positive, while they are negative for whom 50-54 years of age and over.

As for women, marginal effects of age on the probability of choosing to work in the formal service sector have negative sign in year 2007 and positive sign -except 55+ dummy- in year 2008.

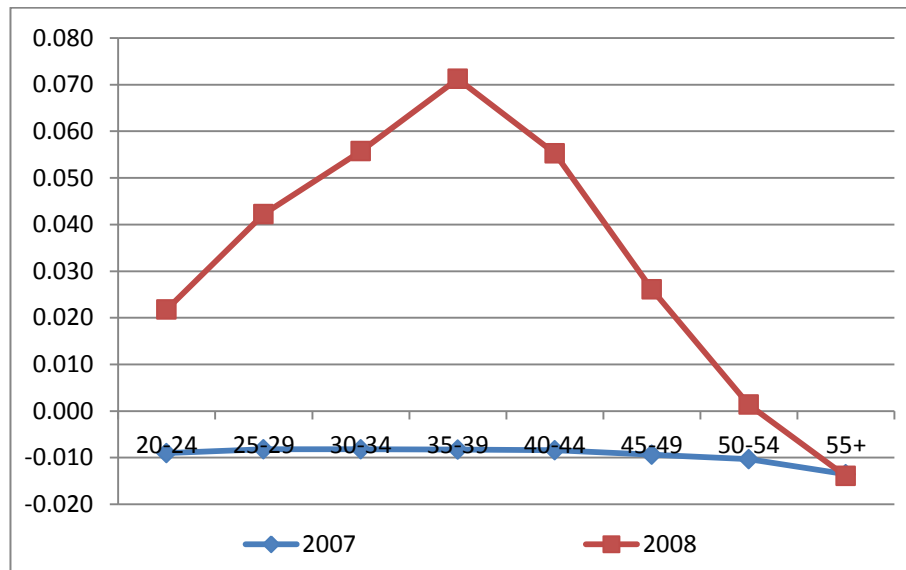


Figure 5.1.6: Relationship between Age and Probability of Selecting Formal Service Sector for Women, 2007 and 2008

This relationship is represented by the Figure 5.1.6 for women. As it can be seen from that figure, there exists concave relationship for women similar to the results of formal manufacturing sector. Unlike the results for men, however, in 2007 all age dummy variables have negative marginal effect on the selection of the formal service sector for female. In other words, females older than 15-19 years of age do not prefer to work in the formal service sector in year 2007 while they prefer working in the formal service sector in 2008. Indeed, there exists year to year difference in preferences of women.

According to MNLM estimation results of informal service sector for men, only “35-39” age dummy variable is insignificant in 2007; others are statistically significant. In addition to this dummy, “40-44” and “45-49” are also insignificant for 2008. Remaining age dummies are significant for men’s choosing the formal service sector. Table 5.1 and Table 5.2 indicate that all age dummy variables have negative sign for men in 2007 and 2008, meaning that men “15-19” years of age are more likely to work in the informal sector than older men workers. Figure 5.1.7 shows that there exists negative relationship between the probability of selecting the informal service

sector and age for men. This curve is similar to that of informal manufacturing sector, meaning that there exists a U-shaped relationship between informal service sector and age for men. Men who are 15-19 years old are more likely to work informally in both manufacturing and service sector.

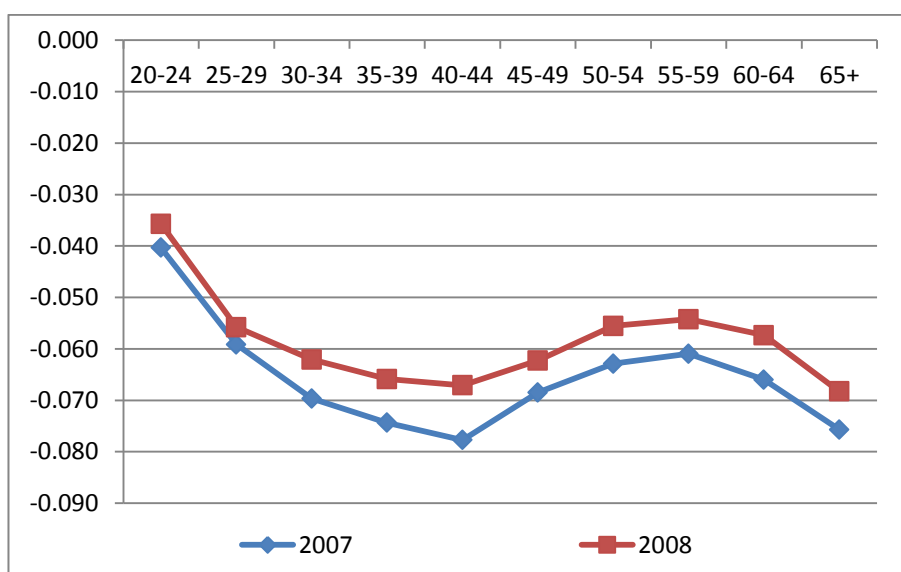


Figure 5.1.7: Relationship between Age and Probability of Selecting Informal Service Sector for Men, 2007 and 2008

As for women, estimation results of informal service sector for years 2007 and 2008 are presented in the Table 5.17 and Table 5.18, respectively. These tables indicate that “45-49” and “50-54” age dummy variables are not significant for the selection of formal service sector for women in 2007. The only insignificant variable is “45-49” age dummy in 2008. While all age dummy variables have negative sign for 2007, those are positive for women in 2008, except “45-49”, “50-54” and “55+” dummies. In 2007, however, all age dummies have negative marginal effects. This indicates that while women who are older than 15-19 age groups do not work in the informal service sector in 2007, they prefer to work in this sector in 2008

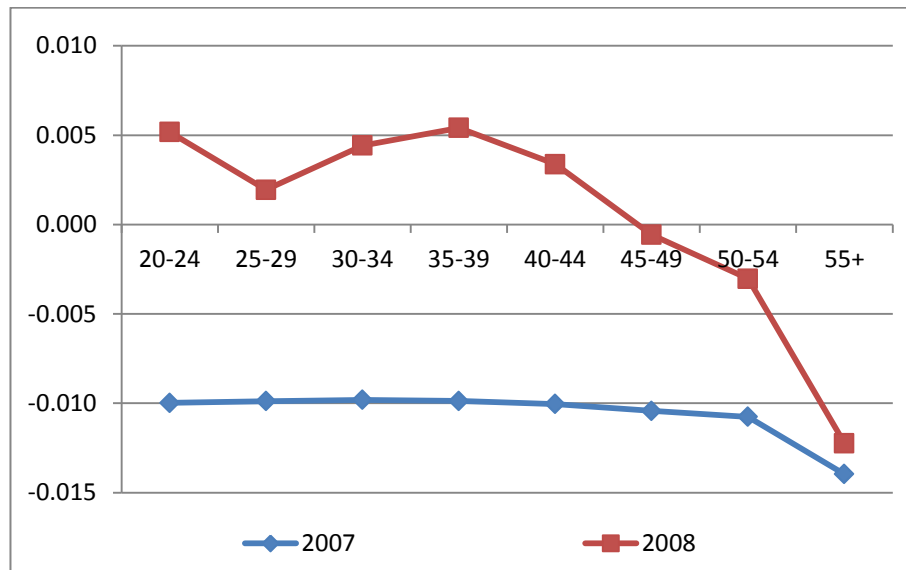


Figure 5.1.8: Relationship between Age and Probability of Selecting Informal Service Sector for Women, 2007 and 2008

For a better understanding the dynamics in the sector selection, also marginal effects of non-employment is presented in the Table 5.1 and Table 5.2. It is apparent from the Figure 5.1.9 that, not surprisingly, there exists a U-shaped relationship between age groups and the probability of selection of being non-employed for men in both 2007 and 2008. It is also true with some caveat for women. Although this relationship looks like a linear curve parallel to the X-axis for women as it can be seen Figure 5.1.10, Table 5.1 indicates that it has also U-shaped relationship for women in year 2007.

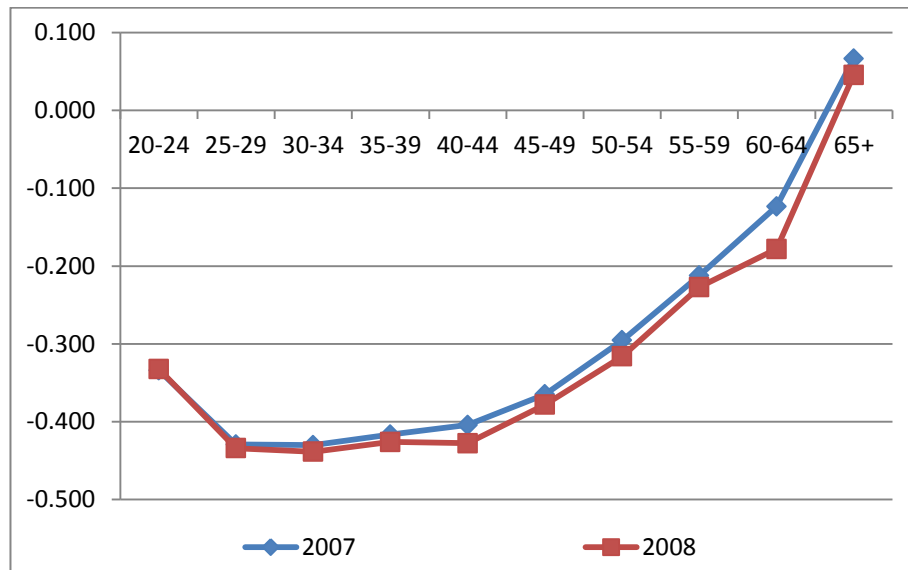


Figure 5.1.9: Relationship between Age and Probability of Selection of Being Non-employed for Men, 2007 and 2008

According to estimation results, women and men who are 15-19 years old are more likely to be non-employed than elders. On the one hand, an individual would be in progress in her education at young ages, i.e. 20-24, so that she would not be considered in the labor force. On the other hand, at older ages individuals most probably become retired so that they are not considered in the labor force, neither. Since middle ages are most productive years for an individual, workers at those years of age are more likely to be in labor force.

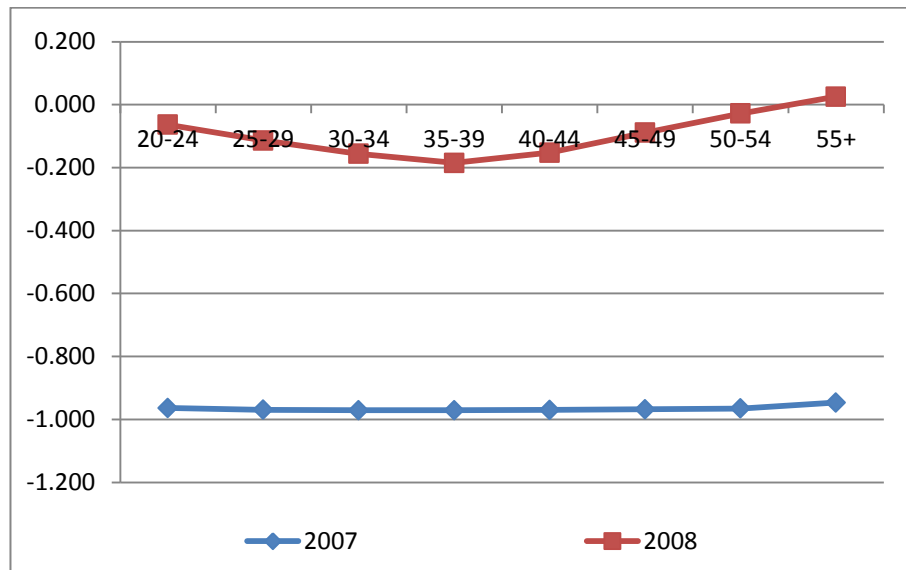


Figure 5.1.10: Relationship between Age and Probability of Selection of Being Non-employed for Women, 2007 and 2008

## 5.2 Education

Education is another important variable that affects the sector selection probability and wage equation as Human Capital Theory suggests. In addition to the base category, i.e. “primary school”, there are four dummy variables - secondary, high school, vocational, university- which represent the education level that is completed. Indeed, these dummy variables measure the effects of educational levels on the sector selection probability relative to primary school graduates.

As it can be seen from the Table 5.3, Table 5.4, Table 5.5 and Table 5.6 for the probability of selection of the formal manufacturing sector, all educational level dummy variables are statistically significant for both men and women in year 2007 and 2008. This indicates that education levels do have effect on the probability of selection of the formal manufacturing sector.

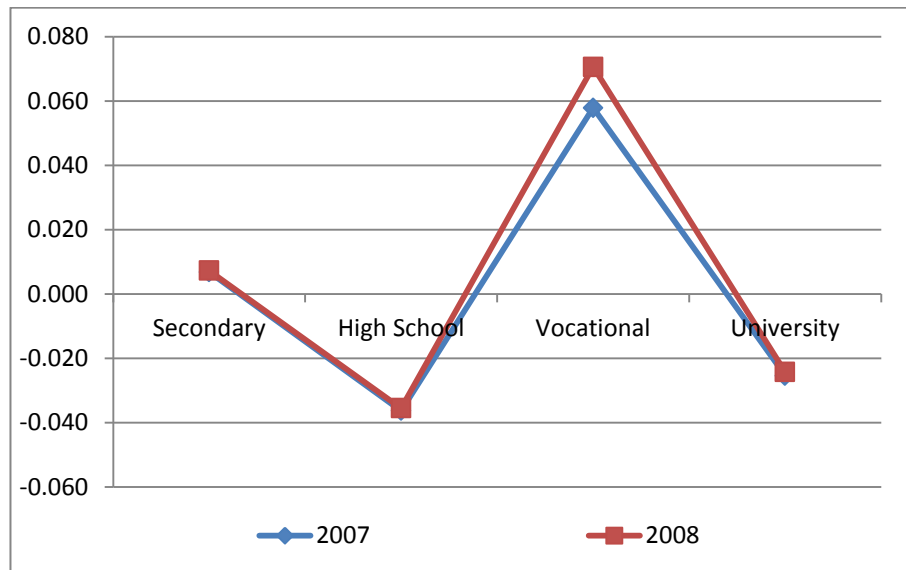


Figure 5.2.1: Relationship between Marginal Effects of Education Levels and Probability of Selecting Formal Manufacturing Sector, Men 2007 and 2008

Figure 5.2.1 shows the relationship between educational level and the probability of selecting formal manufacturing sector for males. As compared to the primary school graduates, men who are graduated from high school or university are not likely to work in the formal manufacturing sector, while their secondary school or vocational school graduate counterparts do, as compared to the primary school graduates.

Relationship between education and probability of selection of the formal manufacturing sector is also presented in the Figure 5.2.2 for women. The figure indicates that as education level increases the probability of working in the formal manufacturing sector also increases for women, holding other variable constant. In other words, women who have higher level of education are more likely to work in the formal manufacturing sector than women who are graduated from primary school.

At this point, it would not be wrong to infer that men and women have different decision pattern on working in the formal manufacturing sector even after controlling educational levels.

While men who are graduated from university or high school do not prefer to work formally in the manufacturing sector, women do, however.

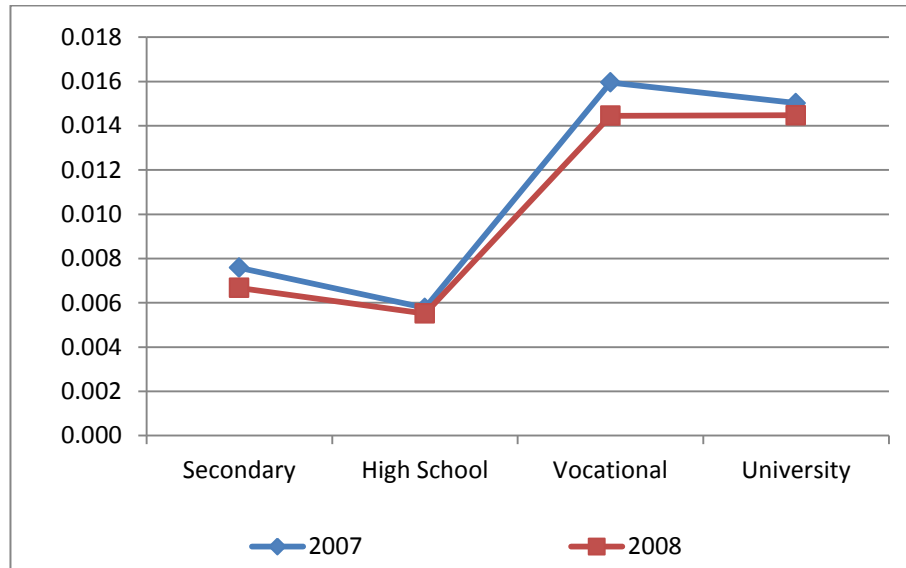


Figure 5.2.2: Relationship between Marginal Effects of Education Levels and Probability of Selecting of Formal Manufacturing Sector, Female

All educational level dummies have statistically significant effect on the selection probability of the informal manufacturing sector for men. Table 5.1 and Table 5.2 indicate that the level of education has negative effect on the probability of working informally in the manufacturing sector with respect to men who are graduated from primary school, holding other variables constant. In other words, primary school graduated women are more likely to work informally than those with a higher level of education.



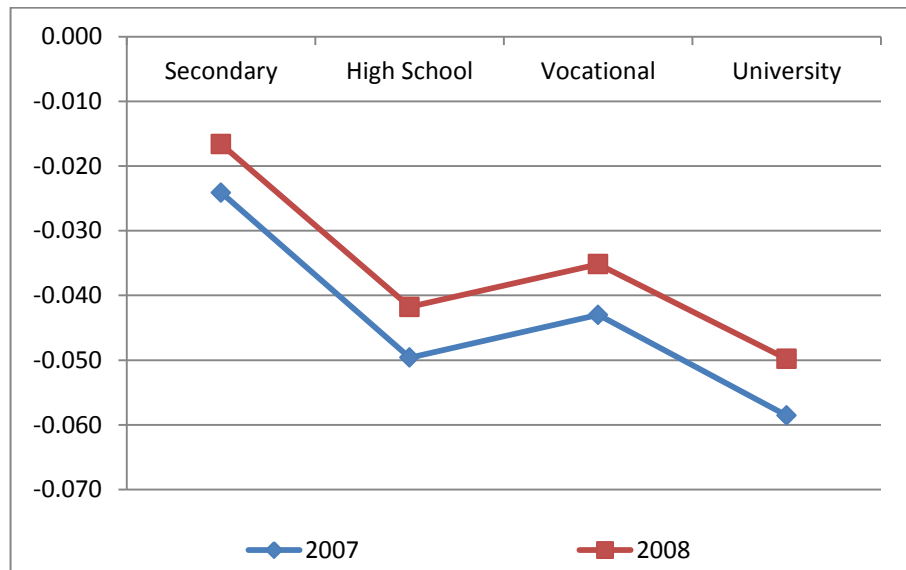


Figure 5.2.3: Relationship between Marginal Effects of Education Levels and Probability of Selecting of Informal Manufacturing Sector, Men

It is shown in Figure 5.2.3 that men who have higher education level are more likely to work formally in the manufacturing sector than to work informally, holding other variables constant.

For women, except “Secondary” dummy variable in 2007 and “Vocational High School” dummy variable in 2008, others are statistically significant for the selection probability of informal manufacturing sector. Figure 5.2.4 presents the relationship between educational level dummy variables and the probability of selecting the informal manufacturing sector for women. It can be seen from the figure, as the level of education increases with respect to the primary school graduates, women also do not prefer to work in the informal manufacturing sector in both years.

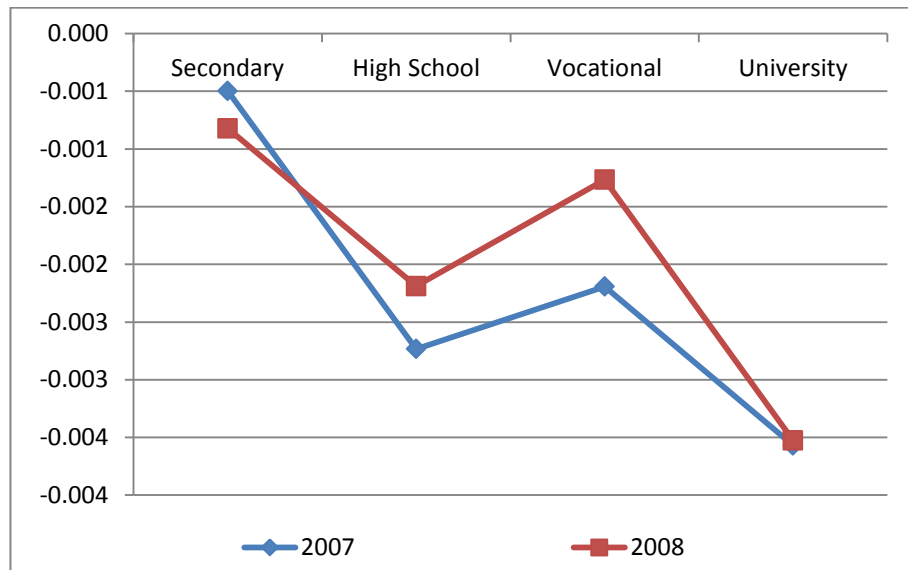


Figure 5.2.4: Relationship between Marginal Effects of Education Levels and Probability of Selecting of Informal Manufacturing Sector, Women

This relationship is similar to that of men who works in the informal manufacturing sector. On this ground, it can be asserted that as the level of education increases, the probability of working informally in the manufacturing sector decreases for both men and women.

As for the estimation results of multinomial logit equations of formal and informal service sector, all educational level dummy variables are statistically significant for women in 2007 and 2008. For men, however, except “university” dummy variable, others are statistically significant in MNLM estimation results of informal service sector in both 2007 and 2008. All educational level dummy variables in the estimation results of formal service sector for men are statistically significant in both years.

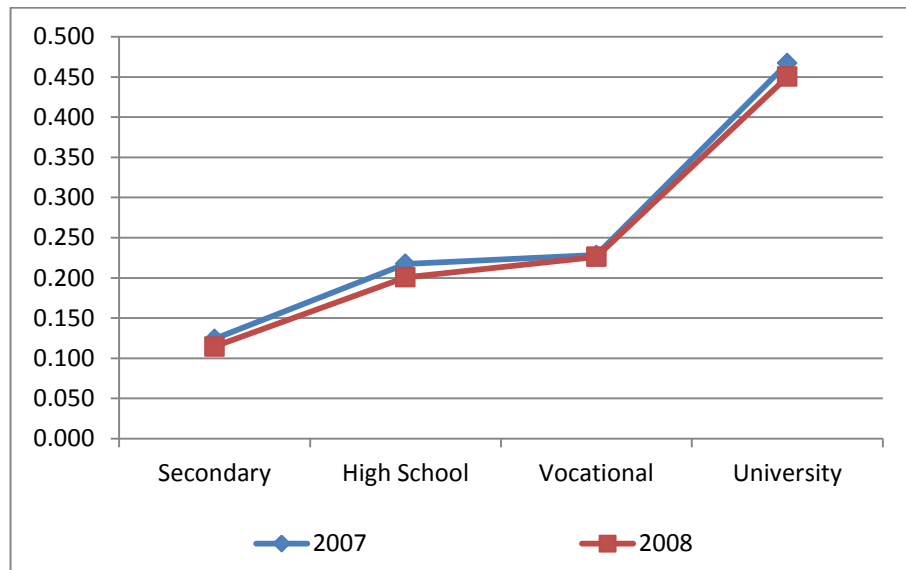


Figure 5.2.5: Relationship between Marginal Effects of Education Levels and Probability of Selecting of Formal Service Sector, Men

Table 5.1 and Table 5.2 indicate that the sign of marginal effects of education levels in MNLM equation of formal-service sector are positive for men, meaning that men who are graduated from secondary school or from higher level of educational institution are more likely to work in the formal service sector than the men who are primary school graduate. Moreover, as presented in the Figure 5.2.5, as education level increases the possibility of choosing formal service sector also increases for men. This possibility is most affected by the “university” dummy, while it is least affected by the “secondary school” dummy variable. Indeed, the possibility of working in the formal service sector for men graduated from university is 4% higher than that of the primary school graduates.

Similar to the estimation results of men, there also exists a positive relationship between education levels and the possibility of choosing formal service sector for women as indicated in the Figure 5.2.6.

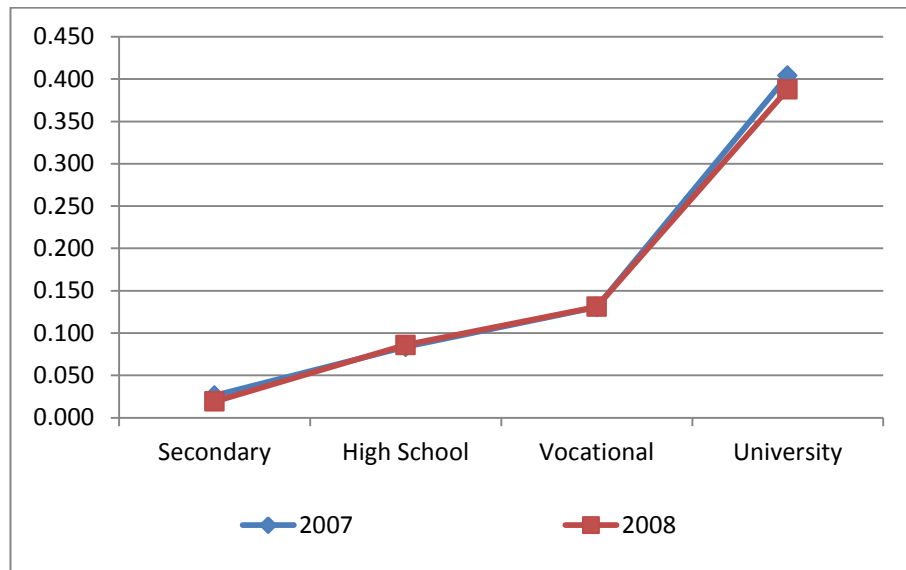


Figure 5.2.6: Relationship between Marginal Effects of Education Levels and Probability of Selecting of Formal Service Sector, Women

In line with the expectations, there exist a negative relationship between the possibility of selecting the informal service sector and education for men. As presented in the Figure 5.2.7, informal service sector is not preferable for males who have higher educational level than the primary school graduates.

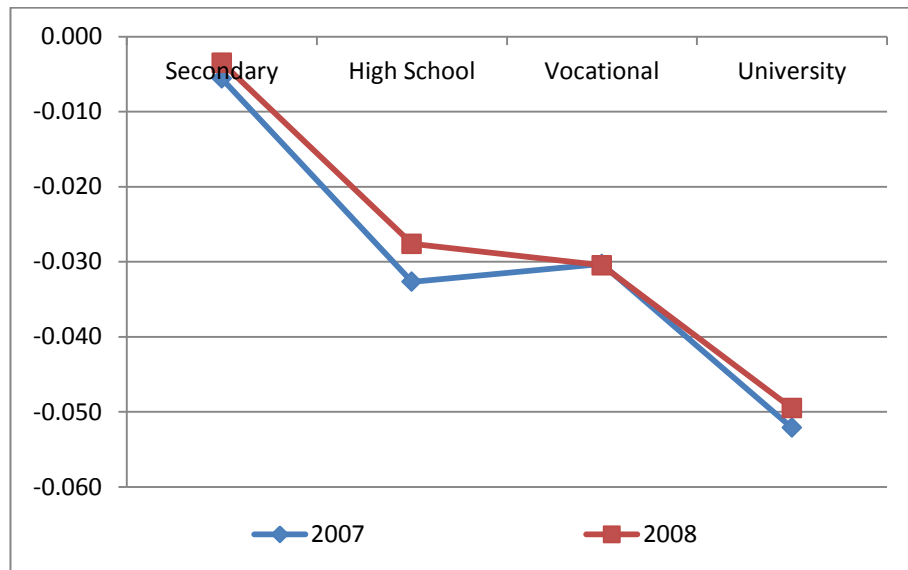


Figure 5.2.7: Relationship between Marginal Effects of Education Levels and Probability of Selecting of Informal Service Sector, Men

The situation for women is somewhat different from that of men. Marginal effects of educational level dummy variables are positive for women as it can be seen from the Table 5.1 and Table 5.2 for both years. As education level increases, the probability of choosing informal service sector also increases for women in both years.

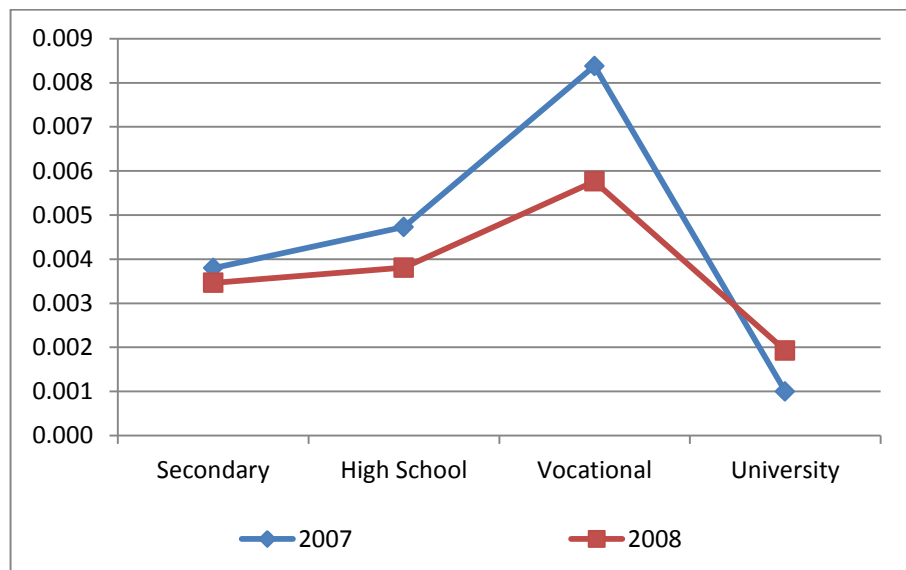


Figure 5.2.8: Relationship between Marginal Effects of Education Levels and Probability of Selecting of Informal Service Sector, Women

This relationship is also indicated in the Figure 5.2.8. The probability of selection of the informal service sector is least but positively affected by being graduated from university. While the probability of working in the informal service sector for women who are graduated from university is 0.1% higher than primary school graduates, this ratio is about 0.8% level for women graduated from vocational high school.

As compared to the relationships between educational level and probability of working in the formal sector and informal sector for women, it can be easily realized that women’s probability of working formally or informally in the service sector increases as the education level increases. This indicates that women who have higher level of education prefer to work regardless of the formal or informal service sector.

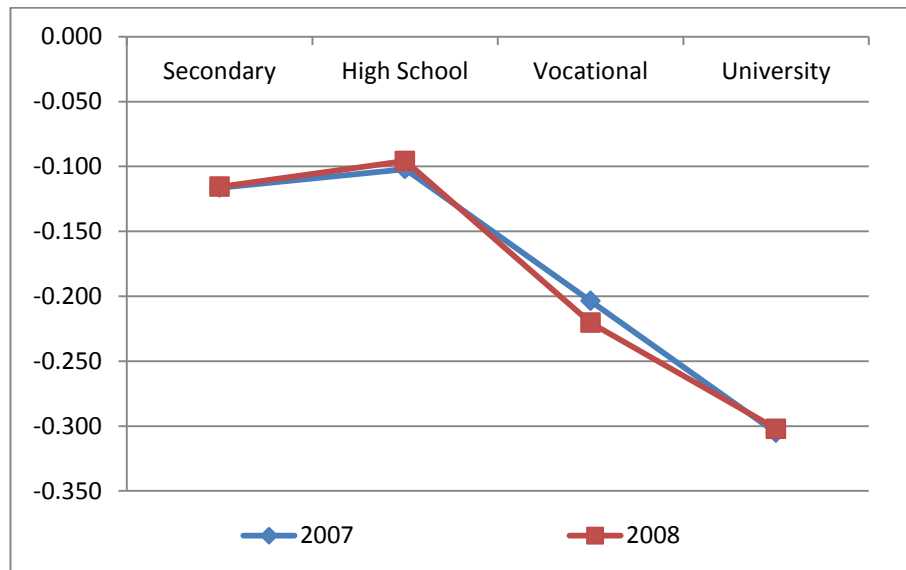


Figure 5.2.9: Relationship between Marginal Effects of Education Levels and Probability of Selection of Being Non-employed, Men

For a better understanding dynamics of the effect of education on sector selection, relationship between education levels and the probability of being non-employed should be examined. The relationship between education levels and non-employment are presented in the Figure 5.2.9 and Figure 5.2.10. In line with a-priori expectations, if the level of education of both men and women increases, the probability of being non-employed decreases. As it can be seen from these figures, men and women graduated from university are less likely to be non-employed, as compared to the primary school graduates.

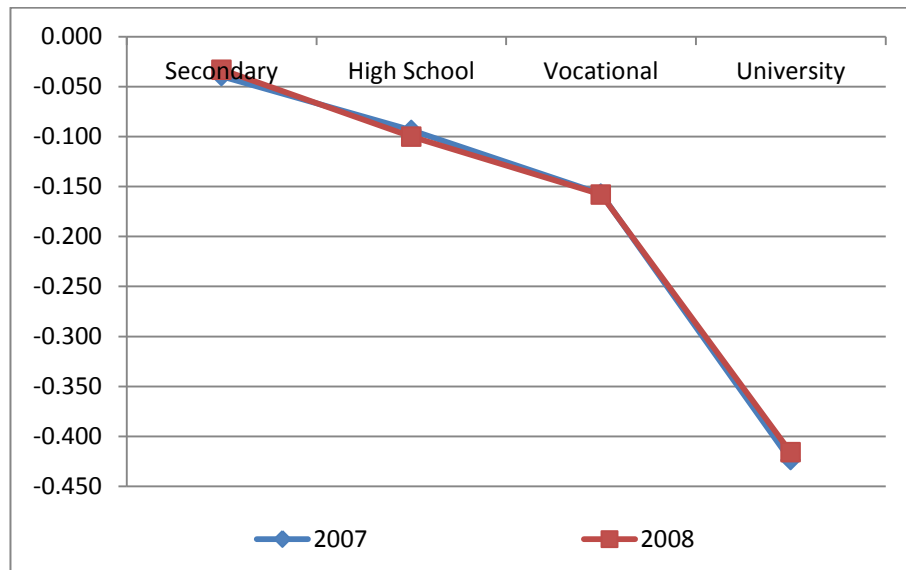


Figure 5.2.10: Relationship between Marginal Effects of Education Levels and Probability of Selection of Being Non-employed, Women

In conclusion, education is important factor for the sector selection decision. As education level increases, men would not prefer working informally in both manufacturing and service sector. It is true for the women who work in the manufacturing sector. Beside, education determines the decision of being labor force, especially in service sector, or not. As the level of education increases, women would choose to work in the service sector than being non-employed, regardless of working formally or informally.

### 5.3 Marital Status

In the multinomial logit equations, there exist two dummy variables –single, divorced- related to the marital status. Since the reference category is “married”, this dummy is omitted from the MNLM equations.

As seen from the Table 5.3 and Table 5.4, all marital status dummy variables, in the formal manufacturing sector equation, are statistically significant for males in 2007 and 2008. Marginal effects of marital status dummy variables for the probability of selecting formal manufacturing sector is presented in the Table 5.1 and Table 5.2 for



years 2007 and 2008, respectively. According those tables, all of the marital status dummy variables have negative effect on the probability of selecting formal manufacturing sector for males, in 2007 and 2008. Indeed, for both years, single or divorced men’s probability of working in the formal manufacturing sector is lower than that of married men, *ceteris paribus*. This fact is also indicated in the Figure 5.3.1. Therefore, it can be asserted that marriage encourages men to work formally in the manufacturing sector.

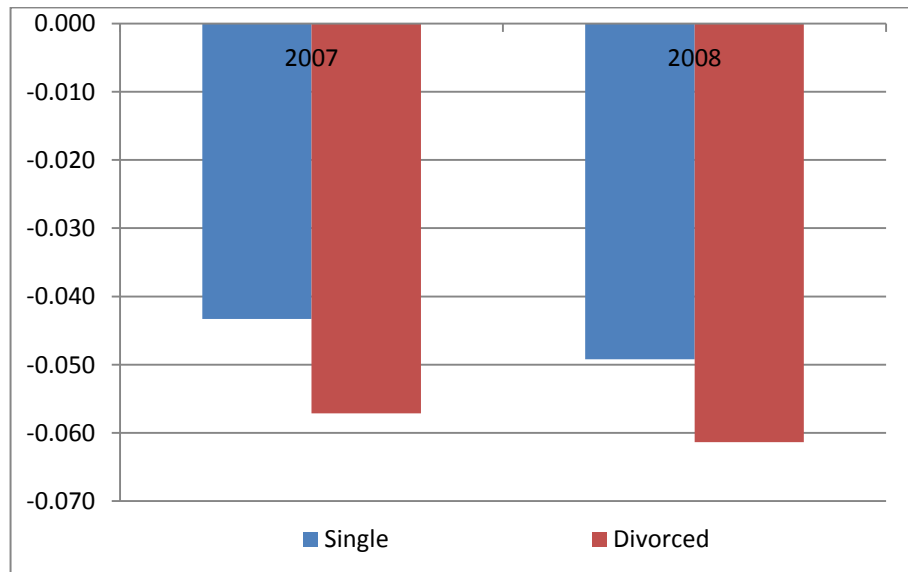


Figure 5.3.1: Relationship between Marginal Effects of Marital Status and Probability of Selecting of Formal Manufacturing Sector, Men

Table 5.5 and Table 5.6 show that only “single” dummy variable is significant for females’ sector selection equation of formal manufacturing sector in 2007 and 2008. In other words, being divorced has no effect on the probability of selecting formal manufacturing sector for women.

To be able to make a comment on the direction of the marital status dummy variables, marginal effects of them should be taken into account. Figure 5.3.2 shows that being single, for women, has positive effect on the probability of choosing formal manufacturing sector with respect to being married in both years. Table 5.1

and Table 5.2 indicate that single women’s probability of selecting formal manufacturing sector is 0.007 higher than that of married women in 2007 and 2008.

It is apparent that decision dynamics are different for men and women. While married men are more likely to work formally in the manufacturing sector, marriage has a discouraging effect for women on working in the formal manufacturing sector.

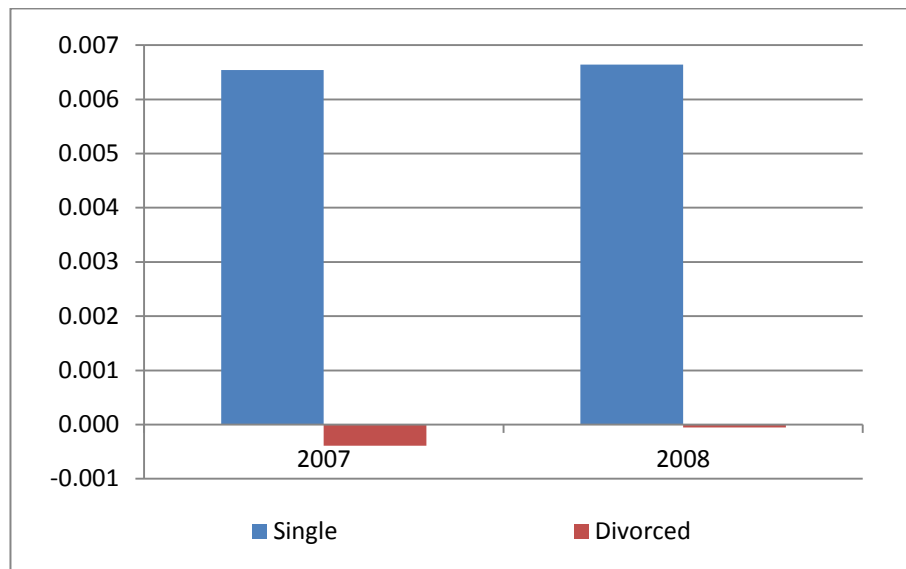


Figure 5.3.2: Relationship between Marginal Effects of Marital Status and Probability of Selecting of Formal Manufacturing Sector, Women

Table 5.7 and Table 5.8 show that only “single” dummy variable is statistically significant for the probability of choosing to work in the informal manufacturing sector for men in 2007 and 2008. This implies that being divorced has no effect on the probability of choosing informal manufacturing sector for men. Figure 5.3.3 indicates that being single has positive effect on the men’s probability of working in the informal manufacturing sector. In other words, single men are more likely to work in the informal manufacturing sector than married men, *ceteris paribus*.

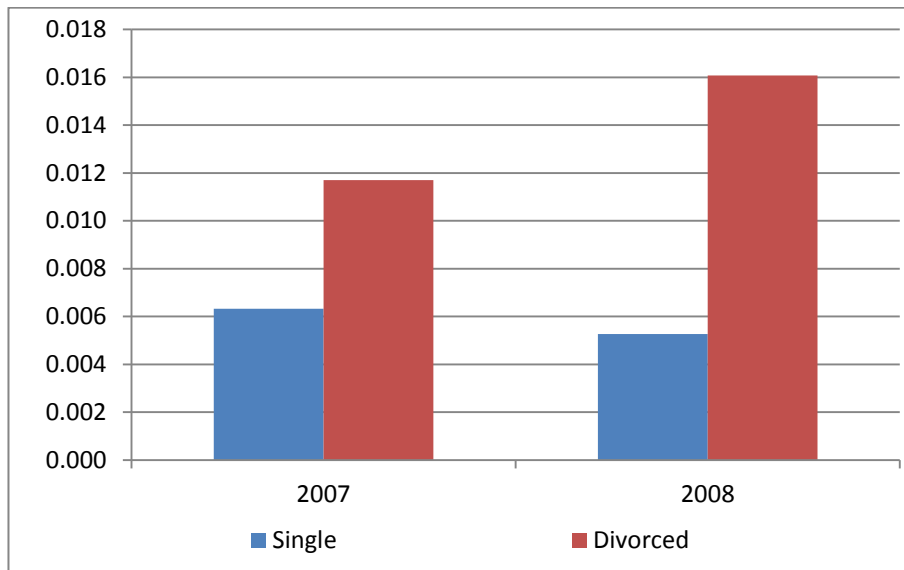


Figure 5.3.3: Relationship between Marginal Effects of Marital Status and Probability of Selecting of Informal Manufacturing Sector, Men

Also, for females, only “single” dummy variable is statistically significant in 2007 as can be seen from the Table 5.9 and both “single” and “divorced” dummy variables are significant in 2008 indicated in the Table 5.10.

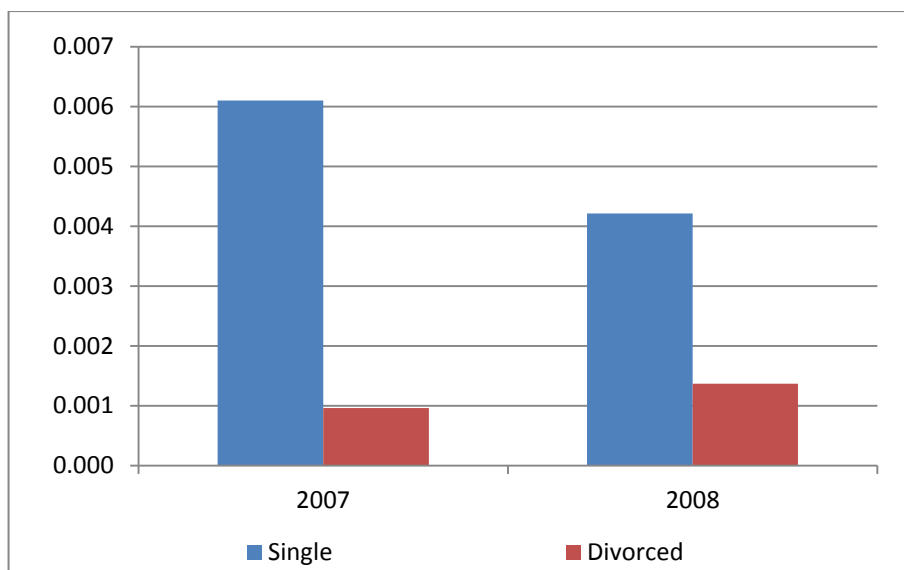


Figure 5.3.4: Relationship between Marginal Effects of Marital Status and Probability of Selecting of Informal Manufacturing Sector, Women

The marginal effect of “single” dummy variable is positive as presented in the Figure 5.3.4. Single women’s probability of selecting the informal manufacturing is 0.006 higher than that of married women in 2007, and 0.004 higher in 2008. Furthermore, divorced women’s probability of selecting informal manufacturing sector is 0.001 higher than that of married women in 2008.

Similar to the estimation results of formal manufacturing sector; all marital status dummy variables are statistically significant for the probability of formal service sector selection of men in years 2007 and 2008 as presented in the Table 5.11 and Table 5.12.

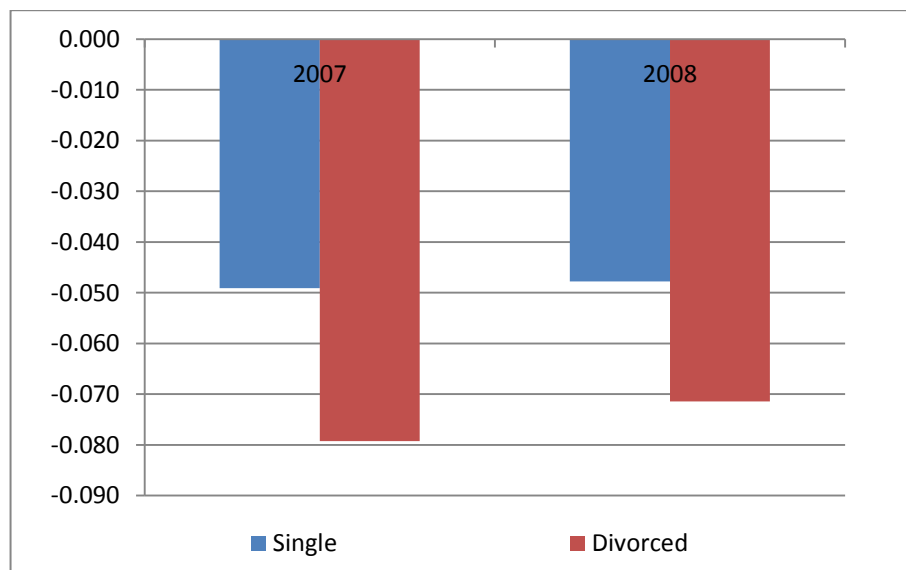


Figure 5.3.5: Relationships between Marginal Effects of Marital Status and Probability of Selecting of Formal Service Sector, Men

Both single and divorced dummy variable have negative effect on the men’s probability of choosing to work in the formal service sector in 2007 and 2008, as can be seen from the Figure 5.3.5. Indeed, single or divorced men are less likely to work in the formal service sector, with respect to married men as in the case that working in the formal manufacturing sector.

For women, the only significant variable is “single” dummy for the selection probability of formal service sector in both years as presented in the Table 5.13 and Table 5.14. Figure 5.3.6 indicates that being single increases women’s probability of selecting the formal service sector with respect to married women. Indeed, the single women’s probability of selecting formal service sector is 0.006 higher than that of married women in 2007, and 0.004 higher in 2008.

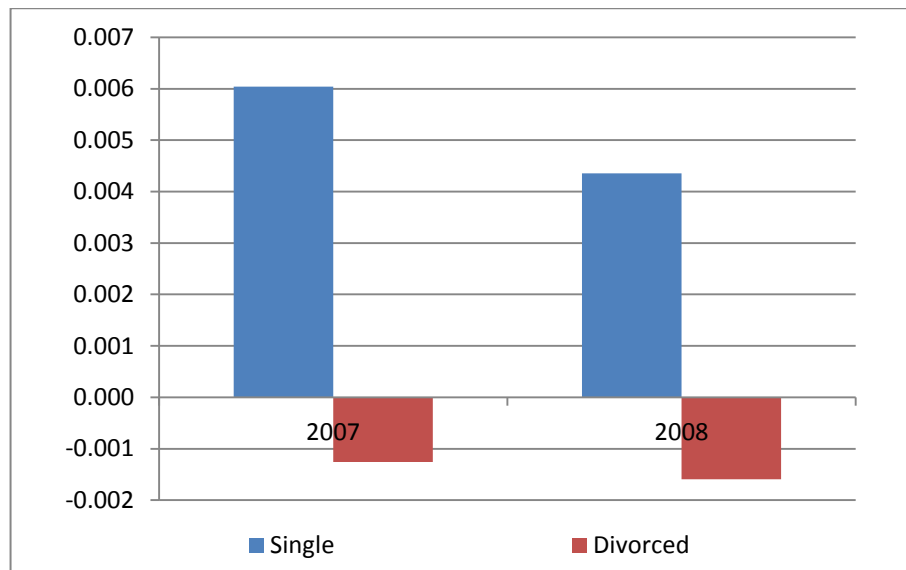


Figure 5.3.6: Relationship between Marginal Effects of Marital Status and Probability of Selecting of Formal Service Sector, Women

According to Table 5.17 and Table 5.18, both single and divorced dummy variables are statistically significant in the female’s informal service sector selection equation. As can be understood from the Figure 5.3.7, being single positively affects the probability of choosing the informal service sector of women. This means that single women are more likely to work in the informal service sector than married women.

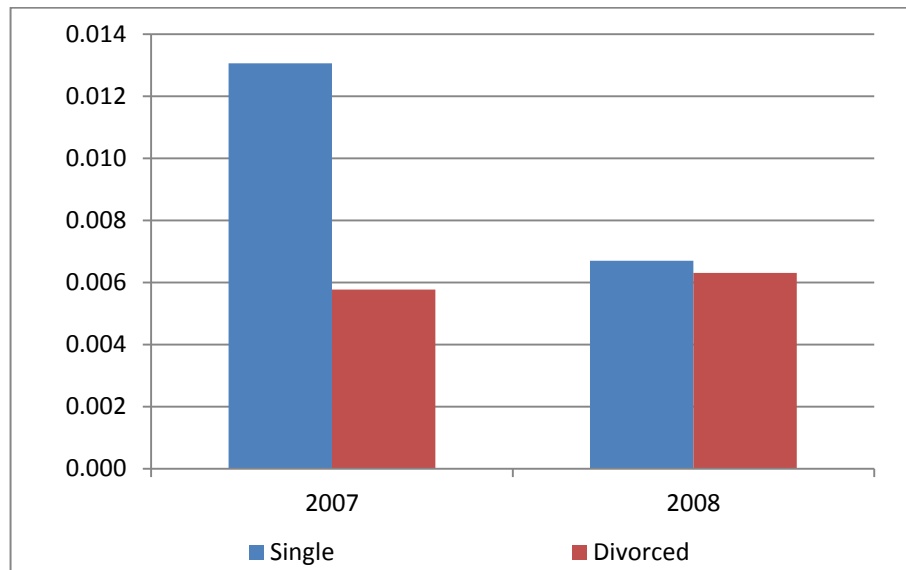


Figure 5.3.7: Relationship between Marginal Effects of Marital Status and Probability of Selecting of Informal Service Sector, Women

Contrary to the estimation results of women, it is seen from the Table 5.15 and Table 5.16 that none of the marital status dummy variables are significant in male's informal service sector selection equations for both 2007 and 2008. In other words, marital status has no effect on the probability of working in the informal service sector for men.

As for the probability of being non-employed, it can be seen from the Figure 5.3.8; it is affected positively by being single or divorced for men. In other words, single or divorced men are likely to become non-employed as compared to married men. Since, married men have more familial responsibilities than single or divorced men, they are more likely to be in the labor force.

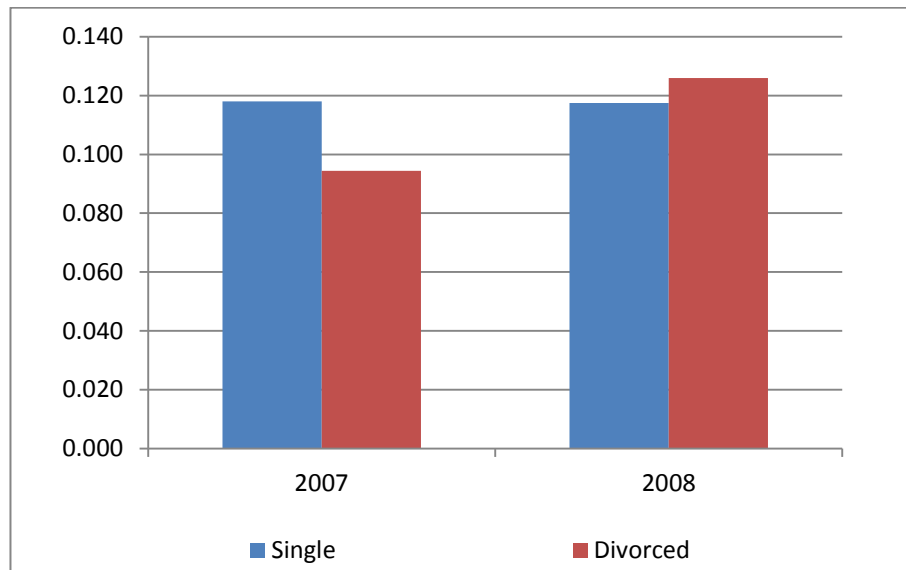


Figure 5.3.8: Relationship between Marginal Effects of Marital Status and Probability of Being Non-employed, Men

Contrary to the men, the probability of being non-employed women is affected negatively by both marital status dummy variables for women. This relationship is presented in the Figure 5.3.9. This indicates that single or divorced women are less likely to be non-employed than married women. This can be due to the fact that women are expected to care their children or do housework. Since married women are more engaged in housework than single or divorced women, they are more likely to be non-employed.

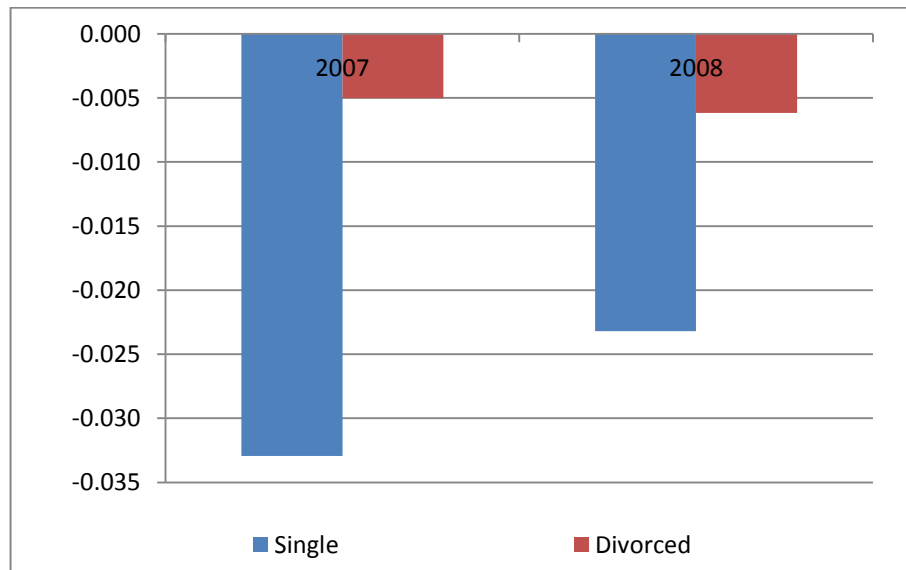


Figure 5.3.9: Relationship between Marginal Effects of Marital Status and Probability of Being Non-employed, Women

Referring the MNLM estimation results of non-employment, it can be asserted that the effect of being single or divorced leads to different way of behavior for men and women.

#### 5.4 Status in Household

In this study, the status in the household is measured by “Child” dummy variable. It takes the value “1” if the person is child, and takes the value “0”, otherwise. Being a child leads to different behaviors for men and women on the sector selection decision. Estimation results indicate that being child has significant and positive effect on the probability of working in the informal service sector for men. That is to say, a male child is more likely to work in the informal service sector than a parent.

The situation is somewhat different for females. Being child significantly affects the probability of working in the formal/informal manufacturing and service sector. This effect is, however, negative. Table 5.1 and Table 5.2 show that being child positively affects being non-employed. In other words, female children are not likely to work in the formal/informal manufacturing and service sector as compared to parent females.



## 5.5 Household Size

There exist two interaction variables which measure the effect of the household size on the probability of selection of relevant sector for parents and children, namely “Parent\*family size” and “Child\*family size”. These variables might have different effects on the sector selection decisions of women and men. In order to be able to make inferences, the marginal effects of these should be taken into account.

As it can be seen from the Table 5.3 and Table 5.4, household size has statistically significant effect on the probability of male parents and children’s choosing to work in the formal manufacturing sector and formal service sector in 2007 and 2008. Table 5.1 and Table 5.2 indicate that increase in the household size has negative effect on the probability of working in the formal manufacturing sector for both male parents and children in 2007 and 2008.

For women, however, only “parent\*family size” variable is statistically significant for the probability of choosing to work in the formal manufacturing sector, while “child\*family size” variable is insignificant in both years. As it can be seen from Table 5.1 and Table 5.2, if family size increases, female parents’ probability of working in the formal manufacturing sector decreases.

As for the informal manufacturing sector selection probability, it is shown in the Table 5.7 and Table 5.8 that both child\*family size and parent\*family size interaction variables are statistically significant for men. These variables have positive effect on the probability of working in the informal manufacturing sector for men. Considering the estimation results, it can be inferred that as family size increases, both male parents and children would probably prefer to work in the informal sector than being non-employed.

Table 5.9 and Table 5.10 show that both family size variables are statistically significant determinants of the sector selection probability of informal manufacturing sector for women in both years. While family size has positive effect on working in

the informal manufacturing sector for female children, it has negative effect for female parents.

Table 5.11 and Table 5.12 indicate that in 2007 and 2008, both “child\*family size” and “parents\*family size” variables are statistically significant for formal service sector for men. As it seen from the Table 5.1, both of them are negative, meaning that as family size increases the probability of working in the formal service sector decreases for male parents and children .

For women, however, both variables are significant for the year 2007, while only “parent\*family size” is significant for the year 2008. As the family size increases, the probability of working in the formal service sector for female parents decreases. Even if it has positive effect for female children, this effect is so small that (% 0.1) it can be ignored.

Family size has also significant effect on the probability of working in the informal service sector for male parents and children in 2007 and 2008. In both years, the marginal effect of family size is positive for both male parents and children. This indicates that, living in the large household encourages male parents and children to work in the informal service sector in 2007 and 2008.

Unlike the estimation results of males, in 2007 only “parent\*family size” variable; in 2008 both “child\*family size” and “parent\*family size” have significant effect on the probability of working in the informal service sector for females. As it can be seen from Table 5.1 and Table 5.2, family size negatively affects the probability of choosing informal service sector for female parents and children in both 2007 and 2008.

Considering the effect of household size on the probability of being non-employed is indispensable to be able to make inferences. In 2007 and 2008, the marginal effects of it are negative for being non-employed for men. In other words, living in the large family increases the probability of being in the labor force for men. This is most

probably due to the fact that men are expected to provide at least minimum level of living condition to the other family members. Thus, men are forced to work, as household size increases. Since women are generally responsible for housework, they tend to stay out of the labor market.

### **5.6 Any Registered Family Member in Household**

In order to measure the effect of existence of any registered person in house on the probability of selecting the relevant sector, “any registered” dummy variable is inserted into the multinomial logit model as an explanatory variable. According to estimation results, this dummy variable is statistically significant for all six sectors for both women and men in years 2007 and 2008.

Marginal effects of “Any Registered” variable for each sector are presented in the Table 5.1 and Table 5.2 for both women and men. As can be seen from these tables, it has negative sign for all formal and informal sectors without gender differences. This implies that existence of a household member who works as a formal employee and provide social security insurance in the household decreases the probability of working in the formal or informal sector. At this point, it is beneficial to look at the marginal effect of any registered dummy variable on the probability of being non-employed. As seen from the Table 5.1 and 5.2, marginal effect of any registered variable is positive for the non-employment in years 2007 and 2008 for both males and females. Indeed, while existence of registered person in the household has negative effect on the probability of choosing formal and informal sectors, it increases the probability of non-employment.

Once a family member provides none wage benefit such as social security insurance, other members are most probably think that working as a formal employee is not crucial for them. Contrary to a priori expectations, it also decreases the probability of working informal sector. Taking the all marginal effects into account, it can be inferred that existence of registered person in the household discourages other family members from entering the labor market so that they would prefer not to work.

### **5.7 Unemployed Household Head**

The fact that household head is unemployed or not is expected to have effect on the probability of sector selection for other family members. This effect is measured by the “Unemployed Household Head” dummy variable. According to the estimation results of multinomial logit model, this dummy variable is statistically significant in estimation results of multinomial logit model of formal and informal sector for both genders in 2007 and 2008.

As seen from the Table 5.1 and Table 5.2, the marginal effect of this dummy variable is negative for both formal and informal sector employment without gender differences in years 2007 and 2008. However, it has positive effect on the probability of being non-employed.

Table 5.1: Determinants of Labor Market Participation Decision, 2007  
(Multinomial Logit Model Estimation Results)

	Non-emp	Informal Worker		Formal Worker		Employer	Self-Emp	Mean Value
		Manuf	Service	Manuf	Services			
<b>MALE</b>								
Child	-0.002	0.008	0.043	0.007	-0.002	-0.011	-0.042	0.310
<i>Age Groups</i>								
20-24	-0.334	-0.032	-0.040	0.048	0.103	0.209	0.046	0.096
25-29	-0.427	-0.043	-0.059	0.031	0.124	0.287	0.087	0.117
30-34	-0.428	-0.049	-0.070	0.011	0.117	0.358	0.061	0.111
35-39	-0.415	-0.053	-0.074	-0.009	0.112	0.374	0.064	0.101
40-44	-0.402	-0.055	-0.078	-0.018	0.130	0.352	0.071	0.100
45-49	-0.364	-0.051	-0.068	-0.053	0.071	0.368	0.098	0.087
50-54	-0.294	-0.051	-0.063	-0.081	-0.016	0.353	0.152	0.080
55-59	-0.209	-0.050	-0.061	-0.100	-0.103	0.382	0.141	0.059
60-64	-0.116	-0.051	-0.066	-0.108	-0.144	0.335	0.149	0.039
65+	0.090	-0.060	-0.076	-0.132	-0.185	0.259	0.104	0.081
<i>Education Level</i>								
Secondary	-0.116	-0.024	-0.006	0.007	0.124	0.018	-0.003	0.193
High School	-0.102	-0.050	-0.033	-0.036	0.218	0.021	-0.018	0.137
Vocational	-0.204	-0.043	-0.030	0.058	0.228	0.013	-0.023	0.112
University	-0.305	-0.059	-0.052	-0.025	0.467	0.031	-0.057	0.121
<i>Marital Status</i>								
Single	0.118	0.006	0.013	-0.045	-0.052	-0.022	-0.018	0.281
Divorced	0.094	0.012	0.033	-0.059	-0.082	-0.014	0.017	0.023
<i>Other Variables</i>								
Parent*family size	-0.045	0.029	0.027	-0.036	-0.030	0.004	0.050	0.873
Child*family size	-0.047	0.030	0.018	-0.030	-0.038	0.002	0.065	0.476
Any Registered	0.684	-0.089	-0.123	-0.097	-0.156	-0.054	-0.165	0.550
Unemployed HH	0.109	-0.014	-0.019	-0.024	-0.037	-0.007	-0.008	0.166
<b>FEMALE</b>								
Child	0.021	-0.004	-0.003	-0.003	-0.008	0.000	-0.002	0.262
<i>Age Groups</i>								
20-24	-0.963	-0.004	-0.010	-0.007	-0.009	0.996	-0.003	0.112
25-29	-0.967	-0.004	-0.010	-0.006	-0.008	0.998	-0.002	0.122
30-34	-0.968	-0.004	-0.010	-0.006	-0.008	0.999	-0.002	0.110
35-39	-0.968	-0.004	-0.010	-0.007	-0.008	1.000	-0.002	0.099
40-44	-0.967	-0.004	-0.010	-0.007	-0.008	1.000	-0.003	0.099
45-49	-0.965	-0.005	-0.010	-0.008	-0.009	1.000	-0.003	0.083
50-54	-0.962	-0.005	-0.011	-0.008	-0.010	0.999	-0.003	0.074
55+	-0.943	-0.007	-0.014	-0.011	-0.014	0.992	-0.003	0.187
<i>Education Level</i>								
Secondary	-0.040	0.000	0.004	0.008	0.026	0.001	0.002	0.130
High School	-0.094	-0.003	0.005	0.006	0.084	0.001	0.001	0.108
Vocational	-0.157	-0.002	0.008	0.016	0.131	0.001	0.003	0.065
University	-0.424	-0.004	0.001	0.015	0.404	0.003	0.005	0.075
<i>Marital Status</i>								
Single	-0.033	0.006	0.013	0.007	0.006	0.000	0.002	0.223
Divorced	-0.005	0.001	0.005	0.000	-0.001	0.000	0.001	0.115
<i>Other Variables</i>								
Parent*family siz	0.020	-0.001	-0.004	-0.007	-0.007	0.000	-0.001	0.901
Child*family size	-0.002	0.003	-0.001	-0.001	0.001	0.000	0.000	0.413
Any Registered	0.647	-0.089	-0.222	-0.090	-0.161	-0.003	-0.082	0.933
Unemployed HH	0.016	-0.002	-0.004	-0.003	-0.006	0.000	-0.002	0.343

Table 5.2: Determinants of Labor Market Participation Decision, 2008  
(Multinomial Logit Model Estimation Results)

	Non-emp	Informal Worker		Formal Worker		Employe	Self-Emp	Mean Value
		Manuf	Services	Manuf	Services			
<b>MALE</b>								
Child	-0.009	0.004	0.025	0.011	0.001	-0.008	-0.024	0.307
<i>Age Groups</i>								
20-24	-0.332	-0.026	-0.036	0.049	0.108	0.169	0.067	0.095
25-29	-0.432	-0.038	-0.056	0.028	0.103	0.290	0.104	0.118
30-34	-0.436	-0.041	-0.062	0.005	0.100	0.338	0.096	0.109
35-39	-0.424	-0.045	-0.066	-0.015	0.102	0.354	0.093	0.103
40-44	-0.425	-0.047	-0.067	-0.023	0.097	0.361	0.106	0.099
45-49	-0.377	-0.043	-0.062	-0.059	0.063	0.333	0.144	0.091
50-54	-0.314	-0.043	-0.056	-0.088	-0.033	0.356	0.177	0.077
55-59	-0.223	-0.043	-0.054	-0.111	-0.109	0.370	0.170	0.060
60-64	-0.171	-0.044	-0.057	-0.118	-0.147	0.366	0.172	0.041
65+	0.064	-0.051	-0.068	-0.139	-0.201	0.274	0.121	0.081
<i>Education Level</i>								
Secondary	-0.116	-0.017	-0.003	0.007	0.115	0.020	-0.006	0.198
High School	-0.096	-0.042	-0.028	-0.036	0.201	0.024	-0.024	0.134
Vocational	-0.220	-0.035	-0.030	0.071	0.226	0.016	-0.027	0.110
University	-0.302	-0.050	-0.050	-0.024	0.450	0.033	-0.057	0.128
<i>Marital Status</i>								
Single	0.117	0.005	0.015	-0.051	-0.050	-0.023	-0.013	0.280
Divorced	0.126	0.016	0.003	-0.064	-0.075	-0.021	0.014	0.024
<i>Other Variables</i>								
Parent*family size	-0.024	0.030	0.023	-0.036	-0.029	0.001	0.034	0.870
Child*family size	-0.045	0.029	0.021	-0.028	-0.036	0.008	0.050	0.471
Any Registered	0.672	-0.081	-0.115	-0.107	-0.159	-0.059	-0.150	0.561
Unemployed HH	0.127	-0.008	-0.014	-0.030	-0.043	-0.018	-0.015	0.168
<b>FEMALE</b>								
Child	0.020	-0.004	-0.001	-0.006	-0.008	0.000	-0.002	0.261
<i>Age Groups</i>								
20-24	-0.071	0.001	0.005	0.024	0.022	0.003	0.015	0.110
25-29	-0.128	0.000	0.002	0.040	0.042	0.012	0.032	0.119
30-34	-0.177	0.000	0.004	0.053	0.056	0.025	0.040	0.110
35-39	-0.207	0.001	0.005	0.048	0.071	0.037	0.045	0.102
40-44	-0.170	-0.001	0.003	0.039	0.055	0.034	0.039	0.095
45-49	-0.095	-0.002	-0.001	0.016	0.026	0.024	0.031	0.085
50-54	-0.025	-0.003	-0.003	0.000	0.001	0.014	0.016	0.073
55+	0.036	-0.006	-0.012	-0.012	-0.014	0.003	0.004	0.189
<i>Education Level</i>								
Secondary	-0.033	-0.001	0.003	0.007	0.019	0.003	0.002	0.138
High School	-0.100	-0.002	0.004	0.006	0.086	0.004	0.003	0.105
Vocational	-0.158	-0.001	0.006	0.014	0.131	0.003	0.004	0.066
University	-0.416	-0.004	0.002	0.014	0.388	0.011	0.004	0.082
<i>Marital Status</i>								
Single	-0.023	0.004	0.006	0.007	0.004	0.000	0.002	0.222
Divorced	-0.006	0.001	0.006	0.000	-0.002	0.000	0.001	0.115
<i>Other Variables</i>								
Parent*family size	0.027	-0.001	-0.004	-0.009	-0.009	-0.001	-0.002	0.899
Child*family size	0.003	0.002	-0.003	0.000	0.000	-0.001	-0.002	0.411
Any Registered	0.623	-0.071	-0.196	-0.077	-0.169	-0.012	-0.098	0.931
Unemployed HH	0.019	-0.002	-0.005	-0.002	-0.007	-0.001	-0.003	0.347

Table 5.3 Determinants of Selection Probability of Formal-Manufacturing Sector for Men, 2007

wsector=3	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Child	0.066	0.116	0.57	0.568	-0.161	0.293
Age 20-24	1.595	0.064	24.99	0.000	1.470	1.720
Age 25-29	2.158	0.069	31.46	0.000	2.023	2.292
Age 30-34	2.055	0.077	26.84	0.000	1.905	2.205
Age 35-39	1.777	0.079	22.46	0.000	1.622	1.932
Age 40-44	1.556	0.079	19.57	0.000	1.400	1.712
Age 45-49	0.753	0.083	9.05	0.000	0.590	0.917
Age 50-54	-0.330	0.092	-3.57	0.000	-0.511	-0.149
Age 55-59	-1.544	0.124	-12.43	0.000	-1.787	-1.300
Age 60-64	-2.765	0.215	-12.83	0.000	-3.187	-2.343
Age 65+	-4.537	0.363	-12.51	0.000	-5.248	-3.826
Secondary	0.353	0.039	9.00	0.000	0.276	0.429
High School	-0.155	0.044	-3.56	0.000	-0.240	-0.070
Vocational	1.047	0.041	25.58	0.000	0.967	1.127
University	0.749	0.044	17.09	0.000	0.663	0.835
Single	-0.736	0.052	-14.09	0.000	-0.838	-0.634
Divorced	-1.008	0.127	-7.92	0.000	-1.258	-0.759
Parent Size	-0.242	0.040	-6.04	0.000	-0.320	-0.163
Child Size	-0.180	0.062	-2.91	0.004	-0.302	-0.059
Any Reg.	-3.172	0.034	-93.51	0.000	-3.239	-3.106
Unemp HH	-0.476	0.048	-9.93	0.000	-0.570	-0.382
Constant	0.181	0.090	2.00	0.045	0.004	0.358

Table 5.4 Determinants of Selection Probability of Formal-Manufacturing Sector for Men, 2008

wsector=3	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Child	0.118	0.112	1.06	0.291	-0.101	0.336
Age 20-24	1.537	0.063	24.43	0.000	1.413	1.660
Age 25-29	2.107	0.067	31.28	0.000	1.975	2.239
Age 30-34	2.019	0.075	26.97	0.000	1.872	2.165
Age 35-39	1.743	0.077	22.54	0.000	1.591	1.894
Age 40-44	1.686	0.078	21.74	0.000	1.534	1.838
Age 45-49	0.776	0.080	9.66	0.000	0.618	0.933
Age 50-54	-0.238	0.089	-2.67	0.008	-0.413	-0.063
Age 55-59	-1.595	0.120	-13.24	0.000	-1.831	-1.359
Age 60-64	-2.699	0.203	-13.26	0.000	-3.097	-2.300
Age 65+	-4.137	0.288	-14.38	0.000	-4.701	-3.574
Secondary	0.345	0.037	9.21	0.000	0.272	0.418
High School	-0.130	0.042	-3.12	0.002	-0.212	-0.049
Vocational	1.146	0.040	28.99	0.000	1.069	1.224
University	0.742	0.042	17.63	0.000	0.660	0.825
Single	-0.757	0.051	-14.96	0.000	-0.856	-0.657
Divorced	-1.057	0.118	-8.99	0.000	-1.288	-0.827
Parent Size	-0.270	0.039	-6.99	0.000	-0.346	-0.194
Child Size	-0.148	0.061	-2.43	0.015	-0.267	-0.028
Any Reg.	-3.122	0.033	-96.04	0.000	-3.186	-3.058
Unemp HH	-0.555	0.047	-11.73	0.000	-0.648	-0.462
Constant	0.221	0.088	2.52	0.012	0.049	0.394

Table 5.5: Determinants of Selection Probability of Formal-Manufacturing Sector for Women, 2007

wsector=3	Coef.	Std.	z	P> z	[95% Conf. Interval]	
Child	-0.466	0.177	-2.64	0.008	-0.813	-0.120
Age 20-24	1.443	0.098	14.71	0.000	1.251	1.636
Age 25-29	2.047	0.105	19.55	0.000	1.842	2.252
Age 30-34	2.170	0.114	18.98	0.000	1.946	2.394
Age 35-39	2.252	0.118	19.15	0.000	2.021	2.482
Age 40-44	1.722	0.128	13.47	0.000	1.472	1.973
Age 45-49	0.884	0.155	5.72	0.000	0.581	1.187
Age 50-54	0.028	0.195	0.14	0.885	-0.354	0.411
Age 55+	-1.914	0.282	-6.78	0.000	-2.467	-1.361
Secondary	0.748	0.076	9.82	0.000	0.598	0.897
High School	0.668	0.073	9.12	0.000	0.524	0.811
Vocational	1.320	0.071	18.67	0.000	1.181	1.458
University	1.706	0.071	24.11	0.000	1.567	1.844
Single	0.694	0.088	7.89	0.000	0.522	0.867
Divorced	-0.044	0.109	-0.40	0.687	-0.258	0.170
Parent Size	-0.928	0.077	-12.09	0.000	-1.078	-0.777
Child Size	-0.063	0.091	-0.70	0.486	-0.242	0.115
Any Reg.	-3.809	0.060	-63.60	0.000	-3.927	-3.692
Unemp. HH	-0.458	0.058	-7.84	0.000	-0.573	-0.344
constant	-1.371	0.161	-8.50	0.000	-1.687	-1.055

Table 5.6: Determinants of Selection Probability of Formal-Manufacturing Sector for Women, 2008

wsector=3	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Child	-0.787	0.169	-4.66	0.000	-1.118	-0.456
Age 20-24	1.549	0.097	15.90	0.000	1.358	1.740
Age 25-29	2.088	0.105	19.85	0.000	1.882	2.295
Age 30-34	2.387	0.111	21.48	0.000	2.169	2.605
Age 35-39	2.319	0.116	20.01	0.000	2.092	2.546
Age 40-44	2.061	0.121	16.97	0.000	1.823	2.299
Age 45-49	1.243	0.139	8.94	0.000	0.971	1.516
Age 50-54	0.003	0.193	0.02	0.987	-0.375	0.382
Age 55+	-2.328	0.312	-7.46	0.000	-2.940	-1.717
Secondary	0.648	0.072	9.03	0.000	0.508	0.789
High School	0.630	0.069	9.17	0.000	0.496	0.765
Vocational	1.214	0.067	17.99	0.000	1.082	1.347
University	1.634	0.065	24.99	0.000	1.506	1.762
Single	0.662	0.081	8.20	0.000	0.503	0.820
Divorced	0.000	0.102	0.00	1.000	-0.199	0.199
Parent Size	-1.110	0.069	-16.04	0.000	-1.246	-0.974
Child Size	-0.035	0.088	-0.40	0.687	-0.207	0.137
Any Reg.	-3.547	0.057	-62.38	0.000	-3.659	-3.436
Unemp. HH	-0.306	0.055	-5.54	0.000	-0.414	-0.198
constant	-1.384	0.148	-9.39	0.000	-1.674	-1.095



Table 5.7: Determinants of Selection Probability of Informal-Manufacturing Sector  
for Men, 2007

wsector=1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Child	0.139	0.150	0.93	0.352	-0.154	0.433
Age 20-24	0.360	0.063	5.73	0.000	0.237	0.483
Age 25-29	0.545	0.073	7.48	0.000	0.402	0.688
Age 30-34	0.218	0.088	2.48	0.013	0.046	0.391
Age 35-39	-0.100	0.092	-1.09	0.274	-0.280	0.079
Age 40-44	-0.357	0.095	-3.77	0.000	-0.542	-0.171
Age 45-49	-0.398	0.095	-4.18	0.000	-0.584	-0.211
Age 50-54	-0.836	0.101	-8.3	0.000	-1.034	-0.639
Age 55-59	-1.272	0.112	-11.4	0.000	-1.490	-1.053
Age 60-64	-1.808	0.142	-12.7	0.000	-2.087	-1.528
Age 65+	-3.198	0.177	-18.1	0.000	-3.544	-2.852
Secondary	-0.227	0.047	-4.86	0.000	-0.318	-0.135
High School	-1.165	0.063	-18.37	0.000	-1.289	-1.041
Vocational	-0.626	0.064	-9.71	0.000	-0.752	-0.499
University	-1.088	0.097	-11.19	0.000	-1.279	-0.898
Single	-0.139	0.069	-2.01	0.045	-0.275	-0.003
Divorced	0.001	0.139	0.01	0.995	-0.272	0.274
Parent Size	0.632	0.052	12.03	0.000	0.529	0.735
Child Size	0.648	0.072	8.95	0.000	0.506	0.790
Any Reg.	-3.827	0.044	-86.01	0.000	-3.914	-3.740
Unemp HH	-0.518	0.054	-9.55	0.000	-0.625	-0.412
Constant	0.070	0.107	0.65	0.516	-0.141	0.280

Table 5.8: Determinants of Selection Probability of Informal-Manufacturing Sector  
for Men, 2008

wsector=1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Child	0.107	0.149	0.72	0.474	-0.185	0.399
Age 20-24	0.393	0.066	5.92	0.000	0.263	0.523
Age 25-29	0.510	0.076	6.72	0.000	0.361	0.659
Age 30-34	0.352	0.088	4.01	0.000	0.180	0.524
Age 35-39	-0.030	0.093	-0.33	0.743	-0.212	0.151
Age 40-44	-0.210	0.096	-2.18	0.029	-0.399	-0.021
Age 45-49	-0.213	0.095	-2.24	0.025	-0.399	-0.027
Age 50-54	-0.638	0.102	-6.26	0.000	-0.837	-0.438
Age 55-59	-1.122	0.114	-9.88	0.000	-1.345	-0.900
Age 60-64	-1.662	0.145	-11.46	0.000	-1.946	-1.378
Age 65+	-3.002	0.181	-16.57	0.000	-3.357	-2.647
Secondary	-0.112	0.046	-2.41	0.016	-0.203	-0.021
High School	-1.121	0.066	-16.91	0.000	-1.250	-0.991
Vocational	-0.472	0.068	-6.98	0.000	-0.604	-0.339
University	-0.995	0.097	-10.31	0.000	-1.185	-0.806
Single	-0.140	0.071	-1.96	0.050	-0.279	0.000
Divorced	0.044	0.136	0.32	0.745	-0.223	0.311
Parent Size	0.687	0.054	12.71	0.000	0.581	0.793
Child Size	0.709	0.070	10.13	0.000	0.572	0.847
Any Reg.	-3.791	0.045	-84.09	0.000	-3.880	-3.703
Unemp HH	-0.429	0.056	-7.61	0.000	-0.540	-0.319
Constant	-0.285	0.109	-2.61	0.009	-0.498	-0.071

Table 5.9: Determinants of Selection Probability of Informal-Manufacturing Sector  
for Women, 2007

wsector=1	Coef.	Std.	z	P> z	[95% Conf. Interval]	
Child	-1.267	0.259	-4.89	0.000	-1.774	-0.759
Age 20-24	0.390	0.103	3.77	0.000	0.187	0.593
Age 25-29	0.378	0.122	3.11	0.002	0.140	0.617
Age 30-34	0.427	0.140	3.05	0.002	0.153	0.702
Age 35-39	0.462	0.143	3.22	0.001	0.181	0.742
Age 40-44	0.080	0.157	0.51	0.610	-0.227	0.387
Age 45-49	-0.583	0.186	-3.13	0.002	-0.947	-0.218
Age 50-54	-1.553	0.243	-6.39	0.000	-2.029	-1.077
Age 55+	-2.571	0.253	-10.16	0.000	-3.067	-2.075
Secondary	-0.077	0.097	-0.79	0.429	-0.267	0.114
High School	-0.751	0.123	-6.08	0.000	-0.992	-0.509
Vocational	-0.483	0.141	-3.43	0.001	-0.759	-0.207
University	-0.854	0.216	-3.96	0.000	-1.277	-0.431
Single	1.027	0.113	9.07	0.000	0.805	1.249
Divorced	0.155	0.139	1.12	0.265	-0.117	0.427
Parent Size	-0.302	0.109	-2.76	0.006	-0.516	-0.087
Child Size	0.633	0.116	5.44	0.000	0.405	0.861
Any Reg.	-4.434	0.075	-59.05	0.000	-4.581	-4.286
Unemp. HH	-0.392	0.074	-5.27	0.000	-0.537	-0.246
constant	-0.384	0.202	-1.9	0.057	-0.780	0.011

Table 5.10: Determinants of Selection Probability of Informal-Manufacturing Sector  
for Women, 2008

wsector=1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Child	-1.131	0.260	-4.35	0.000	-1.640	-0.621
Age 20-24	0.322	0.113	2.86	0.004	0.101	0.544
Age 25-29	0.170	0.133	1.28	0.201	-0.091	0.431
Age 30-34	0.159	0.154	1.03	0.302	-0.143	0.461
Age 35-39	0.439	0.149	2.93	0.003	0.146	0.732
Age 40-44	-0.055	0.167	-0.33	0.742	-0.383	0.273
Age 45-49	-0.471	0.189	-2.49	0.013	-0.841	-0.100
Age 50-54	-0.966	0.218	-4.43	0.000	-1.394	-0.539
Age 55+	-2.441	0.265	-9.21	0.000	-2.961	-1.922
Secondary	-0.189	0.108	-1.75	0.080	-0.400	0.023
High School	-0.611	0.131	-4.65	0.000	-0.868	-0.353
Vocational	-0.196	0.138	-1.42	0.154	-0.466	0.074
University	-1.077	0.246	-4.38	0.000	-1.560	-0.595
Single	0.828	0.118	7.04	0.000	0.597	1.058
Divorced	0.267	0.140	1.90	0.057	-0.008	0.541
Parent Size	-0.354	0.106	-3.35	0.001	-0.562	-0.147
Child Size	0.576	0.113	5.08	0.000	0.354	0.798
Any Reg.	-4.237	0.077	-55.35	0.000	-4.387	-4.087
Unemp. HH	-0.449	0.077	-5.82	0.000	-0.600	-0.298
constant	-0.570	0.200	-2.84	0.004	-0.963	-0.177

Table 5.11: Determinants of Selection Probability of Formal-Service Sector for Men,  
2007

wsector=4	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Child	-0.010	0.108	-0.10	0.923	-0.223	0.202
Age 20-24	1.699	0.066	25.79	0.000	1.570	1.829
Age 25-29	2.489	0.070	35.81	0.000	2.353	2.625
Age 30-34	2.540	0.077	33.04	0.000	2.389	2.690
Age 35-39	2.445	0.079	30.94	0.000	2.290	2.600
Age 40-44	2.398	0.079	30.29	0.000	2.243	2.553
Age 45-49	1.844	0.080	23.05	0.000	1.687	2.001
Age 50-54	0.923	0.083	11.14	0.000	0.761	1.086
Age 55-59	-0.274	0.096	-2.86	0.004	-0.462	-0.086
Age 60-64	-1.380	0.133	-10.39	0.000	-1.640	-1.119
Age 65+	-3.087	0.205	-15.04	0.000	-3.489	-2.685
Secondary	0.890	0.037	24.02	0.000	0.818	0.963
High School	1.163	0.037	31.71	0.000	1.091	1.235
Vocational	1.501	0.040	37.79	0.000	1.423	1.579
University	2.548	0.036	71.40	0.000	2.478	2.618
Single	-0.582	0.049	-11.77	0.000	-0.679	-0.485
Divorced	-0.843	0.101	-8.34	0.000	-1.041	-0.645
Parent Size	-0.074	0.036	-2.05	0.040	-0.145	-0.003
Child Size	-0.116	0.059	-1.96	0.050	-0.232	0.000
Any Reg.	-3.156	0.030	-103.76	0.000	-3.215	-3.096
Unemp HH	-0.464	0.045	-10.36	0.000	-0.552	-0.376
Constant	-0.785	0.089	-8.85	0.000	-0.959	-0.611

Table 5.12: Determinants of Selection Probability of Formal-Service Sector for Men,  
2008

wsector=4	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Child	0.029	0.103	0.28	0.779	-0.172	0.230
Age 20-24	1.664	0.063	26.56	0.000	1.541	1.787
Age 25-29	2.379	0.066	36.06	0.000	2.250	2.509
Age 30-34	2.475	0.073	33.76	0.000	2.331	2.619
Age 35-39	2.407	0.075	32.10	0.000	2.260	2.554
Age 40-44	2.425	0.075	32.27	0.000	2.278	2.572
Age 45-49	1.850	0.076	24.41	0.000	1.701	1.998
Age 50-54	0.906	0.079	11.42	0.000	0.751	1.061
Age 55-59	-0.259	0.091	-2.84	0.005	-0.439	-0.080
Age 60-64	-1.163	0.119	-9.78	0.000	-1.397	-0.930
Age 65+	-3.420	0.225	-15.20	0.000	-3.861	-2.979
Secondary	0.830	0.036	23.36	0.000	0.760	0.899
High School	1.066	0.036	29.97	0.000	0.996	1.136
Vocational	1.524	0.038	39.77	0.000	1.449	1.599
University	2.450	0.034	71.09	0.000	2.382	2.517
Single	-0.556	0.047	-11.81	0.000	-0.648	-0.464
Divorced	-0.793	0.094	-8.39	0.000	-0.978	-0.608
Parent Size	-0.111	0.035	-3.21	0.001	-0.179	-0.043
Child Size	-0.103	0.057	-1.79	0.074	-0.215	0.010
Any Reg.	-3.075	0.030	-103.87	0.000	-3.133	-3.017
Unemp HH	-0.524	0.043	-12.16	0.000	-0.608	-0.439
Constant	-0.696	0.085	-8.22	0.000	-0.862	-0.530

Table 5.13: Determinants of Selection Probability of Formal-Service Sector for Women, 2007

wsector=4	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Child	-0.879	0.138	-6.35	0.000	-1.150	-0.607
Age 20-24	1.288	0.085	15.23	0.000	1.122	1.454
Age 25-29	1.996	0.090	22.29	0.000	1.820	2.171
Age 30-34	2.293	0.095	24.04	0.000	2.106	2.480
Age 35-39	2.474	0.095	25.95	0.000	2.287	2.661
Age 40-44	2.259	0.099	22.86	0.000	2.065	2.452
Age 45-49	1.382	0.110	12.57	0.000	1.166	1.597
Age 50-54	0.220	0.134	1.64	0.101	-0.043	0.483
Age 55+	-1.445	0.171	-8.44	0.000	-1.780	-1.110
Secondary	1.424	0.069	20.63	0.000	1.289	1.560
High School	2.539	0.055	46.37	0.000	2.432	2.647
Vocational	2.954	0.057	52.02	0.000	2.842	3.065
University	4.586	0.053	86.23	0.000	4.482	4.690
Single	0.532	0.065	8.13	0.000	0.403	0.660
Divorced	-0.120	0.079	-1.52	0.129	-0.276	0.035
Parent Size	-0.676	0.055	-12.32	0.000	-0.783	-0.568
Child Size	0.125	0.075	1.67	0.096	-0.022	0.272
Any Reg.	-4.144	0.053	-78.91	0.000	-4.247	-4.041
Unemp. HH	-0.613	0.045	-13.68	0.000	-0.701	-0.525
constant	-1.722	0.124	-13.87	0.000	-1.965	-1.479

Table 5.14: Determinants of Selection Probability of Formal-Service Sector for Women, 2008

wsector=4	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Child	-0.711	0.131	-5.44	0.000	-0.968	-0.455
Age 20-24	1.159	0.078	14.79	0.000	1.005	1.313
Age 25-29	1.773	0.085	20.98	0.000	1.607	1.939
Age 30-34	2.073	0.089	23.39	0.000	1.900	2.247
Age 35-39	2.334	0.090	26.01	0.000	2.158	2.510
Age 40-44	2.031	0.093	21.73	0.000	1.848	2.214
Age 45-49	1.298	0.102	12.69	0.000	1.098	1.499
Age 50-54	0.131	0.121	1.08	0.281	-0.107	0.369
Age 55+	-1.702	0.151	-11.30	0.000	-1.997	-1.406
Secondary	1.049	0.070	15.07	0.000	0.912	1.185
High School	2.383	0.051	46.71	0.000	2.283	2.483
Vocational	2.775	0.052	53.21	0.000	2.673	2.878
University	4.363	0.049	88.98	0.000	4.266	4.459
Single	0.339	0.062	5.50	0.000	0.218	0.460
Divorced	-0.126	0.077	-1.64	0.102	-0.278	0.025
Parent Size	-0.767	0.051	-14.96	0.000	-0.868	-0.667
Child Size	0.006	0.072	0.08	0.936	-0.135	0.146
Any Reg.	-3.940	0.049	-79.66	0.000	-4.037	-3.843
Unemp. HH	-0.605	0.042	-14.39	0.000	-0.688	-0.523
constant	-1.369	0.117	-11.75	0.000	-1.598	-1.141

Table 5.15: Determinants of Selection Probability of Informal-Service Sector for Men, 2007

wsector=2	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Child	0.498	0.129	3.85	0.000	0.244	0.751
Age 20-24	0.506	0.055	9.12	0.000	0.397	0.614
Age 25-29	0.637	0.065	9.76	0.000	0.509	0.765
Age 30-34	0.288	0.081	3.55	0.000	0.129	0.447
Age 35-39	-0.024	0.087	-0.27	0.785	-0.195	0.147
Age 40-44	-0.297	0.090	-3.31	0.001	-0.474	-0.121
Age 45-49	-0.153	0.089	-1.72	0.086	-0.327	0.021
Age 50-54	-0.359	0.090	-3.98	0.000	-0.535	-0.182
Age 55-59	-0.714	0.097	-7.34	0.000	-0.904	-0.523
Age 60-64	-1.334	0.124	-10.72	0.000	-1.578	-1.091
Age 65+	-2.344	0.135	-17.31	0.000	-2.610	-2.079
Secondary	0.215	0.044	4.89	0.000	0.129	0.301
High School	-0.243	0.050	-4.87	0.000	-0.340	-0.145
Vocational	0.113	0.054	2.1	0.036	0.007	0.219
University	0.061	0.063	0.96	0.337	-0.063	0.185
Single	-0.095	0.065	-1.46	0.143	-0.222	0.032
Divorced	0.156	0.117	1.34	0.182	-0.073	0.386
Parent Size	0.441	0.050	8.8	0.000	0.342	0.539
Child Size	0.329	0.061	5.36	0.000	0.209	0.449
Any Reg.	-3.767	0.040	-93.58	0.000	-3.846	-3.688
Unemp HH	-0.497	0.047	-10.62	0.000	-0.588	-0.405
Constant	-0.068	0.099	-0.69	0.492	-0.261	0.126

Table 5.16: Determinants of Selection Probability of Informal-Service Sector for Men, 2008

wsector=2	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Child	0.340	0.134	2.53	0.012	0.076	0.603
Age 20-24	0.499	0.058	8.63	0.000	0.386	0.612
Age 25-29	0.570	0.067	8.55	0.000	0.439	0.701
Age 30-34	0.389	0.081	4.78	0.000	0.230	0.549
Age 35-39	0.122	0.087	1.40	0.162	-0.049	0.292
Age 40-44	0.075	0.090	0.83	0.405	-0.101	0.250
Age 45-49	-0.073	0.089	-0.83	0.409	-0.248	0.101
Age 50-54	-0.192	0.092	-2.09	0.037	-0.371	-0.012
Age 55-59	-0.598	0.099	-6.04	0.000	-0.792	-0.404
Age 60-64	-0.993	0.118	-8.43	0.000	-1.224	-0.762
Age 65+	-2.234	0.140	-15.91	0.000	-2.509	-1.959
Secondary	0.232	0.044	5.23	0.000	0.145	0.319
High School	-0.218	0.051	-4.32	0.000	-0.317	-0.119
Vocational	0.108	0.056	1.93	0.053	-0.001	0.218
University	-0.025	0.065	-0.39	0.700	-0.152	0.102
Single	-0.055	0.067	-0.81	0.416	-0.186	0.077
Divorced	-0.209	0.130	-1.61	0.107	-0.463	0.045
Parent Size	0.376	0.051	7.39	0.000	0.276	0.476
Child Size	0.388	0.064	6.06	0.000	0.263	0.514
Any Reg.	-3.707	0.040	-92.26	0.000	-3.786	-3.628
Unemp HH	-0.470	0.048	-9.73	0.000	-0.565	-0.375
Constant	-0.185	0.100	-1.84	0.065	-0.381	0.012

Table 5.17: Determinants of Selection Probability of Informal-Service Sector for Women, 2007

wsector=2	Coef.	Std.	z	P> z	[95% Conf. Interval]	
Child	-0.312	0.171	-1.82	0.068	-0.647	0.023
Age 20-24	0.510	0.087	5.85	0.000	0.339	0.681
Age 25-29	0.595	0.102	5.84	0.000	0.395	0.794
Age 30-34	0.738	0.107	6.9	0.000	0.529	0.948
Age 35-39	0.759	0.114	6.68	0.000	0.536	0.982
Age 40-44	0.573	0.118	4.87	0.000	0.342	0.804
Age 45-49	0.209	0.128	1.64	0.102	-0.041	0.460
Age 50-54	-0.223	0.140	-1.6	0.111	-0.498	0.051
Age 55+	-1.558	0.159	-9.78	0.000	-1.871	-1.246
Secondary	0.360	0.073	4.93	0.000	0.217	0.503
High School	0.487	0.068	7.18	0.000	0.354	0.620
Vocational	0.782	0.077	10.22	0.000	0.632	0.932
University	0.671	0.093	7.25	0.000	0.490	0.852
Single	0.940	0.088	10.7	0.000	0.767	1.112
Divorced	0.411	0.090	4.57	0.000	0.235	0.587
Parent Size	-0.357	0.071	-5.02	0.000	-0.496	-0.217
Child Size	-0.133	0.087	-1.53	0.126	-0.303	0.037
Any Reg.	-4.461	0.056	-79.08	0.000	-4.572	-4.351
Unemp. HH	-0.426	0.056	-7.66	0.000	-0.536	-0.317
constant	-0.252	0.145	-1.74	0.082	-0.536	0.032

Table 5.18: Determinants of Selection Probability of Informal-Service Sector for Women, 2008

wsector=2	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Child	-0.089	0.176	-0.50	0.614	-0.434	0.256
Age 20-24	0.525	0.089	5.89	0.000	0.350	0.700
Age 25-29	0.332	0.107	3.11	0.002	0.123	0.542
Age 30-34	0.598	0.111	5.41	0.000	0.382	0.815
Age 35-39	0.711	0.115	6.21	0.000	0.486	0.935
Age 40-44	0.505	0.119	4.24	0.000	0.271	0.738
Age 45-49	0.043	0.130	0.33	0.740	-0.212	0.299
Age 50-54	-0.339	0.144	-2.36	0.018	-0.620	-0.057
Age 55+	-2.073	0.170	-12.21	0.000	-2.406	-1.741
Secondary	0.354	0.074	4.77	0.000	0.208	0.499
High School	0.455	0.070	6.51	0.000	0.318	0.592
Vocational	0.662	0.079	8.44	0.000	0.508	0.816
University	0.755	0.090	8.40	0.000	0.579	0.932
Single	0.582	0.088	6.63	0.000	0.410	0.755
Divorced	0.503	0.087	5.76	0.000	0.332	0.674
Parent Size	-0.484	0.069	-7.04	0.000	-0.618	-0.349
Child Size	-0.277	0.094	-2.94	0.003	-0.461	-0.092
Any Reg.	-4.368	0.056	-78.43	0.000	-4.477	-4.259
Unemp. HH	-0.541	0.057	-9.57	0.000	-0.652	-0.430
constant	-0.031	0.144	-0.22	0.827	-0.313	0.251

Table 5.19: Determinants of Selection Probability of Being Employer for Men, 2007

wsector=5	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Child	-0.258	0.212	-1.21	0.224	-0.673	0.158
Age 20-24	3.113	0.346	9.00	0.000	2.436	3.791
Age 25-29	4.193	0.343	12.21	0.000	3.520	4.867
Age 30-34	4.486	0.346	12.95	0.000	3.808	5.165
Age 35-39	4.429	0.347	12.76	0.000	3.749	5.109
Age 40-44	4.245	0.347	12.23	0.000	3.565	4.926
Age 45-49	3.942	0.348	11.33	0.000	3.260	4.624
Age 50-54	3.425	0.349	9.83	0.000	2.742	4.108
Age 55-59	3.056	0.351	8.72	0.000	2.369	3.743
Age 60-64	2.553	0.357	7.15	0.000	1.853	3.253
Age 65+	1.941	0.357	5.44	0.000	1.242	2.640
Secondary	0.648	0.050	13.05	0.000	0.551	0.746
High School	0.669	0.051	13.17	0.000	0.570	0.769
Vocational	0.848	0.056	15.26	0.000	0.739	0.957
University	1.621	0.048	33.84	0.000	1.527	1.715
Single	-0.812	0.089	-9.15	0.000	-0.986	-0.638
Divorced	-0.574	0.137	-4.19	0.000	-0.843	-0.306
Parent Size	0.197	0.047	4.18	0.000	0.105	0.289
Child Size	0.141	0.118	1.19	0.233	-0.091	0.372
Any Reg.	-3.455	0.041	-83.57	0.000	-3.536	-3.374
Unemp HH	-0.386	0.081	-4.75	0.000	-0.545	-0.227
Constant	-3.966	0.352	-11.28	0.000	-4.656	-3.277

Table 5.20: Determinants of Selection Probability of Being Employer for Men, 2008

wsector=5	Coef.	Std.	z	P> z	[95% Conf. Interval]	
Child	-0.144	0.195	-0.74	0.460	-0.527	0.239
Age 20-24	2.770	0.274	10.12	0.000	2.234	3.307
Age 25-29	4.078	0.271	15.03	0.000	3.546	4.610
Age 30-34	4.322	0.276	15.65	0.000	3.780	4.863
Age 35-39	4.276	0.277	15.43	0.000	3.733	4.820
Age 40-44	4.328	0.277	15.60	0.000	3.784	4.872
Age 45-49	3.787	0.278	13.62	0.000	3.242	4.332
Age 50-54	3.409	0.279	12.21	0.000	2.862	3.956
Age 55-59	2.967	0.281	10.55	0.000	2.416	3.518
Age 60-64	2.710	0.287	9.45	0.000	2.148	3.272
Age 65+	1.946	0.288	6.76	0.000	1.381	2.510
Secondary	0.640	0.048	13.30	0.000	0.546	0.734
High School	0.652	0.050	13.05	0.000	0.554	0.750
Vocational	0.916	0.054	16.87	0.000	0.809	1.022
University	1.552	0.047	32.98	0.000	1.460	1.644
Single	-0.756	0.080	-9.49	0.000	-0.912	-0.600
Divorced	-0.775	0.132	-5.88	0.000	-1.034	-0.517
Parent Size	0.082	0.045	1.84	0.066	-0.006	0.170
Child Size	0.257	0.108	2.39	0.017	0.047	0.468
Any Reg.	-3.335	0.039	-84.51	0.000	-3.412	-3.258
Unemp HH	-0.662	0.083	-8.00	0.000	-0.824	-0.500
Constant	-3.776	0.283	-13.35	0.000	-4.330	-3.222

Table 5.21: Determinants of Selection Probability of Being Employer for Women,  
2007

wsector=5	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
<b>Child</b>	-0.552	0.517	-1.07	0.286	-1.566	0.462
<b>Age 20-24</b>	16.242	3.685	4.41	0.000	9.019	23.465
<b>Age 25-29</b>	17.609	3.686	4.78	0.000	10.383	24.834
<b>Age 30-34</b>	18.532	3.690	5.02	0.000	11.300	25.763
<b>Age 35-39</b>	18.910	3.685	5.13	0.000	11.688	26.132
<b>Age 40-44</b>	18.477	3.688	5.01	0.000	11.249	25.705
<b>Age 45-49</b>	18.306	3.690	4.96	0.000	11.073	25.539
<b>Age 50-54</b>	17.616	3.695	4.77	0.000	10.375	24.857
<b>Age 55+</b>	16.797	3.698	4.54	0.000	9.548	24.045
<b>Secondary</b>	1.958	0.200	9.81	0.000	1.566	2.349
<b>High School</b>	2.344	0.188	12.49	0.000	1.977	2.712
<b>Vocational</b>	2.311	0.214	10.82	0.000	1.892	2.729
<b>University</b>	3.764	0.169	22.29	0.000	3.433	4.095
<b>Single</b>	0.533	0.229	2.33	0.020	0.084	0.983
<b>Divorced</b>	-0.066	0.196	-0.34	0.736	-0.451	0.318
<b>Parent Size</b>	-0.649	0.168	-3.87	0.000	-0.978	-0.320
<b>Child Size</b>	-0.119	0.345	-0.34	0.731	-0.796	0.558
<b>Any Reg.</b>	-4.306	0.121	-35.44	0.000	-4.544	-4.068
<b>Unemp. HH</b>	-0.999	0.143	-6.98	0.000	-1.280	-0.719
<b>constant</b>	-20.354	3.693	-5.51	0.000	-27.592	-13.115

Table 5.22: Determinants of Selection Probability of Being Employer for Women,  
2008

wsector=5	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
<b>Child</b>	0.067	0.500	0.13	0.894	-0.913	1.047
<b>Age 20-24</b>	1.947	0.776	2.51	0.012	0.427	3.468
<b>Age 25-29</b>	3.372	0.768	4.39	0.000	1.868	4.877
<b>Age 30-34</b>	4.176	0.774	5.40	0.000	2.659	5.692
<b>Age 35-39</b>	4.639	0.771	6.02	0.000	3.128	6.150
<b>Age 40-44</b>	4.455	0.777	5.73	0.000	2.932	5.978
<b>Age 45-49</b>	3.923	0.786	4.99	0.000	2.382	5.464
<b>Age 50-54</b>	3.212	0.800	4.01	0.000	1.644	4.781
<b>Age 55+</b>	1.981	0.819	2.42	0.016	0.375	3.587
<b>Secondary</b>	1.804	0.195	9.27	0.000	1.423	2.185
<b>High School</b>	2.164	0.177	12.26	0.000	1.818	2.510
<b>Vocational</b>	2.021	0.206	9.82	0.000	1.617	2.424
<b>University</b>	3.591	0.155	23.10	0.000	3.286	3.896
<b>Single</b>	0.165	0.204	0.81	0.420	-0.235	0.565
<b>Divorced</b>	-0.280	0.202	-1.39	0.165	-0.676	0.115
<b>Parent Size</b>	-0.772	0.156	-4.96	0.000	-1.077	-0.466
<b>Child Size</b>	-0.689	0.339	-2.03	0.042	-1.353	-0.025
<b>Any Reg.</b>	-4.142	0.115	-35.90	0.000	-4.368	-3.916
<b>Unemp. HH</b>	-0.978	0.147	-6.67	0.000	-1.266	-0.691
<b>constant</b>	-5.833	0.824	-7.08	0.000	-7.448	-4.218



Table 5.23: Determinants of Selection Probability of Being Self-Employment for Men, 2007

wsector=6	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Child	-0.443	0.173	-2.56	0.010	-0.781	-0.104
Age 20-24	1.585	0.105	15.12	0.000	1.380	1.791
Age 25-29	2.571	0.107	24.04	0.000	2.361	2.780
Age 30-34	2.475	0.116	21.38	0.000	2.248	2.702
Age 35-39	2.418	0.118	20.52	0.000	2.187	2.649
Age 40-44	2.348	0.118	19.85	0.000	2.116	2.580
Age 45-49	2.203	0.118	18.66	0.000	1.972	2.434
Age 50-54	2.014	0.119	16.94	0.000	1.781	2.247
Age 55-59	1.560	0.122	12.76	0.000	1.320	1.800
Age 60-64	1.252	0.131	9.53	0.000	0.994	1.509
Age 65+	0.579	0.129	4.48	0.000	0.326	0.832
Secondary	0.258	0.041	6.31	0.000	0.178	0.338
High School	0.063	0.044	1.42	0.155	-0.024	0.149
Vocational	0.328	0.048	6.82	0.000	0.234	0.422
University	0.265	0.051	5.22	0.000	0.166	0.365
Single	-0.435	0.072	-6.04	0.000	-0.577	-0.294
Divorced	-0.041	0.094	-0.44	0.661	-0.226	0.144
Parent Size	0.590	0.040	14.90	0.000	0.512	0.668
Child Size	0.738	0.086	8.60	0.000	0.570	0.906
Any Reg.	-3.815	0.036	-106.99	0.000	-3.885	-3.745
Unemp HH	-0.305	0.062	-4.92	0.000	-0.427	-0.184
Constant	-1.798	0.126	-14.30	0.000	-2.045	-1.552

Table 5.24: Determinants of Selection Probability of Being Self-Employment for Men, 2008

wsector=6	Coef.	Std.	z	P> z	[95% Conf. Interval]	
Child	-0.265	0.164	-1.62	0.106	-0.586	0.056
Age 20-24	1.747	0.113	15.41	0.000	1.525	1.969
Age 25-29	2.735	0.116	23.63	0.000	2.508	2.961
Age 30-34	2.793	0.124	22.49	0.000	2.549	3.036
Age 35-39	2.694	0.126	21.36	0.000	2.447	2.942
Age 40-44	2.810	0.126	22.22	0.000	2.562	3.058
Age 45-49	2.574	0.126	20.42	0.000	2.327	2.821
Age 50-54	2.301	0.127	18.13	0.000	2.053	2.550
Age 55-59	1.821	0.131	13.86	0.000	1.564	2.079
Age 60-64	1.608	0.138	11.66	0.000	1.338	1.878
Age 65+	0.809	0.138	5.85	0.000	0.538	1.081
Secondary	0.210	0.041	5.08	0.000	0.129	0.290
High School	-0.073	0.045	-1.60	0.109	-0.162	0.016
Vocational	0.283	0.049	5.82	0.000	0.188	0.379
University	0.069	0.053	1.32	0.186	-0.033	0.172
Single	-0.396	0.071	-5.61	0.000	-0.535	-0.258
Divorced	-0.101	0.092	-1.09	0.277	-0.282	0.081
Parent Size	0.434	0.040	10.97	0.000	0.357	0.512
Child Size	0.656	0.082	7.98	0.000	0.495	0.817
Any Reg.	-3.767	0.036	-104.62	0.000	-3.837	-3.696
Unemp HH	-0.432	0.064	-6.79	0.000	-0.556	-0.307
Constant	-1.986	0.134	-14.80	0.000	-2.249	-1.723

Table 5.25: Determinants of Selection Probability of Being Self-Employment for Women, 2007

wsector=6	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Child	-0.834	0.356	-2.34	0.019	-1.531	-0.137
Age 20-24	2.213	0.406	5.45	0.000	1.416	3.009
Age 25-29	3.052	0.410	7.44	0.000	2.248	3.856
Age 30-34	3.575	0.415	8.62	0.000	2.762	4.388
Age 35-39	3.767	0.418	9.01	0.000	2.947	4.586
Age 40-44	3.282	0.422	7.78	0.000	2.456	4.108
Age 45-49	2.744	0.430	6.38	0.000	1.901	3.588
Age 50-54	2.292	0.435	5.27	0.000	1.439	3.144
Age 55+	1.083	0.444	2.44	0.015	0.214	1.953
Secondary	0.486	0.113	4.29	0.000	0.264	0.709
High School	0.393	0.118	3.33	0.001	0.162	0.625
Vocational	0.845	0.120	7.05	0.000	0.610	1.080
University	1.476	0.102	14.42	0.000	1.275	1.677
Single	0.434	0.146	2.97	0.003	0.147	0.721
Divorced	0.241	0.108	2.24	0.025	0.030	0.452
Parent Size	-0.233	0.087	-2.68	0.007	-0.403	-0.063
Child Size	-0.055	0.210	-0.26	0.791	-0.467	0.356
Any Reg.	-4.548	0.073	-62.04	0.000	-4.691	-4.404
Unemp. HH	-0.482	0.083	-5.82	0.000	-0.644	-0.319
constant	-3.428	0.441	-7.77	0.000	-4.293	-2.563

Table 5.26: Determinants of Selection Probability of Being Self-Employment for Women, 2008

wsector=6	Coef.	Std.Err.	z	P> z	[95% Conf. Interval]	
Child	-0.523	0.337	-1.55	0.121	-1.182	0.137
Age 20-24	1.619	0.284	5.71	0.000	1.063	2.175
Age 25-29	2.378	0.287	8.30	0.000	1.816	2.939
Age 30-34	2.645	0.294	9.00	0.000	2.069	3.221
Age 35-39	2.797	0.294	9.51	0.000	2.220	3.373
Age 40-44	2.584	0.298	8.66	0.000	1.999	3.169
Age 45-49	2.239	0.304	7.36	0.000	1.643	2.836
Age 50-54	1.556	0.317	4.90	0.000	0.934	2.178
Age 55+	0.630	0.317	1.99	0.047	0.008	1.252
Secondary	0.337	0.113	3.00	0.003	0.117	0.558
High School	0.572	0.101	5.64	0.000	0.373	0.770
Vocational	0.834	0.108	7.74	0.000	0.623	1.045
University	1.225	0.100	12.27	0.000	1.030	1.421
Single	0.321	0.144	2.23	0.026	0.039	0.602
Divorced	0.194	0.104	1.87	0.062	-0.010	0.397
Parent Size	-0.361	0.080	-4.50	0.000	-0.518	-0.204
Child Size	-0.361	0.200	-1.80	0.072	-0.754	0.032
Any Reg.	-4.335	0.067	-64.71	0.000	-4.467	-4.204
Unemp. HH	-0.626	0.075	-8.37	0.000	-0.772	-0.479
constant	-2.455	0.319	-7.70	0.000	-3.080	-1.831

## CHAPTER 6

### DETERMINANTS OF INFORMAL AND FORMAL WAGES

In this chapter, estimation results of selection corrected wage equations of formal/informal manufacturing sector and formal/informal service sector for men and women are presented, separately. Robust estimation results of coefficients, standard errors, and the number of observations, F-statistics and the coefficients of determination ( $R^2$ ) are presented in the Table 6.1.1 and 6.1.2, at the end of the chapter.

Determinants of wage equations are explained in related subsections with figures. Also results of individually significance tests are indicated in these subsections. Furthermore, for joint significance F-tests are examined for each wage equation. According to those, all wage equations are jointly significant. Estimation results also indicate that selection process has significant impact on wage rates.

#### 6.1 Determinants of Wage Equations

##### 6.1.1 Age

Age is important factor that affects the wage rates of workers. Employers consider the ages of workers while deciding to hire them or deciding how much wage to paid. Moreover, age is a kind of proxy that determines the level of experience. Employers also take the experience level of workers into account while determining the wage rates of workers.

Table 6.1.1 and Table 6.1.2 indicate the estimation results of Mincer-type wage equations of formal and informal sectors for 2007 and 2008, respectively. As it is indicated in these tables, age has significantly positive effect on wage rates of formal/informal manufacturing and service sector for males. Except informal-manufacturing sector, it has also significantly positive effect on women's wage rates.

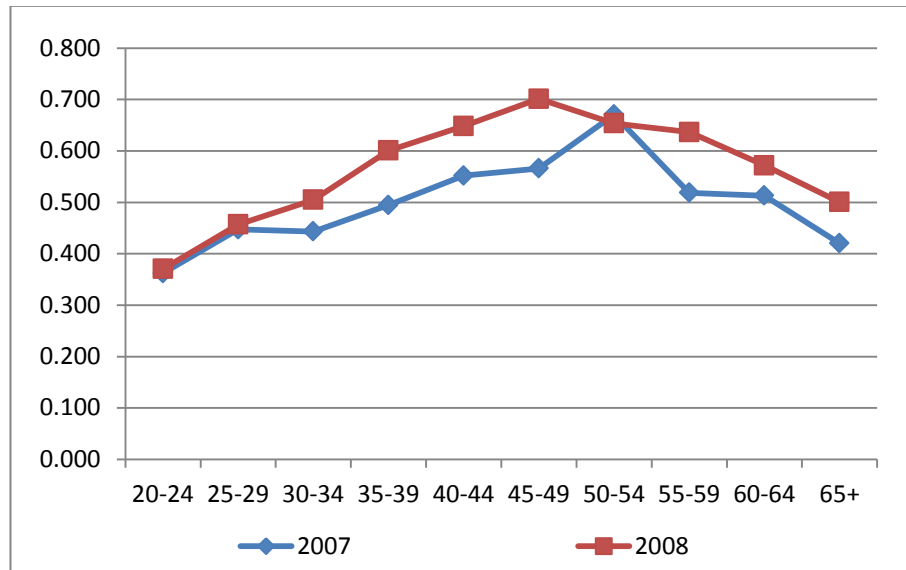


Figure 6.1.1.1: Relationship between Age and Log Wages of Formal-Manufacturing Sector, Men

Figure 6.1.1.1 and Figure 6.1.1.2 show the relationship between age and log wages of males in the formal-manufacturing and informal-manufacturing sector, respectively. In accordance with our a-priori expectations, there exists hump-shaped relationship in the formal manufacturing sector. At younger and older ages, wages are less than in the case of middle ages. In other words, being at the middle ages has most contribution to the wages, since workers are more productive at those years. Since younger workers have little experience and older workers are not capable to work efficiently, being middle ages is more advantageous in terms of wage rate. Surprisingly, this relationship is also true for the informal sector.

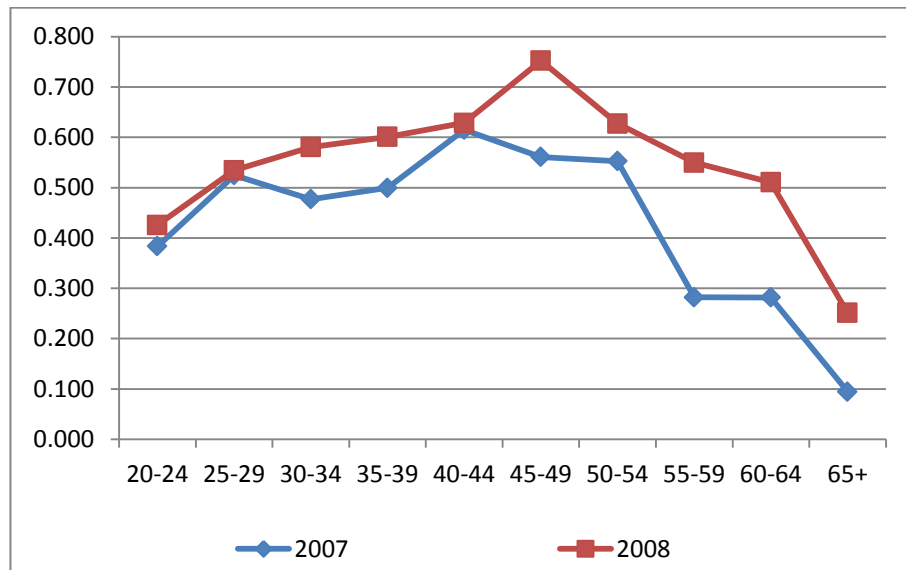


Figure 6.1.1.2: Relationship between Age and Log Wages of Informal-Manufacturing Sector, Men

Age has no significant effect on women’s wage rates in the informal manufacturing and service sector. It has significant and positive effect on the log wages in the formal manufacturing sector. Hump-shaped relationship, which is presented in Figure 6.1.1.3, between age and formal manufacturing sector wage rate exists for women.

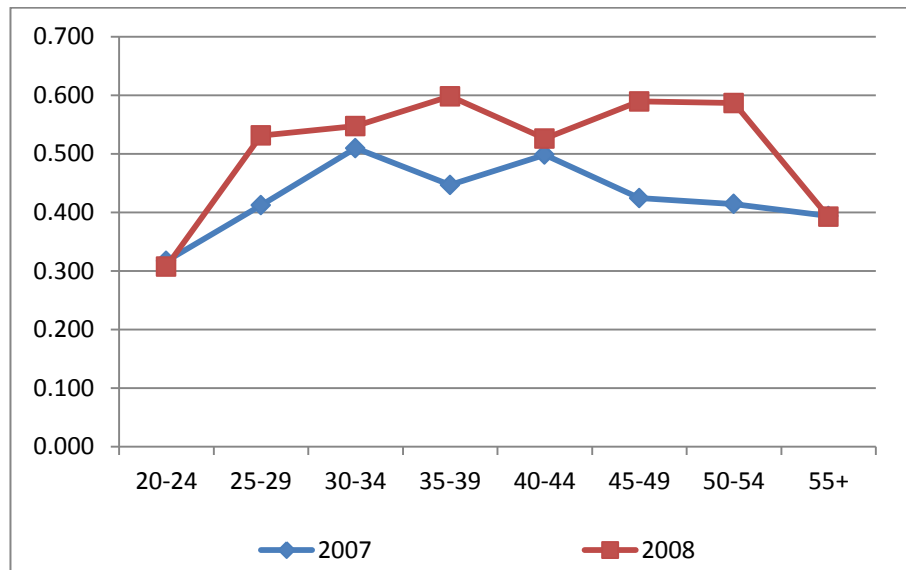


Figure 6.1.1.3: Relationship between Age and Log Wages of Formal-Manufacturing Sector, Women

Increasing relationship between age and wage rates in the formal and informal service sector exists for men. Figure 6.1.1.4 and Figure 6.1.1.5 reveal this relationship which is similar for the formal and informal service sector.

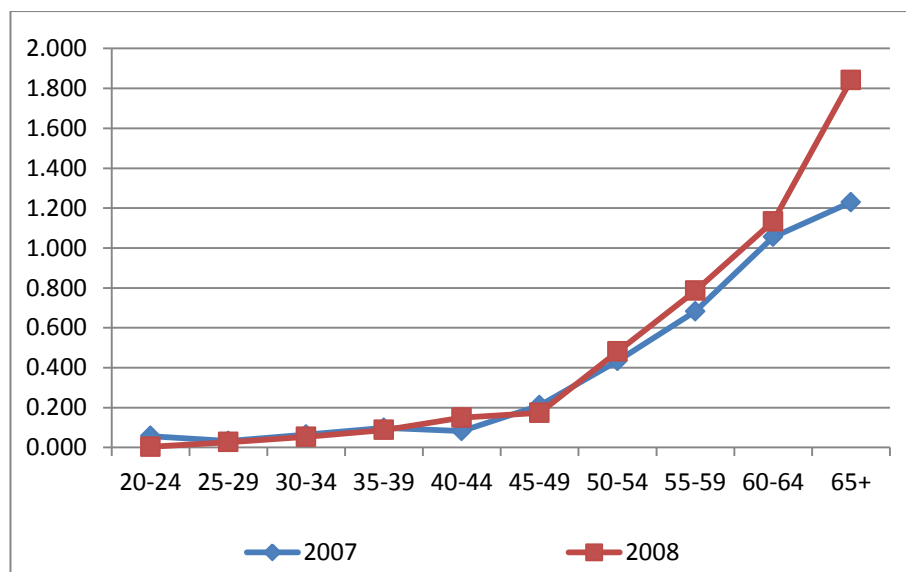


Figure 6.1.1.4: Relationship between Age and Log Wages of Formal-Service Sector, Men

In the formal service sector, as age of male workers increases, log wages also increase. The relationship is represented by a convex curve, i.e. wages are increasing in an increasing rate with respect to that of men in the base category-15-19 age group. In the informal service sector, except, 50-55 years old men and 65 years old and over men, convex relationship is observed, as well.

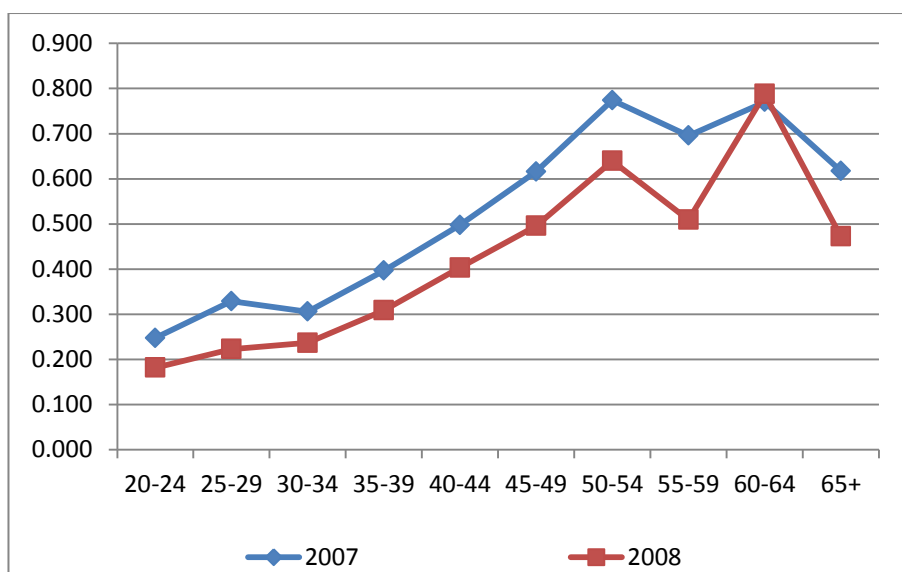


Figure 6.1.1.5: Relationship between Age and Log Wages of Informal-Service Sector, Men

For women, however, hump-shaped relationship between age and log wages in the formal-service sector is observed. It is indicated in the Figure 6.1.1.6. As it is expected, it seems to be U-shaped relationship between age and informal sector wages for women, especially in 2008. This is not surprising because employing old women and inexperienced young women is less costly than hiring qualified female workers. Furthermore, year to year difference in the wage rate and age relation for women, as it can be seen from the Figure 6.1.1.7.

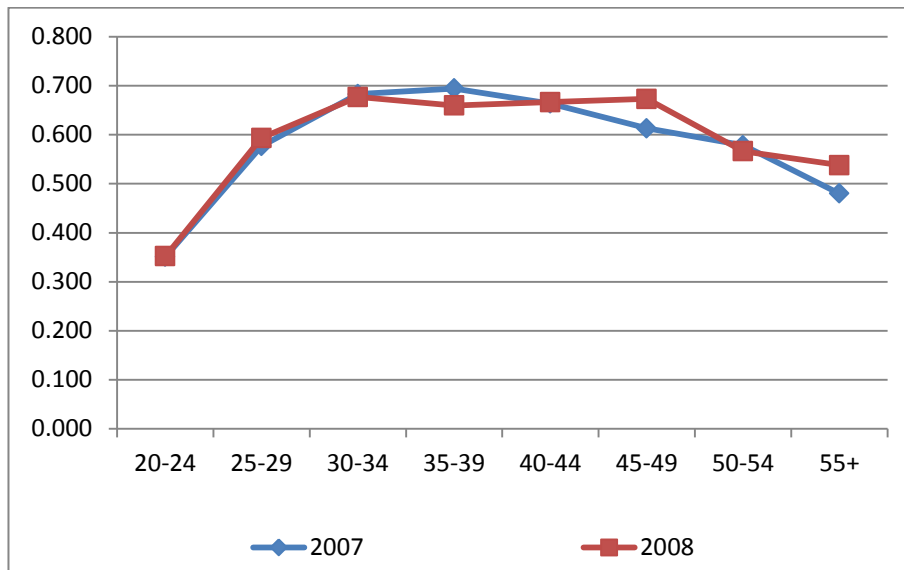


Figure 6.1.1.6: Relationship between Age and Log Wages of Formal-Service Sector, Women

Women, who are at their more productive years, earn more money in the formal service sector than in the informal-service sector in line with a-priori expectations.

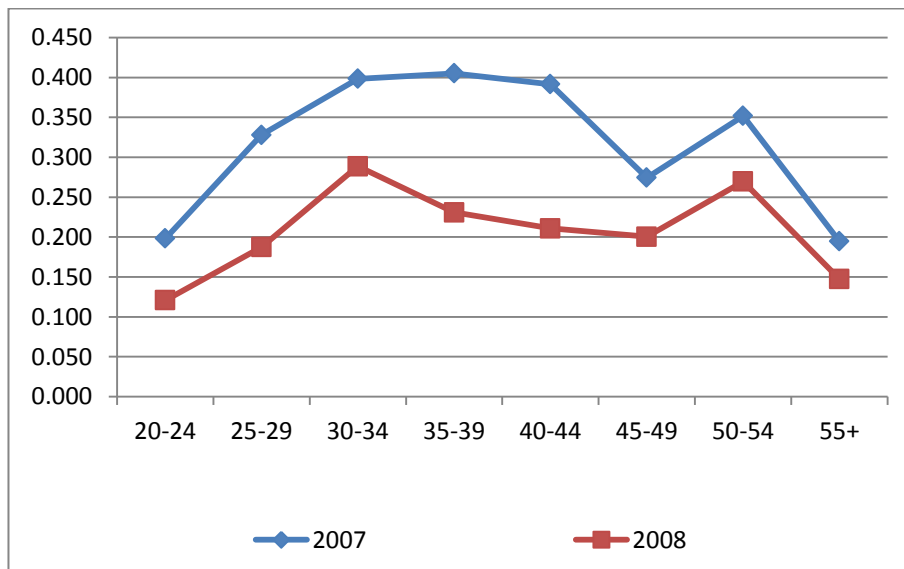


Figure 6.1.1.7: Relationship between Age and Log Wages of Informal-Service Sector, Women



## 6.1.2 Firm Size

Among the determinants of decision corrected wage equation, the most substantial one is the firm size. As it is presented in the Table 6.1.1 and Table 6.1.2, firm size dummy variables are statistically significant in all wage equations. Moreover, it has positive effect on the formal and informal sector wages of men and women.

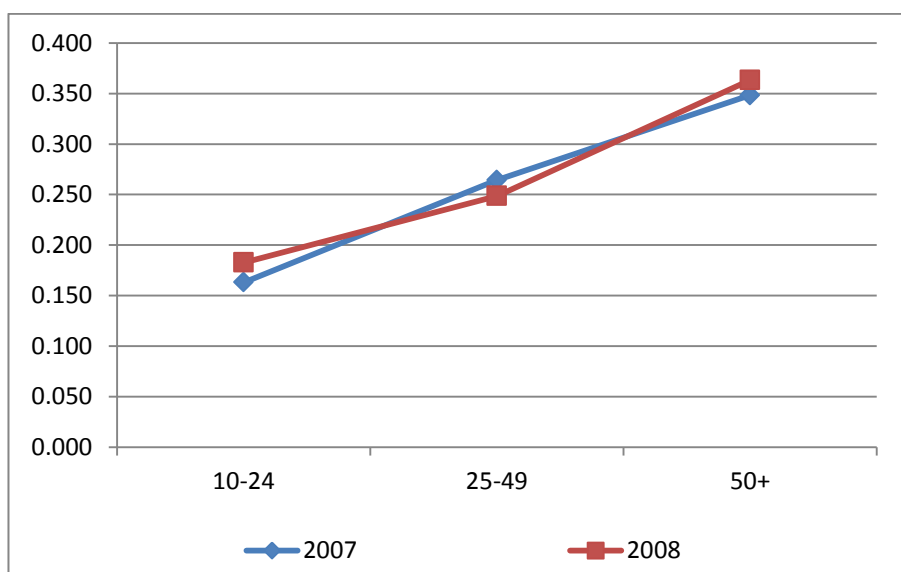


Figure 6.1.2.1: Relationship between Firm Size and Log Wages of Formal-Manufacturing Sector, Men

Figure 6.1.2.1 and Figure 6.1.2.2 show the relationship between firm size and log wages of men in the formal-manufacturing sector, and informal manufacturing sector, respectively. Not surprisingly, there seems to be increasing relationship between them. As the number of workers hired increases, the wage rate of men increases in the formal and informal sector, with respect to the base category i.e. firms hiring less than 10 workers.

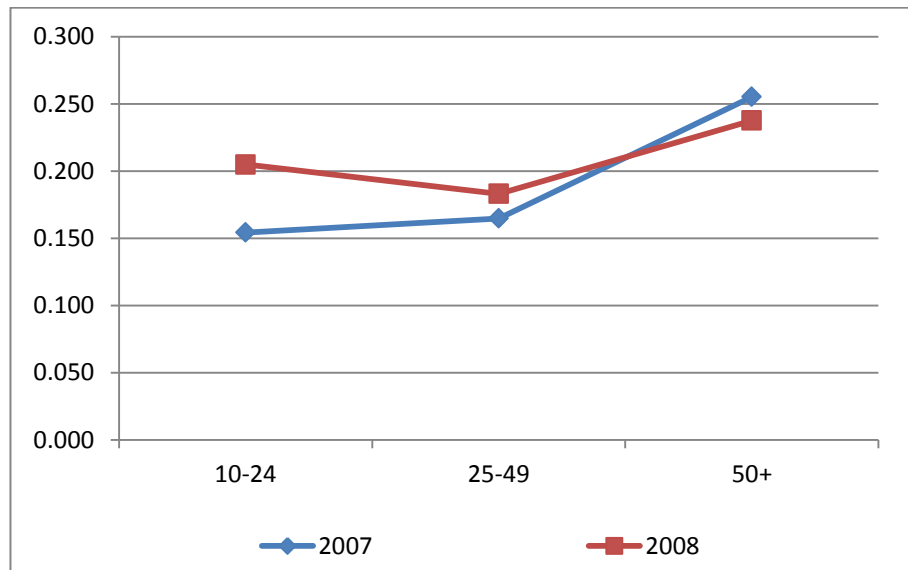


Figure 6.1.2.2: Relationship between Firm Size and Log Wages of Informal-Manufacturing Sector, Men

This relationship is somewhat different for female workers employed in the informal manufacturing sector. While there is an increasing relationship between firm size and log wages in the formal manufacturing sector, this relationship is negative for the informal manufacturing sector as it is shown in the Figure 6.1.2.3 and Figure 6.1.2.4.

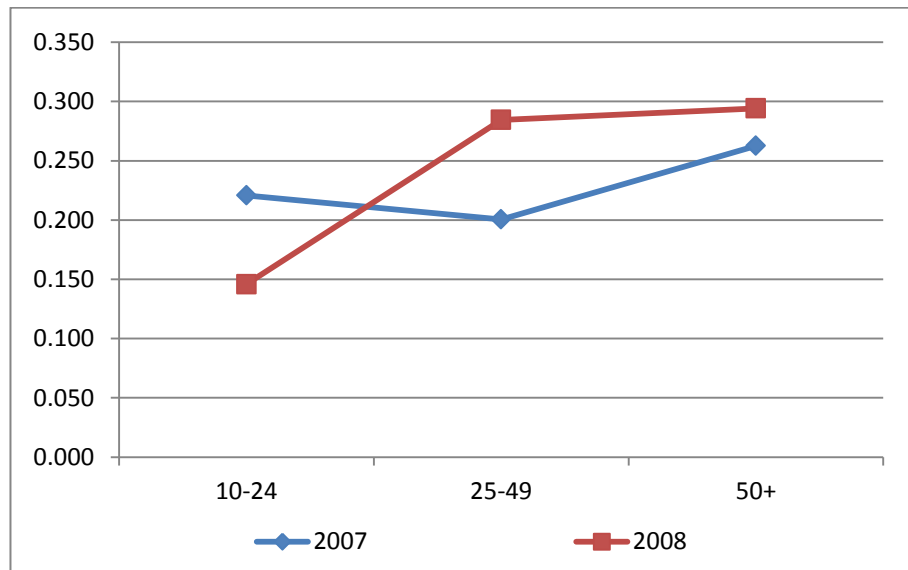


Figure 6.1.2.3: Relationship between Firm Size and Log Wages of Formal-Manufacturing Sector, Women

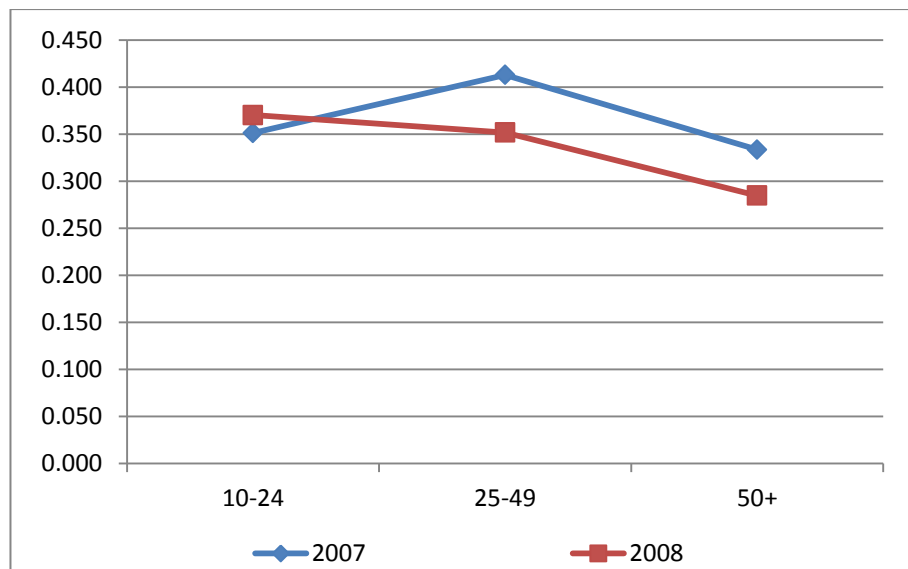


Figure 6.1.2.4: Relationship between Firm Size and Log Wages of Informal-Manufacturing Sector, Women

As for the relationship between firm size and wages in the formal and informal service sector, there is also increasingly positive relationship between them for both formal service sector wages and informal service sector wages. This relationship is

observable for both men and women. Figure 6.1.2.5 and 6.1.2.6 reveal this fact for men. These figures indicate that as the firm size increases, log wages of men also increases in the formal and informal sector.

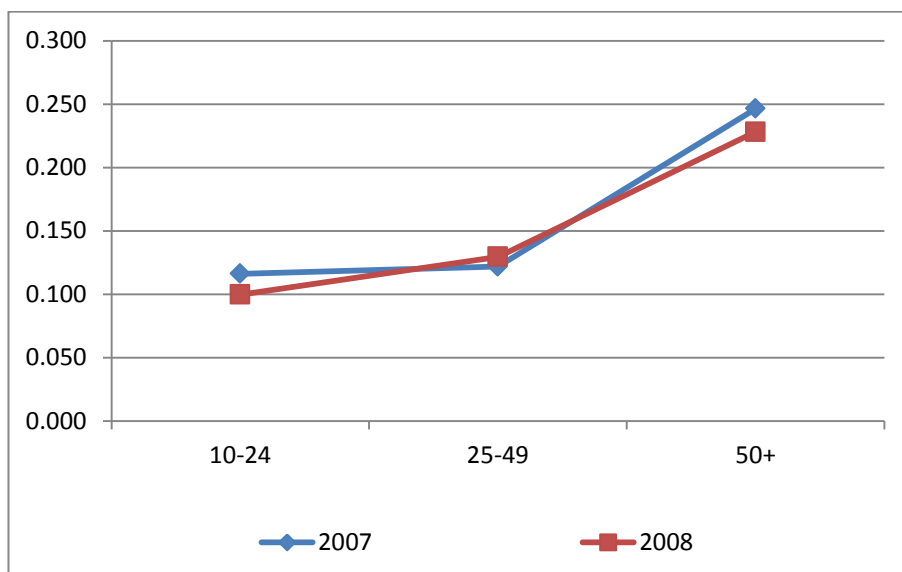


Figure 6.1.2.5: Relationship between Firm Size and Log Wages of Formal-Service Sector, Men

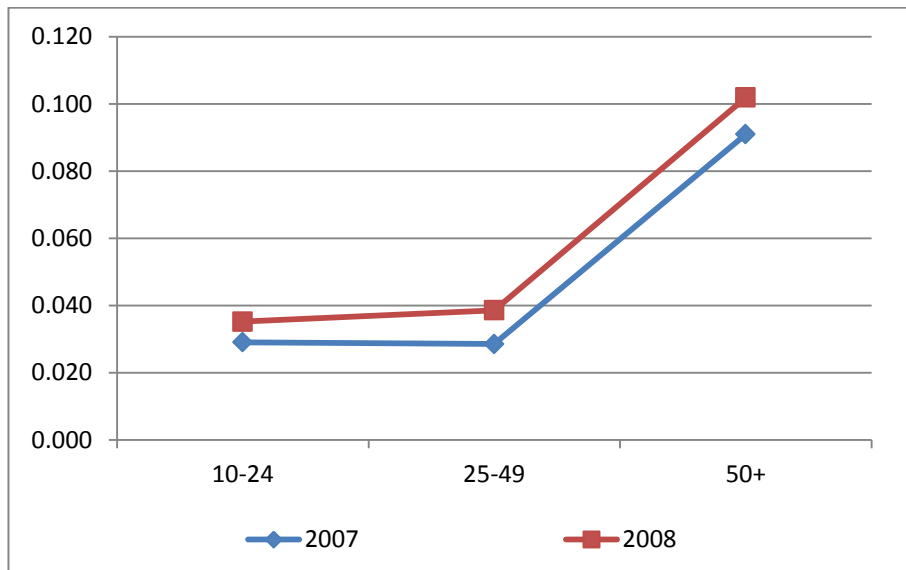


Figure 6.1.2.6: Relationship between Firm Size and Log Wages of Informal-Service Sector, Men

The relationship between firm size and log wages are indicated in Figure 6.1.2.7 and Figure 6.1.2.8 for women working in the formal service and informal service sector, respectively.

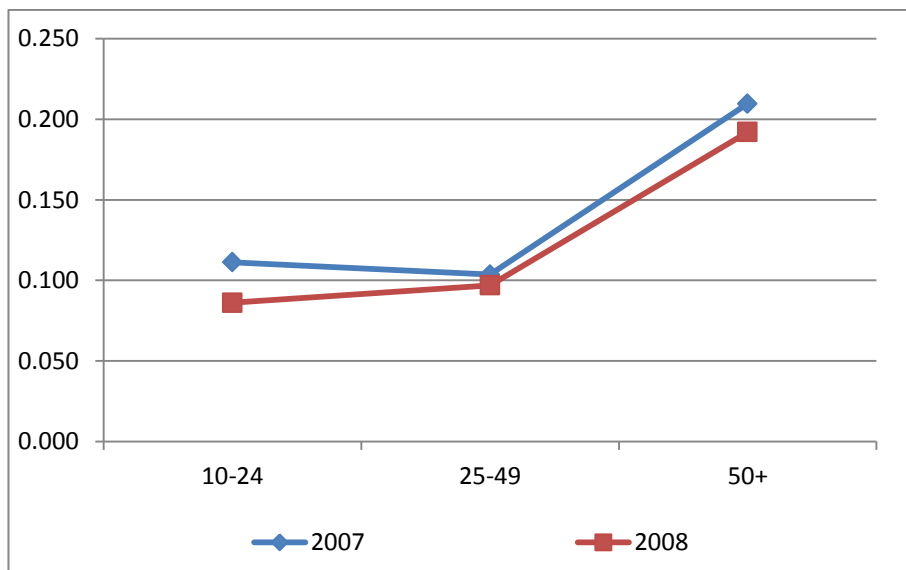


Figure 6.1.2.7: Relationship between Firm Size and Log Wages of Formal-Service Sector, Women

In the formal and informal service sector, as the firm size increases wage rates of women also increases.

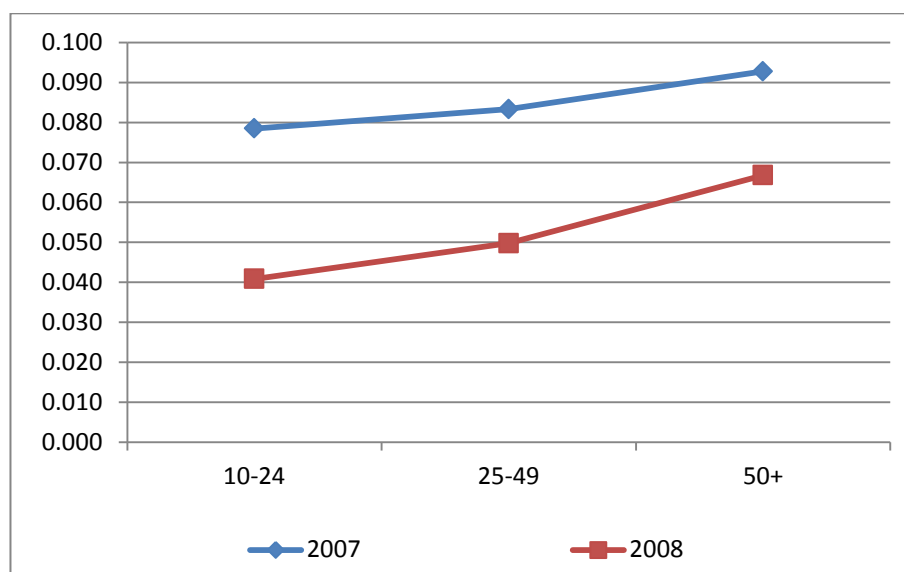


Figure 6.1.2.8: Relationship between Firm Size and Log Wages of Informal-Service Sector, Women

### 6.1.3 Education

As suggested by the Human-Capital Theory, level of education is one of the most important factors that affect the wage rates. According to the estimation results of Mincer-type wage equations indicated in the Table 6.1.1 and Table 6.1.2, educational level dummies are statistically significant for both formal and informal sectors, in general.

Except male workers employed in the formal service sector, for those in other sectors education level positively affects wage rates. The relationship between education level and log wages of males in the formal-manufacturing sector is shown in the Figure 6.1.3.1. Men who have higher educational level earn more money than primary school graduates in the formal manufacturing sector. As the level of education increases, the log wages of male workers employed in the formal manufacturing sector also increases, holding other variables constant. Although those

who are graduated from vocational school get more wage rate than primary school graduates; their wage rate is less than the male workers graduated from high school or university.

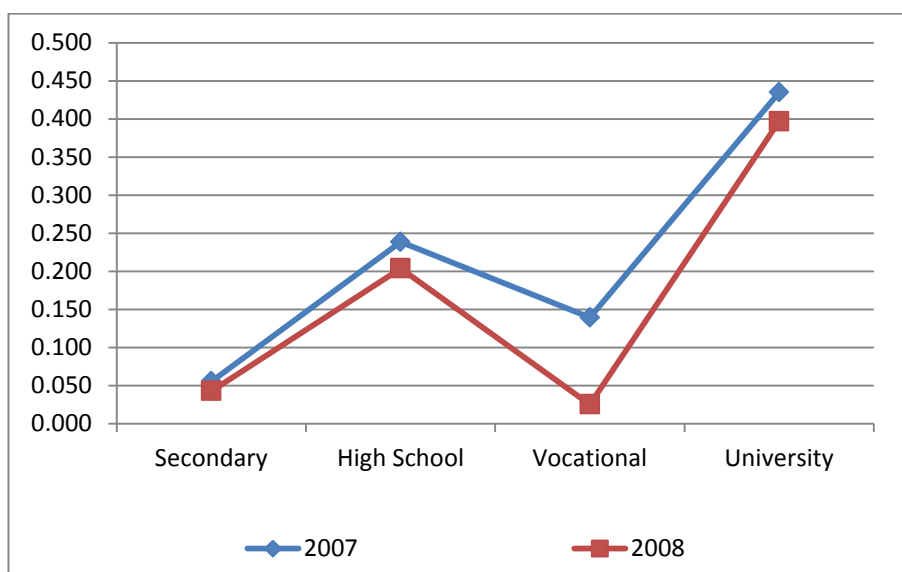


Figure 6.1.3.1: Relationship between Education and Log Wages of Formal-Manufacturing Sector, Men

In the informal manufacturing sector, being graduated from the university for men has significantly positive effects on wages as compared to being graduated from primary school. This is also true for females.

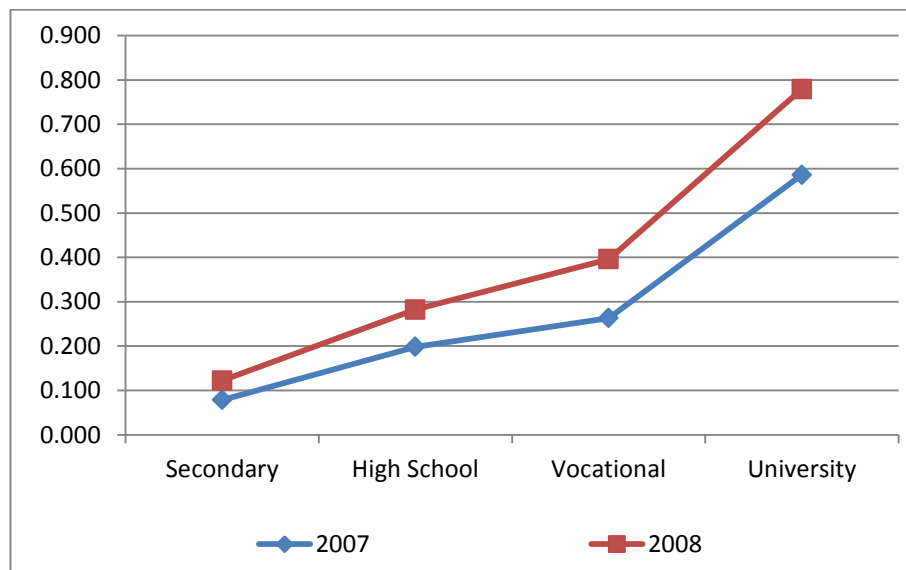


Figure 6.1.3.2: Relationship between Education and Log Wages of Formal-Manufacturing Sector, Women

In accordance with the a priori expectations, education level positively affects the wage rates of women who work in the formal-manufacturing sector, as it can be seen from the Figure 6.1.3.2. In the formal manufacturing sector, female workers who are graduated from secondary school or higher educational level have more wage rates than their colleagues who have primary school diploma or lower level of education, holding other variables constant.

Situation for men working as wage earners in the formal service sector is somewhat different. Contrary to our *a-priori* expectations, having higher levels of education from primary school diploma does not positively affect wage rates. Indeed, primary school graduates get more wage rate than those with higher level of education, in general. Figure 6.1.3.3 also reveals this result. According to estimation results, only vocational school graduation positively affects wage rates in the formal service sector with respect to the primary school graduation in 2007.



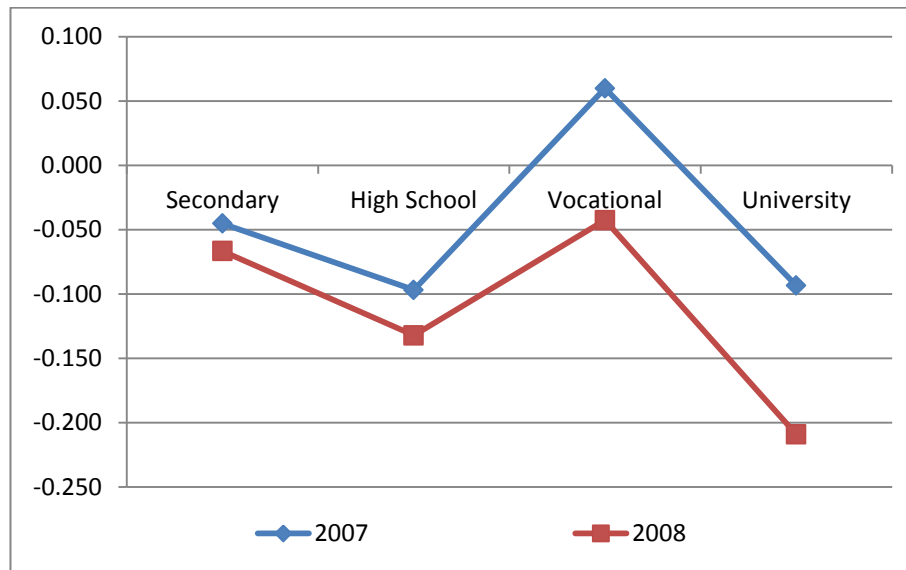


Figure 6.1.3.3: Relationship between Education and Log Wages of Formal-Service Sector, Men

This may be caused by two reasons. First, data on the formal service sector may not reflect the truth. Males who have higher education level, for instance, might work as a professional so that they might get non-wage benefits. Thus male workers with higher level of education may seem as if they earned lower wages. Second, male workers with lower education level in the formal sector might work in tough and troublesome tasks so that they might be paid higher wage rate.

Estimation results of women employed in the formal service sector are compatible with our a-priori expectations. As can be seen from the Figure 6.1.3.4, female workers with higher level of education earn higher wage rate than primary school graduate female workers.

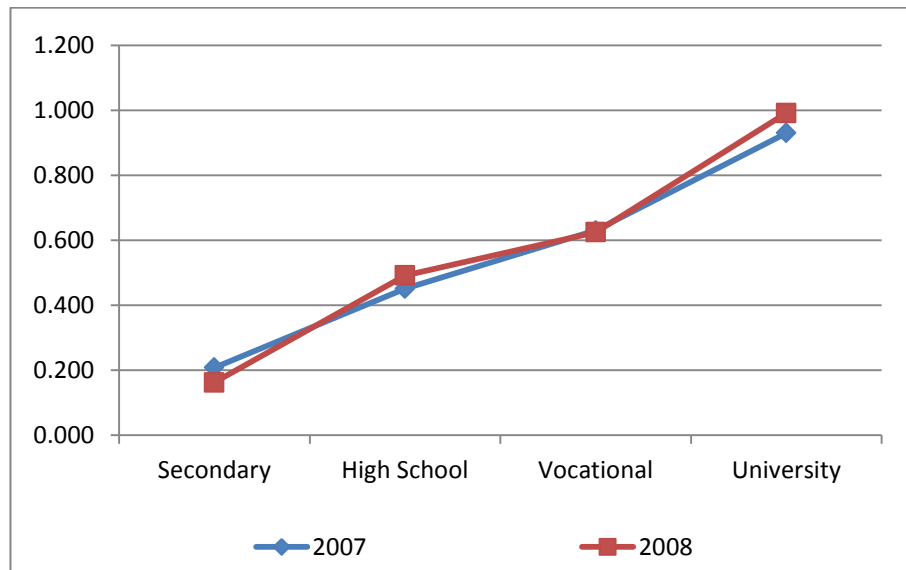


Figure 6.1.3.4: Relationship between Education and Log Wages of Formal-Service Sector, Women

According to the estimation results of wage equation for the informal service sector, having higher level of education positively affect wage rate with respect to being graduated from the primary school. This not surprising result is valid for both male and female workers. It is represented in the Figure 6.1.3.5 and 6.1.3.6 for men and women, respectively.

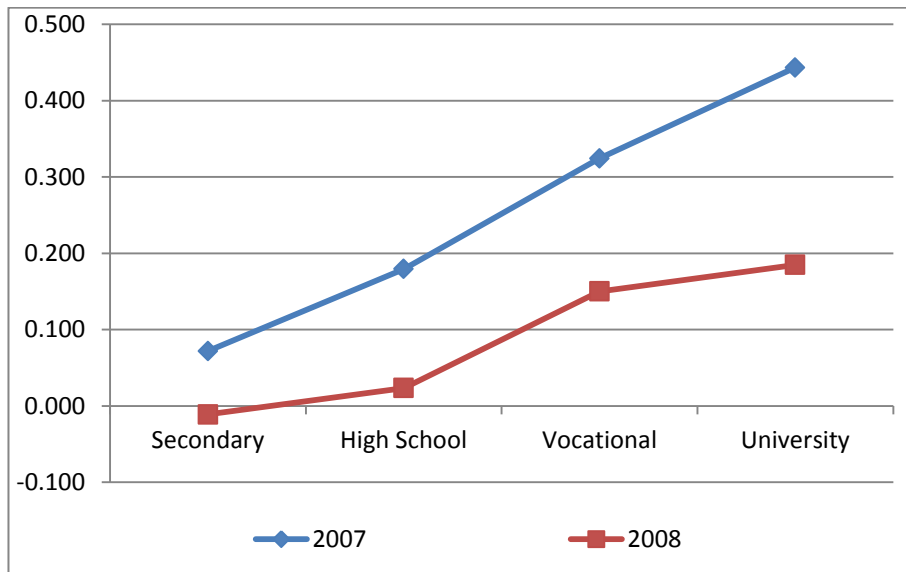


Figure 6.1.3.5: Relationship between Education and Log Wages of Informal-Service Sector, Men

It can be asserted, then, except male workers employed in the formal service sector, having higher level of education has positive effect on wage rates of both male and female workers.

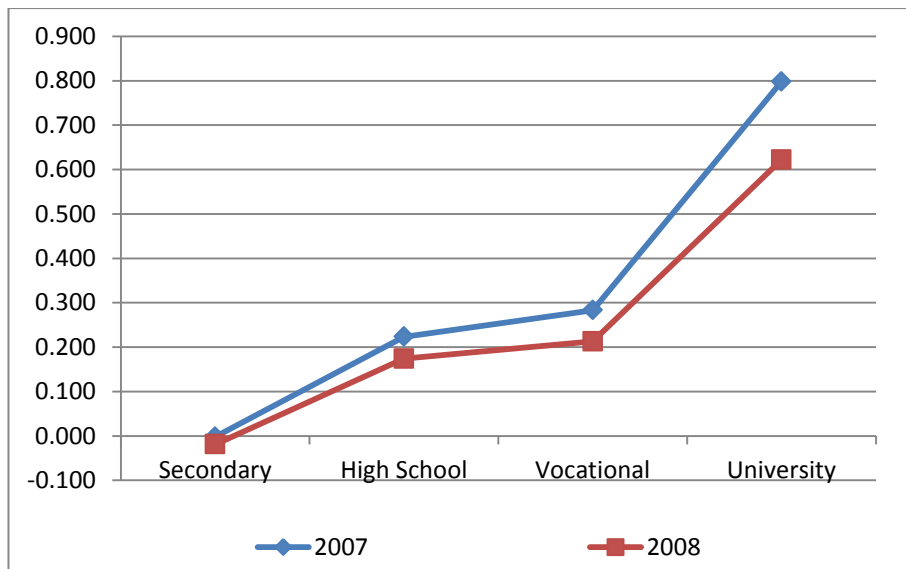


Figure 6.1.3.6: Relationship between Education and Log Wages of Informal-Service Sector, Women

#### **6.1.4 Working Time**

Working time is another important variable that affects the wage rate. As it is explained in the Chapter 4, working time variable is inserted into the wage equation as in the log form. The coefficient of log of working time indicates the elasticity of wage rates with respect to the working time.

In general, working time has significantly positive effect on wages in the informal and the formal manufacturing sector for male. In light of the estimation results presented in the Table 6.1.1 and Table 6.1.2, if the working time is increased by 1%, wages in the informal and formal manufacturing sectors increase by 0.235 % and 0.251% , respectively in 2007 (0.242% and 0.275%, respectively in 2008). Moreover, working time has significantly negative effect on the elasticity of wages in the formal service sector for male.

The results are somewhat different for female. While, the elasticity of wages in the formal and informal manufacturing sectors are positive; it is negative for the formal and informal service sector. That is to say, as working hours increase, wage rates of women, in the formal and informal service sector decreases. This can be due to the characteristics of occupations in the service sector.

#### **6.1.5 Fulltime**

Whether working as a fulltime worker or not is important factor in determining the wage rate. According the estimation results as indicated in the Table 6.1.1 and Table 6.1.2, fulltime dummy variable is statistically significant in all formal and informal sector wage equations for both male and female, except wages of females working in the informal service sector. Moreover, it has positive effect on the log wages; i.e. employees working as fulltime workers get more wages than those who work as part-time workers, in accordance with a-priori expectations.

### **6.1.6 Selection Variables**

In each wage equations, it is found that selection terms are significant. This indicates that selection process has significant effect on wage rates. In the informal manufacturing sector wage equation of both males and females, significantly negative selection as related to the alternatives of working formally in the manufacturing sector and working as an employer are found, while there is significantly positive selection as related to working in the formal service sector. Furthermore, for the formal manufacturing sector wages, there exists significantly negative selection process as related to the working informally and working as an employer for both males and females. Selecting the other alternatives has positive effect on formal manufacturing wage rates.

As for the service sector wage equation, while selection of the being non-employed, being employer, and working in the informal manufacturing and formal service sector negatively affect the wage rates informal service sector; choosing informal manufacturing sector and formal service sector has negative effect on formal service sector wage rates for men. While selecting the informal service sector positively affect the formal service wage rates for men, it has negative effect for women.

Table 6.1.1: Determinants of Corrected Mincer-Type Wage Equation, 2007

	Male Employees								Female Employees							
	Manufacturing				Services				Manufacturing				Services			
	Informal		Formal		Informal		Formal		Informal		Formal		Informal		Formal	
	Coeff	Std Dev	Coeff	Std Dev	Coeff	Std Dev	Coeff	Std Dev	Coeff	Std Dev	Coeff	Std Dev	Coeff	Std Dev	Coeff	Std Dev
<i>Age Groups</i>																
20-24	0,383	0,042***	0,362	0,038***	0,247	0,033***	0,057	0,032*	0,005	0,069	0,317	0,055***	0,198	0,041***	0,351	0,038***
25-29	0,525	0,063***	0,447	0,058***	0,329	0,042***	0,032	0,040	-0,008	0,097	0,412	0,073***	0,328	0,049***	0,577	0,046***
30-34	0,477	0,071***	0,443	0,066***	0,306	0,043***	0,064	0,042	-0,079	0,099	0,510	0,077***	0,398	0,049***	0,683	0,045***
35-39	0,500	0,082***	0,495	0,074***	0,396	0,047***	0,098	0,045**	-0,002	0,104	0,447	0,081***	0,405	0,051***	0,694	0,046***
40-44	0,615	0,091***	0,552	0,082***	0,498	0,053***	0,082	0,050**	-0,078	0,103	0,498	0,079***	0,392	0,048***	0,664	0,045***
45-49	0,561	0,097***	0,566	0,074***	0,616	0,052***	0,211	0,047***	-0,008	0,122	0,424	0,078***	0,274	0,053***	0,613	0,041***
50-54	0,553	0,113***	0,671	0,066***	0,774	0,054***	0,433	0,043***	-0,279	0,160*	0,414	0,079***	0,352	0,068***	0,578	0,047***
55-59	0,282	0,121**	0,518	0,061***	0,696	0,066***	0,682	0,040***	-0,073	0,166	0,394	0,085*	0,195	0,100***	0,480	0,068***
60-64	0,282	0,133**	0,513	0,073***	0,770	0,103***	1,055	0,055***								
65+	0,095	0,174*	0,420	0,081***	0,617	0,168***	1,229	0,091***								
<i>Firm Size</i>																
10-24	0,154	0,019***	0,163	0,022**	0,029	0,014***	0,116	0,010***	0,351	0,043***	0,221	0,042**	0,078	0,038***	0,111	0,016***
25-49	0,165	0,021***	0,264	0,023**	0,029	0,012***	0,122	0,008***	0,413	0,045***	0,201	0,042***	0,083	0,032***	0,104	0,014***
50+	0,255	0,023***	0,348	0,028***	0,091	0,010***	0,246	0,007***	0,334	0,046***	0,263	0,058***	0,093	0,029***	0,210	0,013***
<i>Education Level</i>																
Secondary	-0,012	0,045	0,055	0,028***	0,072	0,025**	-0,045	0,020**	-0,120	0,066*	0,079	0,053	-0,002	0,031	0,208	0,038***
High School	0,151	0,099	0,238	0,052***	0,179	0,052***	-0,097	0,039**	-0,043	0,120	0,199	0,081***	0,223	0,048**	0,451	0,063***
Vocational	0,112	0,067*	0,139	0,038***	0,324	0,029***	0,060	0,026**	-0,015	0,135	0,263	0,085***	0,283	0,054***	0,630	0,066***
University	0,346	0,134**	0,435	0,082***	0,443	0,074***	-0,094	0,058	0,492	0,237**	0,586	0,136***	0,798	0,095***	0,930	0,096***
Log of Working Time	0,235	0,021***	0,251	0,020	0,023	0,015***	-0,028	0,009***	0,238	0,050***	0,312	0,029	-0,016	0,029***	-0,004	0,015
Full-time Dummy	0,297	0,044***	0,359	0,038***	0,551	0,064***	0,213	0,025***	0,839	0,078***	0,211	0,047***	0,752	0,078***	0,198	0,026***
<i>Selection Variables</i>																
m0, nonemployed	0,189	0,108*	-0,089	0,129**	-0,174	0,076	0,310	0,042***	-0,376	0,294	0,215	0,220	-0,021	0,111	-0,067	0,033**
m1, inf-manuf	0,125	0,067*	-0,834	0,210***	-2,353	0,191***	-1,637	0,139***	0,014	0,042	-0,255	0,232***	-0,647	0,192	-1,017	0,177***
m2, inf-service	-0,817	0,322**	0,082	0,030***	1,146	0,181***	2,000	0,139***	0,013	0,397	-0,003	0,028	-0,335	0,231	-0,406	0,170**
m3, formal-manuf	-0,454	0,186**	-0,517	0,168**	0,061	0,026***	1,224	0,124***	-1,166	0,423***	0,730	0,304***	0,060	0,023**	1,211	0,145***
m4, formal-service	1,539	0,254***	0,482	0,246**	-0,535	0,215*	-0,359	0,028***	0,331	0,413	0,522	0,320*	0,351	0,211	0,025	0,026
m5, employer	-3,104	0,355***	-2,354	0,268***	-2,478	0,272***	0,144	0,182	-5,946	0,961***	-2,786	0,513***	-4,655	0,468***	-2,127	0,250***
m6, self-employed	1,232	0,244***	1,172	0,195***	1,722	0,137***	0,996	0,094***	1,544	0,290***	0,538	0,217***	1,463	0,164**	0,591	0,157***
Constant	4,213	0,272***	3,674	0,233***	4,684	0,174***	7,712	0,172***	3,467	0,365***	4,276	0,275***	4,790	0,219***	5,078	0,169***
n	5180		6197		12470		21150		1087		2190		2423		7859	
F-stat	57,22***		104,84***		221,25***		649,33***		34,09***		36,21***		72,34***		305,63***	
R-squared	0,224		0,3064		0,3162		0,4442		0,4351		0,2864		0,4199		0,4836	

\*\*\*, \*\*, and \* mean statistically significant at the 1%, 5% and 10%, respectively. Robust standard errors

Table 6.1.2: Determinants of Corrected Mincer-Type Wage Equation, 2008

	Male Employees								Female Employees							
	Manufacturing				Services				Manufacturing				Services			
	Informal		Formal		Informal		Formal		Informal		Formal		Informal		Formal	
	Coeff	Std Dev	Coeff	Std Dev	Coeff	Std Dev	Coeff	Std Dev	Coeff	Std Dev	Coeff	Std Dev	Coeff	Std Dev	Coeff	Std Dev
<i>Age Groups</i>																
20-24	0,426	0,044***	0,370	0,043***	0,182	0,032***	0,003	0,030	0,077	0,084	0,308	0,055***	0,121	0,041***	0,352	0,034***
25-29	0,535	0,062***	0,457	0,063***	0,223	0,038***	0,027	0,035	0,167	0,121	0,531	0,076***	0,187	0,049***	0,594	0,041***
30-34	0,581	0,070***	0,505	0,073***	0,237	0,041***	0,053	0,038	0,061	0,133	0,547	0,079***	0,289	0,050***	0,677	0,042***
35-39	0,601	0,082***	0,601	0,080***	0,309	0,045***	0,088	0,041***	-0,015	0,125	0,598	0,078***	0,231	0,050***	0,660	0,042***
40-44	0,629	0,093***	0,649	0,083***	0,403	0,047***	0,149	0,042***	0,021	0,137	0,526	0,080***	0,211	0,049***	0,667	0,041***
45-49	0,753	0,092***	0,701	0,084***	0,496	0,050***	0,173	0,044***	0,012	0,141	0,589	0,079***	0,200	0,051***	0,673	0,039***
50-54	0,628	0,106***	0,654	0,071***	0,640	0,051***	0,481	0,038***	-0,158	0,147	0,587	0,075***	0,270	0,066***	0,566	0,043***
55-59	0,550	0,119***	0,637	0,067***	0,509	0,067***	0,785	0,038***	-0,335	0,174*	0,392	0,096	0,147	0,117***	0,538	0,063***
60-64	0,511	0,147***	0,572	0,075***	0,788	0,107***	1,133	0,051***								
65+	0,251	0,177	0,501	0,088***	0,472	0,135***	1,840	0,109***								
<i>Firm Size</i>																
10-24	0,205	0,021***	0,183	0,025**	0,035	0,014***	0,100	0,009***	0,370	0,053***	0,146	0,044	0,041	0,038***	0,086	0,015***
25-49	0,183	0,022***	0,249	0,024***	0,039	0,012***	0,130	0,008***	0,352	0,053***	0,284	0,043	0,050	0,033***	0,097	0,013***
50+	0,238	0,026***	0,363	0,031***	0,102	0,010***	0,228	0,007***	0,285	0,058***	0,294	0,054**	0,067	0,030***	0,192	0,012***
<i>Education Level</i>																
Secondary	-0,015	0,039	0,043	0,029	-0,011	0,023	-0,067	0,017***	-0,064	0,082	0,122	0,051	-0,019	0,030**	0,163	0,034***
High School	-0,001	0,093	0,204	0,053	0,023	0,046***	-0,132	0,033***	0,232	0,157	0,282	0,082***	0,174	0,048***	0,492	0,059***
Vocational	-0,010	0,058	0,025	0,039***	0,150	0,025	-0,043	0,022***	0,165	0,153	0,396	0,090***	0,213	0,054***	0,625	0,062***
University	0,445	0,127***	0,397	0,086***	0,185	0,067***	-0,209	0,053***	0,698	0,289**	0,779	0,138***	0,622	0,090***	0,991	0,090***
Log of Work Time	0,242	0,026***	0,275	0,023	0,007	0,020***	-0,109	0,011***	0,626	0,073***	0,454	0,032**	-0,100	0,045***	-0,038	0,019*
Full-time Dummy	0,444	0,051***	0,244	0,041***	0,350	0,067***	0,222	0,026***	0,486	0,097***	0,019	0,050***	0,749	0,141	0,251	0,025***
<i>Selection Variables</i>																
m0, nonemployed	0,180	0,124	-0,166	0,139***	-0,282	0,066	0,432	0,038***	0,687	0,419	0,553	0,215	0,085	0,111**	-0,102	0,034***
m1, inf-manuf	0,091	0,065	-0,549	0,220***	-2,615	0,185**	-1,865	0,133***	0,101	0,048**	0,343	0,274***	-1,115	0,233	-0,995	0,219***
m2, inf-service	-0,476	0,314	0,066	0,033***	1,378	0,179**	2,421	0,134***	-0,300	0,429	-0,015	0,035***	0,622	0,227	-0,451	0,165***
m3, formal-manuf	-0,462	0,211**	-0,945	0,181***	0,077	0,026***	1,305	0,114***	-0,309	0,462	0,084	0,268	0,022	0,020	0,712	0,124***
m4, formal-service	0,845	0,273***	0,533	0,255***	-1,063	0,193**	-0,421	0,026***	1,209	0,548**	1,167	0,324	0,147	0,202***	0,058	0,025***
m5, employer	-1,908	0,351***	-1,883	0,268***	-2,250	0,265***	0,876	0,163***	-5,617	1,183***	-2,143	0,602***	-4,308	0,439***	-2,573	0,273***
m6, self-employed	1,082	0,248***	1,043	0,209***	1,765	0,135***	0,953	0,094***	1,508	0,381***	0,519	0,265***	0,879	0,189*	0,588	0,167***
Constant	4,123	0,266***	3,730	0,250***	4,978	0,164***	8,516	0,156***	3,005	0,528***	4,310	0,280***	5,665	0,256***	5,083	0,164
n	4515		5807		13491		22097		904		2090		2695		8545	
F-stat	70,77***		100,56***		233,54***		726,28***		31,43***		42,39***		80,9***		333,61***	
R-squared	0,2908		0,3115		0,3108		0,4611		0,4618		0,33		0,421		0,4845	

\*\*\*, \*\*, and \* mean statistically significant at the 1%, 5% and 10%, respectively. Robust standard errors

## 6.2 Determinants of Wage Gap between Formal and Informal Sectors

In this study, it is found that there is dualistic labor market in the formal and informal employment in terms of wages, even after controlling the individual characteristics. Indeed, wage differential is mostly triggered by individual characteristics of workers and size of firms. Table 6.2.1 and Table 6.2.2 show the mean log wages and means of log wage differentials between formal and informal sector for years 2007 and 2008, respectively. It indicates that wages in the formal manufacturing and service sector are significantly higher than wages in the informal sector. Firm size is important factor that causes the wage differentials.

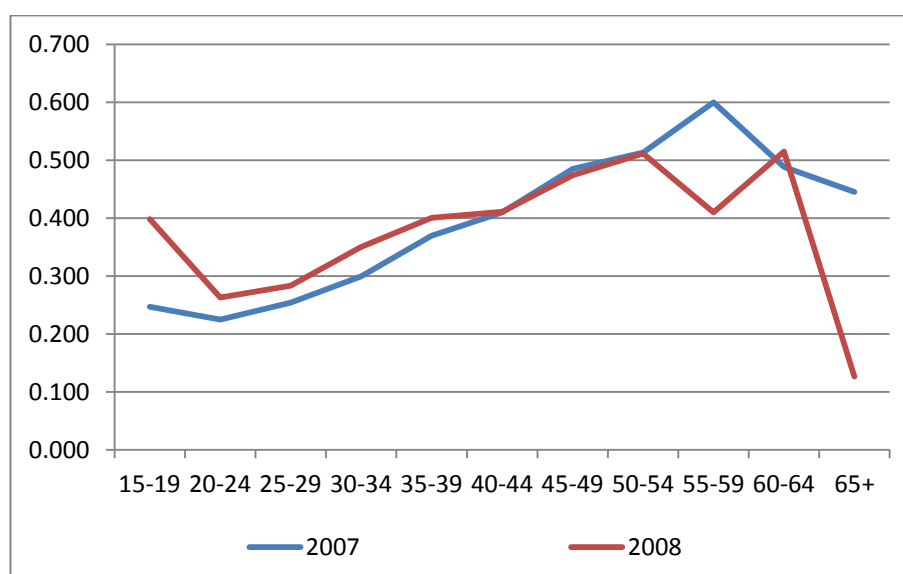


Figure 6.2.1: Mean Log Wage Differentials in Manufacturing Sector with respect to Age Groups, Men

Figure 6.2.1 conceals the mean log wage differentials of men for manufacturing sector with respect to the age groups. Figure 6.2.2 indicates the same relationship for women. According to these figures, as women's and men's age increases, the wage gap also become larger. Especially it reaches the maximum levels at middle ages in the manufacturing sector. For women, wage difference between formal and informal manufacturing and service sector are much higher than that of men.



Table 6.2.1: Mean Log Wages and Differentials, 2007

2007	Manufacturing			Service		
MALES	mean(lw1)	mean(lw3)	Mean Diff. (lw3-lw1)	mean(lw2)	mean(lw4)	Mean Diff. (lw4-lw2)
<b>Age Groups</b>						
15-19	5.762	6.009	0.247	5.569	5.978	0.409
20-24	6.083	6.308	0.224	5.970	6.364	0.394
25-29	6.179	6.433	0.254	6.047	6.567	0.520
30-34	6.226	6.525	0.299	6.151	6.716	0.565
35-39	6.216	6.585	0.369	6.194	6.792	0.598
40-44	6.225	6.635	0.410	6.168	6.805	0.637
45-49	6.238	6.723	0.485	6.172	6.890	0.718
50-54	6.259	6.772	0.513	6.222	6.969	0.747
55-59	6.210	6.810	0.600	6.158	6.913	0.755
60-64	6.274	6.763	0.489	6.089	7.131	1.043
65+	6.303	6.748	0.445	5.939	6.748	0.809
<b>Education</b>						
Primary School	6.164	6.403	0.238	6.038	6.447	0.409
Secondary School	5.940	6.378	0.437	5.835	6.486	0.651
High School	6.179	6.534	0.355	6.052	6.662	0.610
Vocational High S.	6.163	6.603	0.441	6.023	6.640	0.617
University	6.515	7.019	0.504	6.482	7.106	0.624
<b>Firm Size</b>						
< 10	6.058	6.376	0.319	5.942	6.419	0.477
10-24	6.214	6.440	0.226	6.175	6.667	0.492
25-49	6.224	6.452	0.229	6.272	6.742	0.470
50 >	6.360	6.585	0.225	6.422	6.883	0.462
<b>FEMALES</b>						
<b>Age Groups</b>						
15-19	5.837	5.959	0.122	5.576	5.989	0.413
20-24	5.942	6.222	0.280	5.796	6.353	0.556
25-29	5.804	6.386	0.582	5.824	6.623	0.799
30-34	5.566	6.437	0.871	5.734	6.812	1.079
35-39	5.599	6.383	0.784	5.685	6.868	1.184
40-44	5.599	6.376	0.776	5.835	6.812	0.977
45-49	5.892	6.295	0.403	5.823	6.837	1.014
50-54	5.439	6.510	1.071	5.873	6.904	1.031
55+	5.552	6.292	0.740	5.897	6.962	1.065
<b>Education</b>						
Primary School	5.705	6.156	0.451	5.677	6.160	0.483
Secondary School	5.834	6.104	0.269	5.716	6.165	0.450
High School	5.938	6.352	0.414	5.801	6.430	0.629
Vocational High S.	5.780	6.297	0.517	5.816	6.503	0.687
University	6.288	6.810	0.523	6.270	6.935	0.665
<b>Firm Size</b>						
< 10	5.404	6.254	0.850	5.696	6.337	0.641
10-24	5.977	6.304	0.327	6.001	6.653	0.652
25-49	6.039	6.323	0.284	6.038	6.697	0.658
50 >	5.961	6.329	0.368	6.000	6.825	0.826

Table 6.2.2: Mean Log Wages and Differentials, 2008

2008	Manufacturing			Service		
MALES	mean(lw1)	mean(lw3)	Mean Diff. (lw3-lw1)	mean(lw2)	mean(lw4)	Mean Diff. (lw4-lw2)
<b>Age Groups</b>						
15-19	5.757	6.155	0.398	5.603	6.081	0.477
20-24	6.164	6.427	0.263	6.032	6.494	0.461
25-29	6.284	6.568	0.283	6.203	6.694	0.491
30-34	6.315	6.665	0.350	6.256	6.829	0.573
35-39	6.317	6.717	0.400	6.304	6.903	0.599
40-44	6.331	6.741	0.411	6.319	6.932	0.613
45-49	6.374	6.848	0.474	6.248	6.986	0.738
50-54	6.337	6.848	0.512	6.217	7.083	0.866
55-59	6.368	6.777	0.410	6.249	7.060	0.811
60-64	6.502	7.016	0.515	6.123	7.196	1.073
65+	6.309	6.435	0.127	6.137	7.233	1.096
<b>Education</b>						
Primary School	6.256	6.530	0.273	6.146	6.572	0.426
Secondary School	6.011	6.512	0.501	5.911	6.587	0.676
High School	6.201	6.654	0.453	6.147	6.760	0.612
Vocational High S.	6.266	6.700	0.434	6.089	6.741	0.652
University	6.894	7.139	0.245	6.517	7.228	0.711
<b>Firm Size</b>						
< 10	6.140	6.492	0.352	6.028	6.538	0.510
10-24	6.332	6.561	0.229	6.291	6.776	0.486
25-49	6.304	6.580	0.277	6.383	6.875	0.491
50 >	6.425	6.713	0.289	6.484	6.998	0.514
<b>FEMALES</b>						
<b>Age Groups</b>						
15-19	5.939	6.153	0.215	5.612	6.091	0.479
20-24	6.036	6.350	0.314	5.872	6.467	0.595
25-29	5.876	6.529	0.653	5.936	6.782	0.847
30-34	5.739	6.628	0.889	5.843	6.905	1.062
35-39	5.623	6.539	0.916	5.822	6.932	1.110
40-44	5.684	6.468	0.784	5.825	6.931	1.106
45-49	5.750	6.426	0.676	5.928	6.968	1.040
50-54	5.525	6.593	1.068	6.089	7.029	0.939
55+	5.305	6.293	0.988	5.771	7.086	1.315
<b>Education</b>						
Primary School	5.761	6.285	0.523	5.734	6.270	0.537
Secondary School	5.925	6.267	0.343	5.804	6.280	0.476
High School	6.024	6.474	0.450	5.894	6.547	0.653
Vocational High S.	5.773	6.442	0.670	5.947	6.591	0.644
University	6.566	6.995	0.428	6.321	7.060	0.739
<b>Firm Size</b>						
< 10	5.465	6.439	0.974	5.768	6.466	0.698
10-24	6.114	6.426	0.312	5.998	6.754	0.756
25-49	6.112	6.452	0.340	6.162	6.814	0.652
50 >	6.078	6.490	0.412	6.210	6.948	0.739

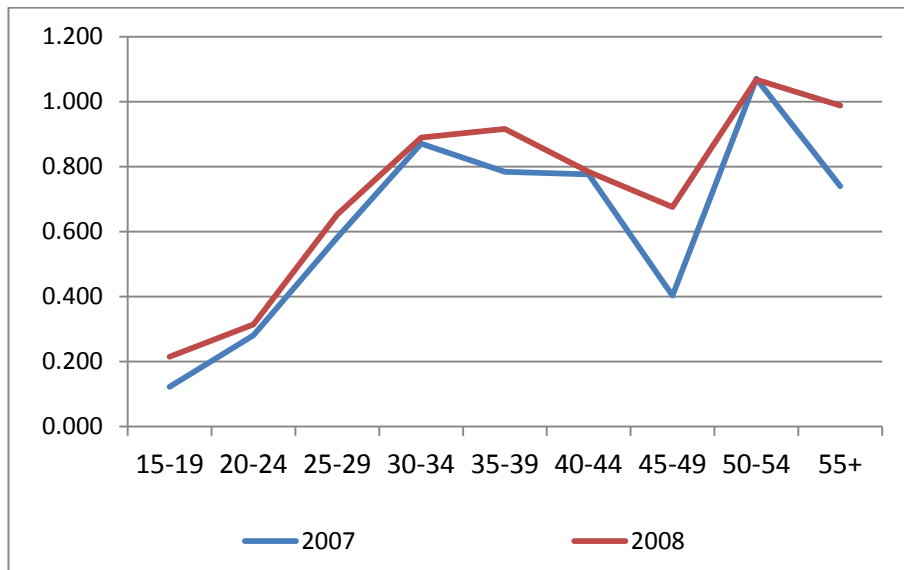


Figure 6.2.2: Mean Log Wage Differentials in Manufacturing Sector with respect to Age Groups, Women

These results prove that dualistic labor market is more severe for middle aged workers in terms of wage rates.

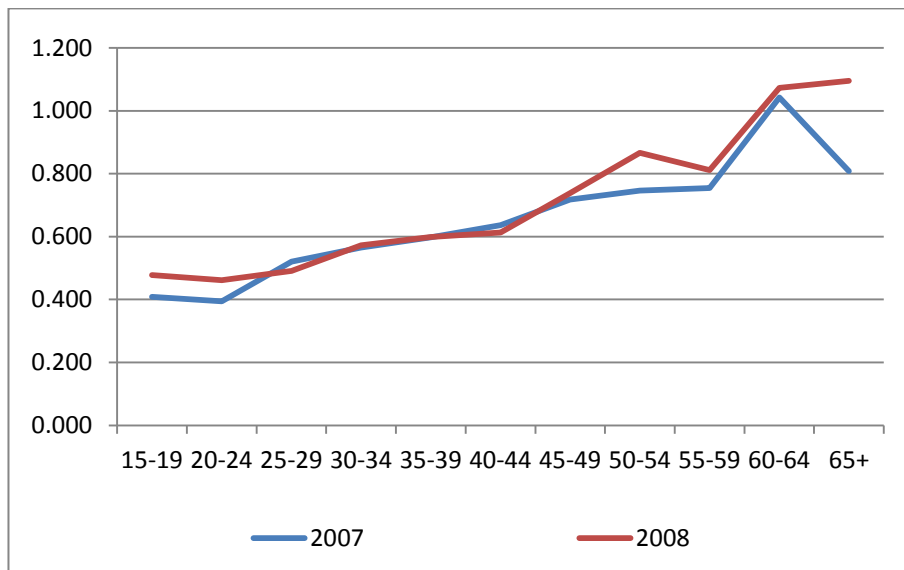


Figure 6.2.3: Mean Log Wage Differentials in Service Sector with respect to Age Groups, Men

Figure 6.2.3 and Figure 6.2.4 indicate the same relationship for service sector, and for males and females, respectively. In the service sector the effects of being older on the wage differentials are much more than any other age groups. Because older workers have more experiences than others in the service sector, they get higher wages in the formal sector than their counterparts working in the informal service sector. Thus, this situation leads to largest wage differential in the old age groups.

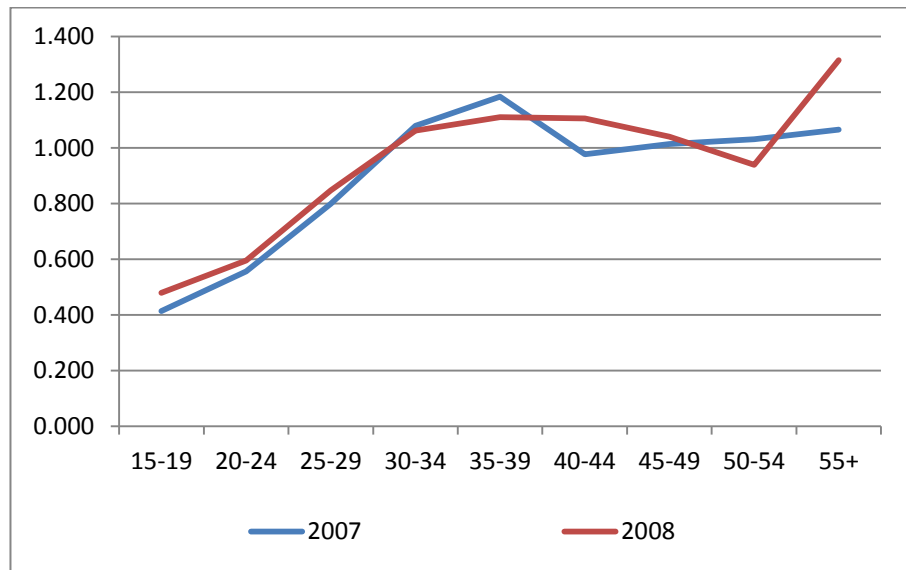


Figure 6.2.4: Mean Log Wage Differentials in Service Sector with respect to Age Groups, Women

As an individual characteristic, education has significant contribution to the wage differences between formal and informal sector for both male and female workers. As the level of education increases, this differential gets larger dramatically, especially in the service sector.

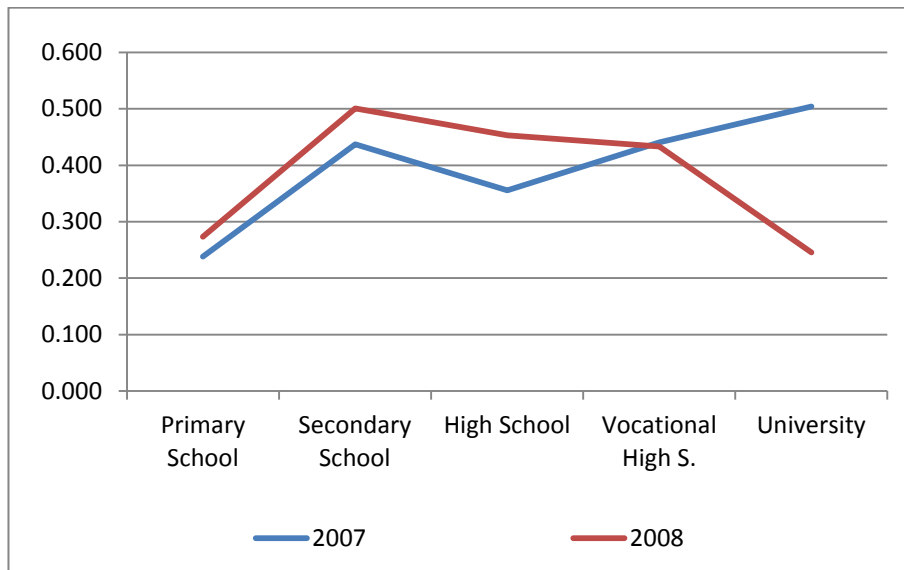


Figure 6.2.5: Mean Log Wage Differentials in Manufacturing Sector with respect to Education, Men

Figure 6.2.5 and Figure 6.2.6 indicate the effect of education levels on the wage gap between formal and informal manufacturing sector for men and women, respectively.

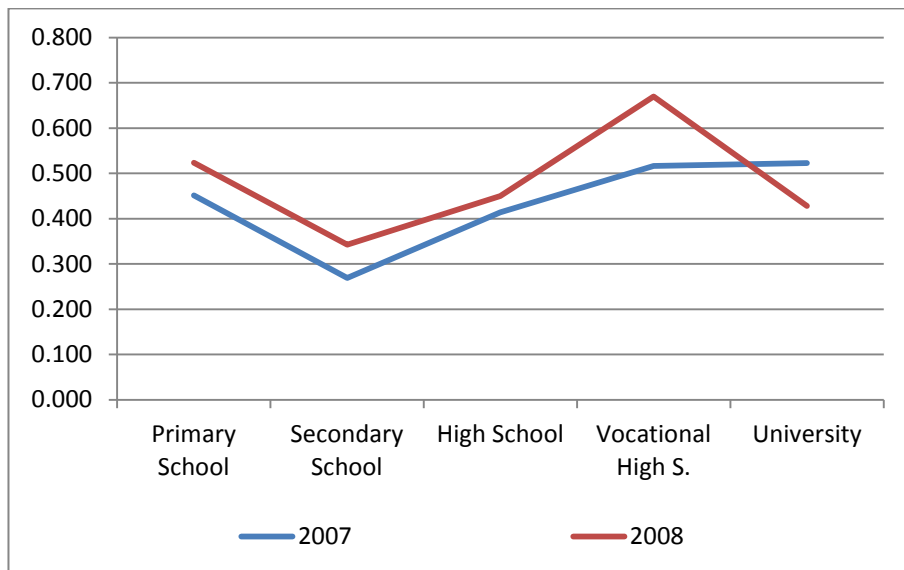


Figure 6.2.6: Mean Log Wage Differentials in Manufacturing Sector with respect to Education, Women

As can be inferred from these figures, wag gap is higher for female than men, even after controlling the education levels. Among women workers, the wage gap is more than those who graduated from vocational high school in manufacturing sector.

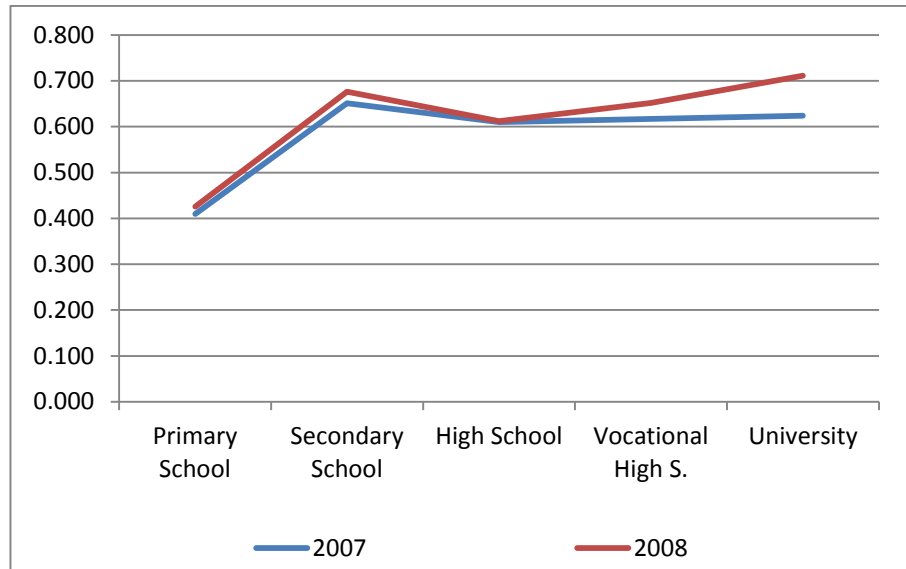


Figure 6.2.7: Mean Log Wage Differentials in Service Sector with respect to Education, Men

In the service sector, wage gap is positively related to the education levels for both women and men as indicated in the Figure 6.2.8 and Figure 6.2.9. Indeed, being university graduate has most effect on wage gap between formal and informal service sectors. This proves the argument that there is dual labor market, even after controlling the education levels of workers.

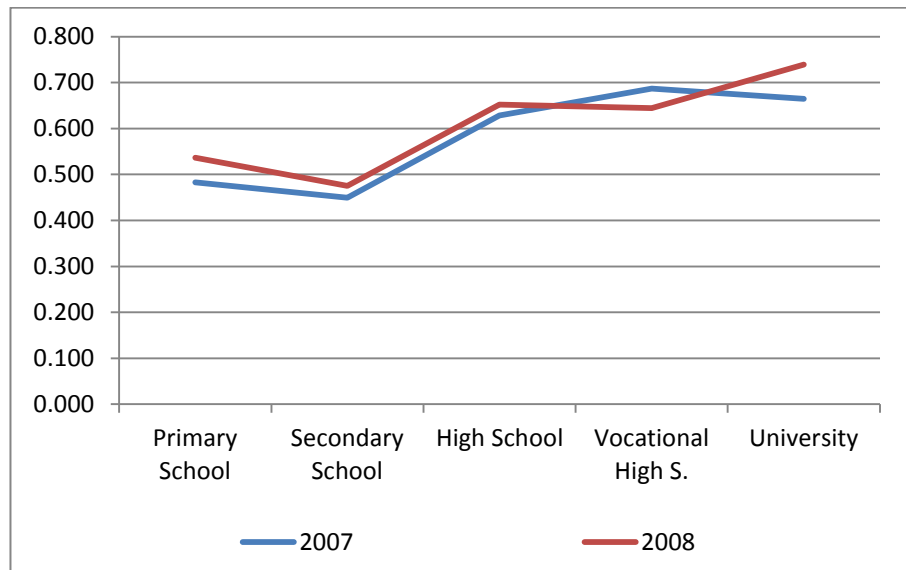


Figure 6.2.8: Mean Log Wage Differentials in Service Sector with respect to Education, Women

According to findings of this study, firm size does have significant effect on the wage gap between formal and informal sector. Large firms are generally assumed to have institutional identity and they consubstantiate with formality. Because of these considerations, they are expected to treat workers fair-mindedly in determining the wage rates; while small sized firms are not. In line with these expectations, resulting wage difference between formal and informal sector indicate that small firms in manufacturing sector do not behave workers fairly. This situation is shown in the Figure 6.2.9 and 6.2.10 for men and women, respectively.

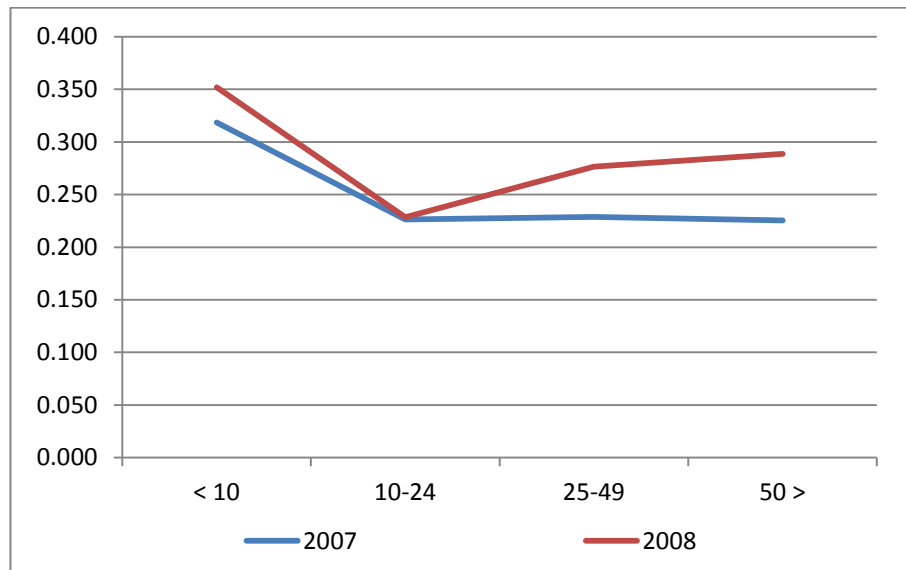


Figure 6.2.9: Mean Log Wage Differentials in Manufacturing Sector with respect to Firm Size, Men

In service sector, however, situation is the opposite. As firm size increases, wage differential between formal and informal sector is becoming larger.

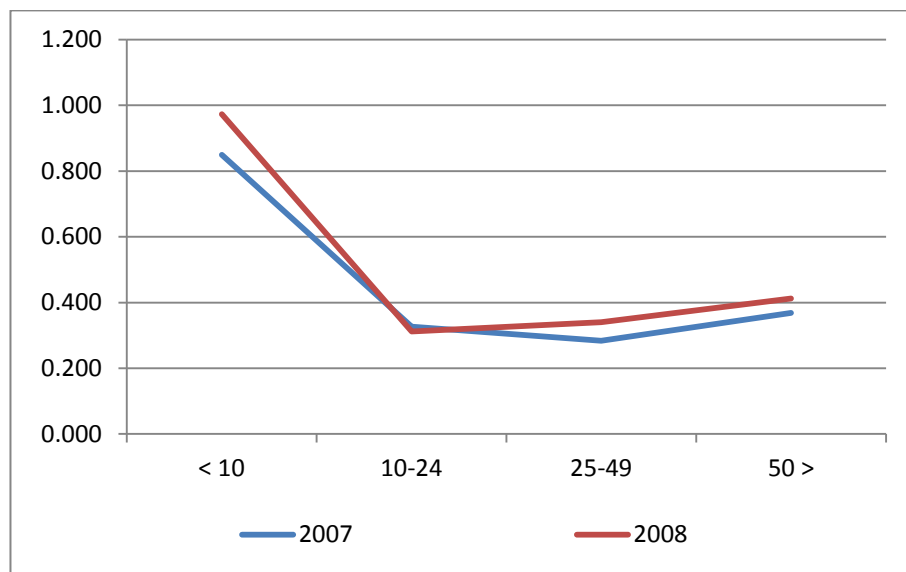


Figure 6.2.10: Mean Log Wage Differentials in Manufacturing Sector with respect to Firm Size, Women



## CHAPTER 7

### CONCLUSION

In this thesis, the existence of the wage gap between formal and informal sectors in Turkey is examined. We use 2007 and 2008 Household Labor Force Survey micro level data in our empirical analysis.

Although informal sector and informal employment are extensively debated in economics, they have no commonly accepted definitions. In this study, informal employment is defined as employment of workers without social security coverage in line with the ILO definition. HLFS conducted in 2007 and 2008 includes a question on social security coverage that is used to define informal employment. The wage rate is observable only for wage workers. Whether becoming a wage earner or not requires sector selection decision of individuals. Therefore, before estimating the wage equation, sector selection decision must be taken into account. In this study, sector selection process is modeled by multinomial logit equation, estimated by Maximum Likelihood method. In addition to unemployment/no participation (the base category) state, multinomial logit model has six outcomes, namely working in i) informal manufacturing sector, ii) informal service sector, iii) formal manufacturing sector, iv) formal service sector, v) being self-employed, and vi) being employer. An individual is assumed to choose one of these alternatives. If she/he chooses wage employments (alternatives i-iv) then her/his wage will be observed for that position.

Selection, however, may not be a random process independent of the wage equation, so that OLS estimation would be biased. In order to eliminate the so-called “selection bias”, the method introduced by Heckman (1976) and developed by Dubin and McFadden (1984) is applied by including multiple selection correction terms into the wage equation.

Estimation results of the multinomial logit model suggest that men and women have different labor market participation behavior even after controlling individual characteristics. While there is a negative relationship between the probability of working formally in the manufacturing sector and age of men, it is represented by a hump-shaped curve for women. For both men and women there is a hump-shaped relationship between age and the probability of working in the formal service sector, in line with our a-priori expectations. Middle ages are the most productive years for workers: middle-aged workers tend to earn more than young and old workers. They are also more likely to work in the formal service sector than young and old workers. Furthermore, the hypothesized U-shaped relationship between the probability of non-employment and age is supported by the data. This relationship is valid both for males and females. Young and old workers are more likely to be non-employed, i.e. middle-aged workers tend to have higher employment probability. The level of education is an important factor that affects the sector selection decisions. In line with our expectations, the probability of working informally decreases with the level of education. Hence, as the level of education increases the probability of working formally increases. This statement is valid both for men and women as well as for the non-employment; data implies that the level of non-employment declines as the level of education increases. However, there are different selection behaviors in the formal manufacturing and formal service sector. While male and female workers who are graduated from vocational school are more likely to work in the formal manufacturing sector than others, those graduated from university prefer more to work formally in the service sector than other workers with lower education levels.

Marital status has a significant effect on the sector selection process. It affects decisions of women and men differently, however. While men who are single or divorced do not prefer to work, being single or divorced encourages women to enter into the labor force so that the probability of being employed increases. Beside, single or divorced men who are in the labor force are more likely to work informally rather than working formally.

The effects of household size on parents and children have not been examined much in the literature. In this thesis, it is found that these variables have significant impact on sector selection decision. This impact, however, is not same for women and men. Household size has a positive effect on the probability of working in the informal manufacturing and service sectors for male parents and all children. In other words, men and children living in larger households have stronger tendency to work. Women have culturally more responsibilities for housework, and women parents living in larger households tend to stay out of the labor market.

Estimation results reveal that the existence of a registered person in the household significantly affects other family members' sector selection decisions. If there is at least one person who works formally and provides social security coverage for the family, other family members would be more likely not to work. Existence of a registered person in the household discourages other family members from working.

Mincer-type wage equations are estimated to find out the determinants of wages in formal and informal manufacturing/services. According to the estimation results, education, age, firm size and fulltime employment have significant and positive effects on wages. Our findings indicate that there is a significant wage gap between formal and informal sectors, even after controlling individual characteristics and the selection process. This supports the hypothesis that there exists a dual labor market. Moreover, since workers employed in the formal sector are more qualified than that of workers in the informal sector, they receive higher wages than informal workers.

This study shows that education is crucial for the wage determination for both men and women. Educated workers have more chance to get a formal job. While marriage encourages male workers to get a (formal) job, it discourages women from being in the labor market. The existence of unemployed household head and registered person in the household affect the other family member's decision about working formally and informally. Furthermore, household size has different effect on the decisions of children and parent workers. This study also proves that there was a segmented labor

market in terms of wages in Turkey in 2007 and 2008. Duality is caused by worker's access to a job which ensures the social security coverage. Employees working without social security insurance get low wage rate even if the individual characteristics are the same with those working with social security coverage. This situation creates inequality of opportunity for the identical workers. The analysis on the sources of wage differentials suggests that reducing the informal employment is a crucial policy towards creating the equality of opportunity and wages. Also complementary education policies should be developed that ensures the skills that are needed for entering the formal labor market.

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## APPENDIX A

### DEFINITION OF VARIABLES

2007 and 2008 Household Labor Force Survey micro level data are used in this study. This appendix presents the definitions of variables used in empirical analysis with references to the Household Labor Force Survey questionnaire.

#### Age

In the Household Labor Force Survey, question-S6 indicates the completed age group. There are fourteen age groups in the survey:

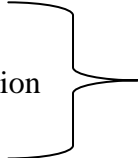
- |                        |   |                                   |
|------------------------|---|-----------------------------------|
| 1- Between 00-04 ages  | } | under 15 years old                |
| 2- Between 05-11 ages  |   |                                   |
| 3- Between 12-14 ages  |   |                                   |
| 4- Between 15-19 ages  |   |                                   |
| 5- Between 20-24 ages  |   |                                   |
| 6- Between 25-29 ages  |   |                                   |
| 7- Between 30-34 ages  |   |                                   |
| 8- Between 35-39 ages  |   |                                   |
| 9- Between 40-44 ages  |   |                                   |
| 10- Between 45-49 ages |   |                                   |
| 11- Between 50-54 ages | } | “55 years old and over” for women |
| 12- Between 55-59 ages |   |                                   |
| 13- Between 60-64 ages |   |                                   |
| 14- 65 ages and over   |   |                                   |



People under 15 years old are not included in the labor force thereby the first three age groups are excluded from the data. The last three groups are merged together and created “55 years old and over” age group for women. Thus, eleven age group dummy variables are defined for men; and nine age group dummy variables exist for women.

### **Education Level**


In the Household Labor force survey the question-S14 asks “*The highest level of education successfully completed*”. Following education levels are indicated in the question;

- 0- Smaller than six years old or illiterate
  - 1- Literate but not completed any educational institution
  - 2- Primary school
  - 3- Secondary school, vocational school at secondary school level or primary education
  - 4- High school
  - 5- Vocational or technical high school
  - 6- Higher education (university, faculty or upper)
- 

Since the primary education is obligatory in Turkey, the first two groups (“Smaller than six years old or illiterate” and “Literate but not completed any educational institution”) are included into “2-Primary School” group.

### **Marital Status**

Question-S19 asks to individuals their marital statuses. There are four marital status groups in the survey.

- 1- Single that is never married
  - 2- Married
  - 3- Divorced
  - 4- Widowed
- 

While defining the marital statuses, the last group (“4-Widowed”) is included into the third group “3-Divorced”. Thus, three dummy variables are created.

### **Firm Size**

Question S37a (“*Number of persons employed in this workplace/firm/org.*”) represents the firm size variable. Six firm size groups are defined in the survey:

- 1- Less than 10
  - 2- 10-24
  - 3- 25-49
  - 4- 50-249
  - 5- 250-499
  - 6- 500 and more
- } 50 +

Because of the insufficient number of observations, the last three groups are merged together and the resulting variable is called “50 or more”.

### **Status in Household**

In the household labor force survey, Question-S11 measures the relationship of respondent to the reference person in the household. (“*Relationship to reference person in the household*”) There are eight relationship categories:

- 1- Reference person
- 2- Spouse (or cohabiting partner)
- 3- Child of reference person
- 4- Bride or bridegroom
- 5- Grandchild
- 6- Mother / father in law
- 7- Other relatives
- 8- Non-relatives

To define the status in the household as “Child” or “Parent”, some groups are merged. “Child” is defined as “3-Child of reference person”, “4-Bride or bridegroom”, “5-Grandchild”. Also “7-Other relatives” and “8-Non-relatives” who are less than or equal “25-29” years of age are included into the “Child”.

“Parent” is defined as “1-Reference person”, “2-Spouse (or cohabiting partner)” and “6-Mather/father in law” groups are merged. “7-Other relatives” and “8-Non-relatives” who are older than “25-29” age group, are also included.

Status in the household is, then, captured by “Child” dummy variable. It takes the value “1” if the person is in the “Child” group; and takes the value “0”, otherwise.

### **Household Size**

The effect of household size is captured by two interaction variables: “Child\*Household Size” and “Parent\*Household Size”. Household size is equal to the (log) number of people living in the household.

### **Any Registered Family Members**

Question-s43 “*Are you registered with any social security institution related to your main job?*” indicates whether a person covered by social security scheme. This variable is renamed as “registered”. It takes the value “1” if person answer “yes” and takes the value “0”, otherwise.

“Any Registered Family Member” dummy variable is equal to one if there is at least one registered person in the household other than the person under consideration, and 0 otherwise.

### **Unemployed Household Head**

In the household labor force survey, the question-s39 indicates the employment statuses. Five employment statuses are defined in the question. :

- 1- Regular employee
- 2- Casual employee
- 3- Employer
- 4- Self-employed
- 5- Unpaid family worker

Before creating the “unemployed household head” variable (hhunemp), the employment variable (“employed”) is defined. The “employed” variable takes the value “1” if the reference person is employed as a regular employee, casual employee, employer, self-employed, unpaid family worker, and 0 otherwise. “Non-employed household head” variable is equal to 1 if the household head is not employed, and 0 otherwise. By definition, this variable takes 0 also for all household heads.