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Reforms and Employment in The Egyptian Labor Market: Evolution by Age From 1988 to 2006

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Abstract

This paper aims to study the evolution in the age composition of males' employment in the aftermath of the public sector downsizing in the 1990s -during the Economic Reform and Structural Adjustment Policies - and the new labor law in 2003. This answers the question of whether young (15-29) and older (50-59) male workers were the most likely to bear the brunt of the 1990s reforms and the new labor law in 2003. Employment, formality and hours-of-work are simultaneously estimated by maximum likelihood to control for the self-selection, using three repeated cross sectional samples from Egyptian Datasets conducted in 1988, 1998 and 2006. Results show that men aged (15-29) and those aged (50-59) were less likely, as compared to their peers in middle age (30-49), to be employed in 1998 than in 1988 (before the first reform). While informality has affected all age groups, the 30 to 49 years old were the category that experienced the most rapid increase in informality as compared to the other two age groups. Findings also show evidence of negative correlation between the probability of employment and the probability of having a formal job, indicating that those who have more incidence to work in formal jobs are more likely to remain unemployed or inactive.

Keywords: Structural Adjustment Programs, Labor Supply, Informality, Simultaneous Equations, Middle-East, Egypt.

J.E.L.: J08, J21, N35, C3.

1 Introduction

Since the early 90s, Egypt has implemented an Economic Reform and a Structural Adjustment Program (ERSAP) to resolve the economic problems experienced at the end of the 80s. Large and unsustainable budget deficits and external debts were among the most serious issues that need to be addressed. The main reforms introduced were the reduction in the public expenses, downsizing the public sector (PS), the privatization of the State Owned Enterprises (SOEs), and liberalizing international trade. The rationale of the ERSAP was to re-orient the Egyptian economy towards a free market economy through the reduction of the State role in the economy and the stimulation of the private sector. Indeed, such a change in the macroeconomic environment has affected the labor market mechanisms, as witnessed in other developing countries that applied similar reform programs.

The public sector was downsized by limiting entry to and encouraging exit from public jobs. The young, mainly the new entrants (15-29 years old), as well as older workers (50 years old and above) were the main two age groups that were likely to be affected by such reforms. Parallel to such contraction in the public sector job opportunities, the formal private sector did not succeed in absorbing the flow of labor supply. Moreover, the capacity of recruitment for the private sector was limited due to the restrictive employment protection legislation. As a result, the labor movement into unprotected jobs with flexible entry, i.e. informal employment, has accelerated. While suspecting that the labor market rigidities could be the reason behind the increase in informality, the government has passed a new labor code (Law No. 12) in 2003. This law brought more flexibility in hiring and firing procedures. Therefore, its objective was to encourage employers to formalize their workers or to formally employ their newly hired ones.

The main objective of the paper is to first present a theoretical analysis of the Egyptian labor market and second to analyze how employment outcomes of particular age groups vary over time, particularly in the aftermath of the ERSAP reforms introduced in the 1990s and the new labor law of 2003. Relying on cross-sectional samples of males aged 15 to 59 in three points of time: before, during and after the reforms, reduced-form equation for the probability of employment, the probability of having a formal job and the weekly hours of work are simultaneously estimated. Thus, in the estimation of the probability of having a formal job, the selection into labor market is taken into account. Moreover, in the estimation of the hours of work, the selection into formality and labor force participation is also accounted for. The introduction of age-groups dummies (15-29 and 50-59), year dummies (1998 and 2006) and the interaction between these dummies can be interpreted as a difference-in-difference approach. I consider the young age group (15-29) and the older age group (50-59) to be the “treatment” groups, as compared to the “control group” which is the prime age group (30-49). This is not a standard difference-in-difference approach in two regards. First, the control group, being the prime age population (30-49) is not comparable to the two treatment groups: the young and older age groups. Second the set of reforms, whether ERSAP or the new labor law, affected all the three age groups. This means that there is not a single age group that was not influenced by the reforms, suggesting that even the control group could have

been affected. However, it is expected that the response of each of the age groups to the reforms is different, and consequently the intensity of the impact could be distinguished across age-groups. This followed technique serves to assess if young (15-29) and older (50-59) age groups were relatively more likely to bear the brunt of the 1990s reforms in terms of labor market outcomes (work decision, formality of employment, and hours-of-work) as compared to the prime age workers (30-49), and if the new law of 2003 had any positive age-differentiated effect on this labor market outcomes.

Results show that the ERSAP reforms were associated with reduced employment chances for young men (15-29) and older men (50-59) in 1998, as compared to those aged 30 to 49 years. Similar trends have been observed in 2006. The incidence of holding an informal job has increased between 1988 and 1998, for both young and prime age men. However, the increase in informality for the prime age was more rapid than for the young age. Older workers have more probability of holding formal jobs, even if more excluded from the labor market. Young and prime men have experienced higher hours of work in 1998 presenting evidence that hours of work are positively correlated with informal employment. Alternatively, looking at the probability of working in the public sector, while older men were more likely to have a public job in 1998 relative to the 30 to 49 men, the latter were more likely to work in the private sector. The increase in the probability of working in the private sector has also increased more rapidly for the prime than for the young ones. There was no clear association between the 2003 law and employment outcomes. More specifically, it was noticed that the probability of informal employment continues to increase for the prime age men. The difference-in-difference in informality for either the young or old as compared to the prime age group was not significant, suggesting that the same trends observed in 1998 continued for both young and old.

This paper contributes to a growing literature that investigates the impact of the Structural Adjustment Programs in developing countries. The change in the gender composition of employment was one of the main impacts of the ERSAP, as found in studies concerning Latin America and the Middle East countries (Cagatay and Osler, 1995; Cerrutti, 2000; Assaad and Arntz, 2005). Likewise, the impact of ERSAP on poverty and income inequality was another point of focus (Handa and King, 1997). El-Hamidi and Wahba (2005) also studied the impact of ERSAP on the youth unemployment during 1988 to 1998. The age composition of the employment and its evolution in the period of reforms is a new dimension analyzed by the paper. It is also a contribution to the existing literature on informal employment in Egypt (Wahba and Mokhtar, 2002; Assaad and Arntz, 2005; Wahba, 2009).

The paper is organized as follows. Section 2 describes the Egyptian context, mainly the structural adjustment policies and the new labor law drawing on recent literature and present recent stylized facts. The description of the data sources is presented in section 3. Then, section 4 tackles the methodology while introducing with discussion on the theories explaining the presence of informal jobs and the expected impacts for Egypt. Estimations results are presented in section 5. Finally, section 6 concludes.

2 Background: The Egyptian labor market in light of ERSAP

2.1 Theoretical Discussion and Expectations

The utility maximization through the life cycle is the conventional theoretical approach explaining individual labor market outcomes (Heckman 1978; Heckman 1993). The individual allocates his time between work and leisure. He/she is also supposed to maximize the utility by choosing whether to have a formal job or not and how many hours of work to perform. The introduction of the choice between formal versus informal employment broadens the discussion to another family of models that analyze the existence and the nature of the informal sector and jobs.

The presence of formal and informal employment or sector in the economy can find its explanation in the dual labor market theory where there is a high productivity "primary" and a low productivity "secondary" sector. The dualistic labor market found its first illustrations in the Lewis model (1945) which explained that the market can be segmented in two labor markets: the modern industrial sector "capitalist" and the traditional -agricultural - sector. The higher wage offered in the industrial sector would attract the surplus labor in the traditional one, up to the point that the wage in the traditional one would rise and poverty would be reduced. The model thus supposed that all those who could not find a job in the modern sector would take up a job in the traditional "lower quality" sector. Thus, unemployment did not exist in such model. Then this dualistic approach has been further elaborated and developed. For instance, Harris and Todaro (1970) introduced the idea of the presence of unemployment besides the idea of migration. The modern industrial sector is urban while the traditional one is rural. Wages in the modern sector are higher than the market-clearing level due to institutional reasons such as minimum wages or strong unionization, etc. Therefore, individuals prefer the modern sector than the traditional sector and rural residents migrate to urban areas in order to get a job in the better-paid sector. However, there are not enough opportunities for all the rural migrants. Therefore, urban unemployment is observed. This model explained the presence of three states in the labor market: a modern one that can be called a "formal" sector, a traditional one symbolizing the "informal" sector and the urban unemployment state that is what rural migrants afford in case of not finding a job in the modern sector. However, this model lacked the presence of an informal job in the urban sector. Fields (1975) proposed an extended model for Harris and Todaro (1970) with a fourth state which is the urban informal sector. In the absence of social transfers in case of unemployment, urban job seekers who cannot afford not having a steady labor income would recur to what is called the informal sector jobs which are mainly with easy entry. Such jobs are necessarily of lower quality than formal sector jobs, in terms of benefits, wages, stability, etc. Such models family concluded that because of the above market-clearing wages set due to efficiency wage theories or to institutional reasons (the minimum wage or the strong unionization, etc), segmentation between formal and informal jobs can exist. However, recent studies did not content only with the distinction between the formal sector as the primary better one and the informal sector as the secondary one, but they also suggested that the informal sector is heterogeneous in the sense that it can encompass a sort of "upper-tier" employment that is chosen and another "easy entry" one

that is undergone or endured¹ (Fields, 1990; Maloney, 2004; Cunningham and Maloney, 2001). The informal sector is not always viewed as the disadvantaged or the less-advantaged sector in a dual segmented market. Many workers have a taste for informality, thus voluntarily sorting themselves into informal jobs - mainly self-employment or being entrepreneurs - as they may seek greater flexibility or independence. Thus, some individuals have some "comparative advantage" in working in the informal sector or informal employment. Maloney (2004) stated examples of such a preference for certain types of informality. For instance, being an entrepreneur or owning oneself own business might be of higher social value and prestige in some countries. Likewise, informal jobs can represent a "safety net" for the older workers since they cannot come back to the formal jobs, legally, because they exceeded the retirement age. More specifically, it was found that older workers preferred moving to informal employment opportunities after the economic reforms of the structural adjustment in the 1990s. This is because their skills were not as much valued or demanded by the post-reforms emerging sectors or companies. Rather, their skills were considered as out-dated. According to Maloney (2004), this implied that the taste for informality might be due to labor market dualism rather than the other way round which sees segmentation (i.e. the wage difference between two sectors) as the root cause for informality. Self-employment being attractive for some workers leaves space for market segmentation. It was also observed that some workers preferred the informal sector as a safety net during the crisis times. The non-pecuniary aspects of formal jobs might not be important enough to outweigh the drop in wages of formal jobs in times of recession. Therefore, individuals choose informal jobs where the benefit is only pecuniary (i.e. monetary). This happens when social security/health provisions systems are not efficient enough or when social benefits are very weakly linked to contributions, which is the case in Egypt and many developing countries (Gindling, 1991; Dickens and Lang, 1985; Pradhan and van Soest, 1995; Tansel, 2005; Arias and Khamis, 2008).

The Egyptian labor market during the 1990s and the 2000s shared many features of the discussed theories but can also be different in many regards. The Egyptian labor market may lie within the framework of the above market-clearing wage set institutionally (Fields, 1990). First, the old labor code (before 2003) prohibited dismissing workers, except in the rarest conditions. Moreover, the dismissal procedures were very complicated. Thus, the labor market was marked by highly restrictive employment protection. Second, the public sector "pay policies" (Fields, 2009:11) play an important role in creating a strong preference for the formal public jobs. The Egyptian public sector (mainly governmental jobs) does not offer a better-paid job, rather it provides a package of benefits (pecuniary and non-pecuniary) that attract the individuals for this kind of jobs. According to what happened during the 1990s, the state began to gradually reduce its recruiting responsibility in the government and the SOEs job opportunities. This type of job was and is still the first preference for the new entrants to the labor market because of its benefit packages, the stability, and the guarantee of holding this job for the lifetime (until reaching the retirement age). Drawing on the Egyptian studies and the stylized facts, the labor supply pressure was greater than the employment growth in the private sector (the other alternative to the public

¹ Due to the above mentioned explanations

sector). It might also be that the skills of the newly graduates do not match the requirements of the private sector leading that a minority can reach these jobs but the rest of new entrants have limited access to such private sector jobs. Thus the reduction of the labor allocation in the public sector jobs in addition to the low employment growth in the private sector may have led to two potential results: longer waiting queues for public jobs that may be translated into higher unemployment, and for those who cannot afford unemployment, more recurrence to temporary² and unprotected jobs. While the Harris and Todaro model (1970) supposed that anyone who wants a job in the rural sector would find it due to its free-entry nature, this might be not plausible in the Egyptian labor market. With the developing trend of informality in formal firms, opportunities of formal jobs inside the firms become limited and thus not at the reach of job seekers. Unemployment may also arise, neither because waiting for a public job nor being unable to have a good job in the private sector, but because of being unable to have even an informal job in the private sector.

The first subject to these reforms are the young persons, or the new entrants, with no experience/not enough developed skills, and not enough connections to make them reach a public job opportunity or a private one, etc. Thus, the first expected result of the ERSAP reforms on the labor market is more informality for young people who cannot afford staying in unemployment. Informal jobs being not regulated and not protected may involve higher number of hours than the formal jobs. Thus, higher hours of work are also expected to happen in this period. The second reform, which is restructuring the labor excess in the SOEs, can affect older workers' employment prospects. As discussed by Maloney (2004), young entrants may have difficulty joining the private sector due to lack of required skills. Thus, they either end up in inactivity or in informal employment. The prime age working group aged of 30 to 49 years might be the most stable cohort. Unlike new entrants, they should have overcome their labor market entry challenges. The reforms in the public sector, for instance, should not affect them. From the private sector side, this age group might have higher labor demand than the 15 to 29, given their more developed and customized skills, especially those in the mid 30s. There is no expectation, *a priori* for their informality trends. During the 2000s, the passage to a new labor aimed to reduce informality by rendering laying-off workers permitted with more flexible conditions and by simplifying the hiring conditions. The expected trend would be more formalization among the already-employed persons, of any age group. It also may increase the likelihood of finding a formal job for the new entrants. The latter expectation should, however, be strengthened by favorable paths of both GDP and employment growth rates.

2.2 Stylized Facts: What happened to Employment Outcomes ?

According to Assaad (2002), yearly employment growth during the period of Structural Adjustment was about 2.5%. The PS recorded the highest share of employment growth between 1988 and 1998, in spite of all the efforts of cutting down the public spending. The reason behind such increase is that government employment continued to increase by 4.8% per year. On the other

² Temporary jobs usually involve not affiliating the worker to the social security, and to a greater limit writing him a contract

hand, the SOEs employment effectively decreased by 2.5% per year but it did not outweigh the increase in the government employment, leading to an overall increase in the PS employment. Between 1998 and 2006, the PS shrank significantly since the SOEs employment continued to decline along with an increase in government employment but with slower pace than its increase during 1988 to 1998 and by smaller rates than the total employment growth (Assaad, 2002; Assaad, 2009).

Consequently, the fiscal tightening measures implied by the ERSAP such as the downsizing of the public sector and the SOEs privatization may have affected employment trends of some workers' categories like, a priori, the new entrants or young workers (15-29) and the older workers (50-59), as compared to the prime age working group (30-49) who, being not directly subject to any policy, can be expected to have relative stable paths. Indeed and as above expected, the data used in this paper³ shows that young (15-29) and older (50-59) men experienced a decline in their employment levels in 1998, as compared to 1988. Then, in 2006, their employment-to-population ratio re-increased, albeit with higher growth rate for young men than their older peers. On the other hand, from 1988 to 2006, employment of the prime-age group almost remained unchanged (Table 1).

[Table 1 is about here]

As for formal employment evolution, Assaad (2009) stated that the share of informal wage employment declined from 75% to 70% in the private sector, over the period 1998 to 2006.⁴ Likewise, over the same period, Wahba (2009) found that the likelihood of moving from informal⁵ to formal employment was higher after 2003, i.e. the introduction of the new law, than in the years before. Yet, informal employment represents an important and increasing share of total employment. According to Assaad (2009), it is around 57% and 61% of overall employment in 1998 and 2006, respectively.

Moreover, the data used in this paper indicate that overall, the share of formal employment among men declined from 52.7% to 44.8% (around 8 percentage points) during 1988-2006 where the decline during 88-98 was by around 2 percentage point. The decline in formal employment was cutting across all age groups between 1988 and 2006. The only exception was for the 50-59 who experienced an increase in their formal employment from 64% in 1988 to 67% in 1998 (Table 2). During 1988 to 1998, the share of those formally employed among the young dropped by around 5 percentage points (from 31.5% in 1988 to 26.1% in 1998) while it decreased by around 3.5 percentage points for the prime age workers from 65.5% in 1988 to 61.9% in 1998. However, during the second period, i.e. from 1998 to 2006, the 30 to 49 witnessed their share of formal employment falling with 6 percentage points as compared to a drop of 2 and 4 percentage points for the 15 to 29 and the 50 to 59 years old workers, respectively. It is important to show that workers ageing 15 to 29 years had the lowest share of formal employment, witnessing the

³ The data are presented in Section 3

⁴ A formal recruitment of a worker means that he has either a legal contract or has been affiliated to the social security by his employer.

⁵ The study found a significant result only for those who were previously employed in the informal private non-agricultural sector and the informal private non-agricultural waged sector

characteristic phenomenon of the Egyptian Labor market that the new entrants are the most likely to be informal.

[Table 2 is about here]

As for hours-of work, they have also changed accordingly with the change in the distribution between formal and informal jobs. Hours of work⁶ showed different trends across the formal and the informal jobs, the public and the private sector as well as across age groups. First, Figures 1 and 2 show the distribution of weekly hours-of-work that are indicated by every male worker aged between 15 and 59 years. Weekly hours presented in these figures are composed of 7 main categories of hours: 0-14, 15-24, 25-34, 35-44, 45-54, 55-64, 75 and above. In general, the formal jobs and the public sector follow similar trends in comparison to informal jobs and the private sector, respectively. Irrespective of the formality status or the sector, hours of work increased over the 1988 to 2006 period. Cutting down by sector or formality status, it is observed that the majority of workers in formal jobs or in the public sector performed between (35 to 44) or (45 to 54) hours per week, respectively.

[Figure 1 is about here]

[Figure 2 is about here]

Hours in formal and informal jobs followed different trends over time. Across all age-groups, there was an increasing trend in the weekly hours of work in formal jobs from 1988 to 2006 for the young and the prime age groups, while it was almost constant for the older-age group. As for informal jobs, all age-groups experienced an increase in their hours of work from 1988 to 1998. However, the change in hours-of-work during 1998-2006 followed different patterns according to the age group. In 2006, informal young workers perform lower hours than their formal peers. On the other hand, informal prime age and older age workers perform higher hours than their formal peers. Informal prime age workers performed higher hours than their formal peers since 1988 and this hours gap between informal and formal workers increased. Hours of work for informal older age workers were lower in 1988, as compared to their formal ones.

3 Data and Definitions

This paper relies on three Egyptian microeconomic datasets: the Labor Force Sample Survey (LFSS 1988), the Egyptian Labor Market Survey (ELMS 1998) and the Egyptian Labor Market Panel Survey (ELMPS 2006). Those datasets were carried out on nationally representative samples of 28286, 23997 and 37140 individuals, respectively. ELMS 1998 was designed to be comparable to the special round of the LFSS carried out in October 1988. The "ELMPS 2006" is the second round of what is intended to be a periodic longitudinal survey that tracks the socio-economic and the demographic characteristics of the households and individuals interviewed in 1998. It was done on 3684 households from the original ELMS 98 to form a panel data; on any new households that might have formed as a result of splits from the original households (2167 households); as well as on a refresher sample of households (2498) to ensure that the data continue to be nationally

⁶ Stylized facts about hours-of-work are presented for men only. This is to confuse the reader with too many descriptive statistics and to remain focused on the objective

representative.⁷ This paper relies on the 15 to 59 years old cross-sectional samples of males extracted from the LFSS 88, the ELMS 98 and the ELMPS 06. Males samples are about 7617, 7320 and 11756 individuals in 1988, 1998 and 2006, respectively. While the empirical analysis relies on the males' samples in these three mentioned years, stylized facts are presented both for men and women to show the evolution by gender.

In the analysis, older workers are considered to be those aged between 50 and 59 years old. At 50 years old, most of the insured workers are eligible to claim for their early retirement pensions. The mandatory age of retirement is at 60 years old for most of workers (mainly wage workers according to the Social Insurance Law). Therefore, the upper limit in this study is chosen at 59 since it is expected that at the retirement age "60", employment will naturally drop for this category of workers and independently than any reforms. Employment is defined according to the extended definition of labor force which is "the production and processing of primary products, whether for the market, for barter, or for their own consumption; the production of all other goods and services for the market; and the corresponding production for own consumption in the case of households producing such goods and services for the market" (Assaad 2009, p.5). Relying on the extended definition enables to integrate data from LFSS 1988 in the study, since this dataset provides only information on the extended labor force participation.⁸ The employment-to-population ratio is the variable of concern studied in the ensuing analysis. This ratio is defined as being the number of employed individuals among the working age population. This notion is different than the "labor force participation" (LFP) which considers the number of both employed and unemployed to the working age population.⁹

4 The Methodology

The methodology consists of simultaneously estimating three reduced form equations: one equation of weekly hours-of-work and two reduced-form equations explaining the selection mechanism (the first is the decision of employment or labor force participation and the second is the decision of working in formal or informal employment). The simultaneous estimation of the three equations is fitted through maximum likelihood approach. Such methodology permits to correct the problem of self-selection and unobserved heterogeneity (Heckman, 1993). The formality status of employment and hours-of-work are only observed for the working individuals while they are not known for the non-working population. Hence, there might be some unobserved characteristics that jointly determine the working decision and the allocation into formal and informal, or the working decision and the hours of work. Likewise, the formality status of employment and the hours of work might be correlated leading that there are some unobserved

⁷ More details on the data are provided in Barsoum (2007), Assaad (2009) and Assaad and Roushdy (2009)

⁸ There are two definitions for the labor force, the market labor force and the extended labor force. The former includes all those who are either engaged in economic activity for purposes of market exchange or seeking such work. The latter includes those engaged in "the production and processing of primary products, whether for the market, for barter, or for their own consumption; the production of all other goods and services for the market; and the corresponding production for own consumption in the case of households producing such goods and services for the market"(Assaad 2002; Assaad 2009, p.5)

⁹ In the interest not to repeat the word employment, the author may sometimes replace with "participation" or "work", both used to reflect being employed

factors, which influence the formal or informal employment, and the choice of performed hours-of-work. Thus, when estimating the probability of formal employment, the probability of not working is taken into account. Furthermore, when hours of work are being estimated, the non-work status and the formality status of the employment are taken into account. Moreover, the simultaneous equation technique permits the estimation of the correlations between the stochastic components of the hours-of-work equation and the stochastic components of the participation/employment and formality equation. Our three outcome of interest are as follows:

1. Participation Equation for any individual i is given by:

$$\begin{aligned} P_i^* &= X_i' \beta + \varepsilon_{pi} \\ P_i &= I(P_i^* \geq 0) \end{aligned} \quad (1)$$

2. Formal/Informal Equation is given by:

$$\begin{aligned} F_i^* &= Z_i' \gamma + \varepsilon_{fi} \\ F_i &= I(F_i^* \geq 0) \text{ if and only if } P_i^* \geq 0 \end{aligned} \quad (2)$$

P^* denotes the propensity to work (participate in the labor market), whereas P is the corresponding observed variable. The latter equals 1 if the corresponding propensity is greater than zero (i.e. the individual is employed) and 0 if it is lower than zero (i.e. in case of unemployment or inactivity). Likewise, the observed variable of formal employment F equals 1 if the corresponding propensity F^* is greater than 1 (i.e. formal job) and 0 if otherwise (informal job). Moreover, the hours-of work performed by the individual conditional on working while taking into account whether the job is formal or not is given as follows:

$$H^* = K_i' \theta + \varepsilon_{hi} \quad (3)$$

Weekly Hours H are only observed for working individuals and for those in formal and informal employment.

The vectors of explanatory variables are given by X, Z, K whereas β, γ, θ are the parameters vectors. The errors terms $\varepsilon_{pi}, \varepsilon_{fi}, \varepsilon_{hi}$ are jointly normally distributed as follows:

$$\begin{pmatrix} \varepsilon_p \\ \varepsilon_f \\ \varepsilon_h \end{pmatrix} \sim \begin{pmatrix} 0 \\ 0, \Sigma \\ 0 \end{pmatrix}$$

Where Sigma Σ is given by:

$$\begin{pmatrix} \rho_{pp} & \rho_{fp} & \rho_{ph} \\ \rho_{fp} & \rho_{ff} & \rho_{fh} \\ \rho_{ph} & \rho_{fh} & \rho_{hh} \end{pmatrix} \quad (4)$$

In order to study the age composition of employment and its evolution during the period 1988 to 2006, I control for dummy variables for age groups (15-29) and (50-59), for the years (1988) and (2006) as well as interactions between these age-groups and both years. As explained above, these dummies are controlled for, besides other individual variables such as education level, region, and some household characteristics as exclusion variables. Hence, the outcome Y whether employment, formal status, or hours of work can be given by:

$$Y = \alpha + D_{age_a}\beta_{age_a} + D_{time_j}\beta_{time_j} + (D_{age_a} * D_{time_j})\beta_{age_{time_{aj}}} + X\beta + \varepsilon_p \quad (8)$$

Where " α " is the constant in the outcome equation. The age Category is represented by " a ", which can be: 15-29, or 50-59. Finally, the time, that is the year of the survey, is represented by " j ", which can be either 1988 or 2006. Thus, D_{age_a} is the dummy variable taking on 1 if age_a occurs and 0 otherwise. D_{time_j} is a dummy variable for the year indicating the year of the sample used. It equals 1 for the period $time_j$ and 0 otherwise. The interaction term " $D_{age_a} * D_{time_j}$ " between an age category and a certain year shows the difference in the coefficients between the treatment and group control in the year j as compared to the year i , hence can be interpreted relying on a difference-in-difference approach. By choosing the reference year to be 1998, the change during the first period (1988-1998) is distinguished from the change in the second period (1998-2006).

Besides the age and year dummies, and since the three equations of outcomes -participation, formal employment and hours are in reduced form (i.e. not including wage variables), the other covariates X include all variables in the wage equation (Pradhan and van Soest, 1995). I control for individual-level characteristics such as education level (less than intermediate, intermediate, above than intermediate) and region (Alex and Canal cities, Urban Lower Egypt, Rural Lower Egypt, Urban Upper Egypt and Rural Upper Egypt). In order to identify both formality and weekly hours equations, the number of dependents aged 0 to 14 in the household is included as an exclusion variable in the employment equation. Although this variable might be correlated with the decision of formality of the employment, it will not affect it directly, rather indirectly through the employment or the participation decision. The problem with such an exclusion variable is its potential influence on the hours-of-work equation. However, it is not easy to find other plausible variables that could explain the selection into labor market or into work, without jointly affecting the hours of work. Moreover, in order to identify the hours-of-work equation, the used instrument in the equation of formal employment is the incidence of the presence of formal workers in the household.¹⁰ Having formal workers or not in the family is likely to affect the decision of formality status of the individual without directly determining hours. For instance, estimating the model on only males may reduce the problem of interdependent household decisions between spouses. This is why the instruments proposed, whether the number of dependents aged (0-14) in the household or the incidence of formal workers in the household, might be considered - in this particular situation - as exogenous.

In order to better link the coefficients results with the structural adjustment reforms or the new law, number of precautions is taken. First and as mentioned before, the age limit of this study is 60 years old that is the mandatory age of retirement for wage workers. This limit is set to eliminate the natural drop in employment, which will occur to older workers after 60. Moreover, the estimation will be fit on the out of schools individuals, i.e. excluding all those who are currently

¹⁰ Incidence of formal workers is a dummy variable coded 1 if there is at least one formal worker in the household, and 0 if not

in school or college. Modeling employment decisions only for the out of school individuals permits excluding the effect of any change in the educational enrollment trends that could influence the participation or the employment of the young people. However excluding the students relies on the assumption that the schooling decision is independent of the participation decision. While such assumption might be strong and not realistic, this is the only feasible solution to isolate the other factors than the reforms that can affect the participation of the young. It is worth reminding that the empirical analysis is conducted on the males' cross sectional samples for 1988, 1998, and 2006. The evolution of female employment, their formality status and their hours of work can be due to various reasons throughout the period. Thus, it is harder for us to limit the other factors' effects as what we attempt to do for men.

5 Estimation Results

5.1 Work, Informality and Hours

Table 3 shows the results of the simultaneous estimation of the employment probability, the formality status of the job and the weekly hours-of-work. The estimations are fit on the pooled sample of males aged 15 to 59 years old in 1988, 1998 and 2006. The reference category is an illiterate person, aged between 30 and 49 years and living in greater Cairo -the capital- in 1998. Consequently, changes over time during (1988-1998) and (1998-2006) for the reference group (males aged 30 to 49 years) are given by the coefficients of time dummies ($D_{time_{1988}}$ and $D_{time_{2006}}$), respectively. Coefficients of age-groups dummies ($D_{age_{15-29}}$, and $D_{age_{50-59}}$) explain the difference between each of these age groups and the reference age-category (30-49) in the reference year 1998. Coefficients of the interaction between the age-group and the year can be interpreted as a difference-in-difference.

[Table 3 is about here]

Findings on the non-students males' samples show that the probability of employment did not significantly differ between 1988 and 1998 for the prime age individuals (reference group) while their probability of formal employment significantly declined in 1998 than in 1988, as observed in the coefficients of the year dummy D_{1988} , *ceteris paribus*. This indicates that, in the (88-98) period, the 30 to 49 years old were more exposed to informality while their employment chances were the same. The latter result was also observed in the stylized facts: the trend of employment for the prime age men was roughly stable. In 2006, their probability of employment increased relative to 1998 but their probability of holding a formal job continues to decrease. Their weekly hours have significantly increased in 1998 and in 2006 as compared to 1988.

As for the young individuals aged 15 to 29 years, they are significantly (at the 1% significance level) less likely to work and in the same time to hold a formal job in 1998 as compared to the reference middle age-group. The decrease in their employment likelihood during the period (1988 to 1998) was very important as compared to the slight or quasi inexistent change in the prime-age employment likelihood. This can be seen in the positive coefficient of the $D_{15-29} * D_{88}$. The positive significant interaction coefficient $D_{15-29} * D_{06}$ in the equation of work suggests that the difference in the probability of employment between the prime and the young age groups has

decreased in 2006 in favor of the young. In other words, the likelihood of working has more increased more for the young than for the prime age individuals in 2006 than in 1998.

While the young males have significantly lower probability of formal employment than the prime-age ones in 1998 (as seen in the negative significant coefficient of D_{15-29}), the negative significant interaction term $D_{15-29} * D_{88}$ in the equation of formal employment shows that the young were even less likely to formally work in 1988 than in 1998, as compared to their prime-age peers. Combining both coefficients, i.e. the age-group dummy and its interaction with 1988, indicates that while the young (15-29) are more inclined to informal jobs and face higher likelihood of being informal in 1998 than in 1988, their informality gap with the 30 to 49 was worse in 1988 than in 1998.¹¹ Between 1988 and 1998, the young people were increasingly excluded out of employment (i.e. more pushed to whether unemployment¹² or inactivity) at the same time that their jobs became more informal. However, the decline in their employment partly outweighed the increase in their informality leading to a share of informal employment that is increasing but at slower pace than the increase in informality of the 30-49 whose share in employment was stable and roughly the highest on the labor market.

The higher incidence of informal jobs observed among the 30 to 49 years old can not only be explained by the undergone reforms of the public sector reduction, but also a cohort effect can be suspected. Informality traces among the youth cohort in 1988 might have remained omnipresent as they moved into older age in 1998 and become a part of the 30 to 49 years old. This may have led to a decline in their probability of formal employment that is more strengthened by the economic reforms. Between 1998 and 2006, the change in the probability of formal employment for the young age (15-29) was not significantly different than the change for the prime age (30-49), indicating that the status of the young males relative to their prime age peers did not change between 1998 and 2006.

In regards to the hours-of-work, young workers performed lower number of hours in 1998 than the prime age workers. The change in their hours of work during 1988-1998 and 1998-2006 was not significantly different than the change in the reference age group's hours.

The older males (50-59) were significantly less likely to work in 1998 relative to the prime-age group. The gap in the employment probability in regards to the 30 to 49 years old was smaller in 1988 than in 1998, as seen in the positive coefficient of the interaction term $D_{50-59} * D_{88}$. Regarding the formality status, workers aged 50 to 59 years always had higher probability than the 30-49 workers to be formally employed. As shown in Table 5, while their probability slightly declined in 1998 relative to 1988, the difference in their likelihood of formality with the prime age increased. It is worth to remind that the prime age experienced a decline in their likelihood of formal employment; this is why the difference with the older was dug. In 2006, the difference in employment and formality probabilities between the two age-groups did not change relative the difference in 1998. It is however observed that the age dummy coefficient (50-59) in the equation

¹¹ The author uses the term "informality gap" to designate the difference in the probability of having an informal job between the young and the prime age group

¹² If excluding the students, the more relevant state is the joblessness

of formal employment is smaller in magnitude in 2006 (0.504) than in 1998 (0.648), as shown in (Table 5).

In 1998, older workers (50-59) performed much lower hours than the prime-age workers (30-49). They have longer of hours in 1988 than in 1998, relative to the prime age workers. Between 1998 and 2006, their hours of work did not significantly change relative to the change in the hours of the 30 to 49 years old workers.

To resume, during the first period (1988 to 1998), the 30 to 49 years old individuals were more likely to work informally, maintaining the same level of employment than 1988. In comparison, young individuals were less likely to be employed, but their increase rate in informality was slower than for the prime age (30-49). Finally, the 50 to 59 years old employment has declined while the difference in their likelihood of formal employment has increased in regards to the prime age workers. These latter results confirm findings of Wahba (2002) indicating that individuals aged 50-59 were the first to be pushed out of the labor market during the adjustment period, since they had higher mobility rates between 1991-1998 than between 1981-1988.¹³ In 2006, the trend in differences was not statistically different than the 1998's except for the young males who have seen their difference in employment with the prime reduced. In 2006, the probability of working increased.

For further investigation of the reliability of the results, estimations were fit including individuals who are currently enrolled. As shown in Table 3, the main difference is that some variables in the participation equation become significant. More specifically, the insignificant positive D_{88} in the out of schools regression turned to be significant, showing that the probability of employment for the reference group significantly declined in 1998 than 1988. Also if we look at the coefficient of the 15 to 29 age group in 1998, its magnitude became -1.729 instead of -1.087, both significant at the 1% significance level. Thus, not controlling for the increase in educational enrollment leads to the overestimation of some coefficients in the work equation. Moreover, when including the students, it is also noticed that, in 1998, those with less than intermediate education level have significantly lower likelihood to work. Once excluded, the impact of this education level becomes insignificant. This is mainly due to the fact that those with less than intermediate educational level in 1998 are more likely to be continuing their education up to higher levels and thus not working. Therefore, the impact of this educational level on the participation is also overestimated if we do not exclude the students. Excluding those who are currently in education seem to be a pertinent solution in order to take into account the increase in education throughout the 1990s and the 2000s.

5.2 Work, Public Sector and Hours

In order to further understand about the effects of the reforms in regards to the distribution of employment between public jobs and private ones, a second specification was fit where the equation of the probability of formal employment in the simultaneous modeling is replaced by the probability of having a public job. This aims to assess the change in age composition of employment in the public sector versus the private one. Findings shown in Table 6 go together

¹³ The results of Wahba (2002) was based on the LFSS88 and the ELMS98

with the first model results (Table 3).

[Table 6 is about here]

Between 1988 and 1998, the prime age (30-49) employment has not significantly changed. However, they were more reported and allocated in private sector jobs with higher rates than the young ones (15-29). The latter group experienced an important drop in their employment probability same as shown in the above results. The coefficient of the age dummy (15-29) in the equation of the probability of public employment was around -1.205 and -1.226 in 1988 and 1998, respectively (Table 8). They had same lower likelihood of being in a public job in the two years. Hence, with the decline in their probability of working, this leads to a more rapid decline in the probability of public employment for the prime age (30-49) than for the (15-29). In 2006, the young men experienced a more rapid increase in their probability of employment than what the prime age witnessed. They also experienced lower likelihood of being in the public sector in 2006 than in 1998 but their difference with the prime age in regards to this matter was not significant, albeit negative.

The older age (50-59) experienced a decline in their employment chances between 1988 and 1998 relatively to the prime age workers. The likelihood of being in the public sector slightly increased in 1998, as compared to 1988. This also leads to a higher rate of decline in public employment for the prime age males than for the older males. In 2006, the higher rate of decline for the prime age continues to exist but the difference was smaller in magnitude: The difference in the probability of having a public job between the older and the prime age workers became 0.166 between 1998 and 200, instead of 0.41 between 1988 and 1998. Looking closely to the probability of public employment for the older, it actually declined in 2006 relative to 1998.

The results confirm also the stylized facts mentioned in section 2. The public sector employment opportunities have effectively declined for all the age groups in the 1990s and the 2000s. The relative decline between age groups is the reason of the positive interactions terms of age and years. In regards to the private sector, it could not absorb the integrity of the new entrants; rather the prime age workers had more access to its jobs. Same results for employment and hours are also concluded.

5.3 Correlation Analysis

Regarding the correlations, Tables 3 and 6 show that the correlation between working and being in a formal job, and working and being in a public job, respectively. Both correlations are significantly negative, suggesting that unobserved characteristics that can increase the probability of not working raise the probability of formal employment/public employment at the same time. In effect, those who do not work could be the unemployed individuals who can afford waiting for formal/public employment. On the other hand, those who cannot afford waiting, accept working in informal jobs. One could think of the unobservables that determine such negative correlation to be the “perseverance” level, or the poverty level. For instance, the decline in employment for the young men aged (15-29) can serve as an example to better clarify such negative correlation. First, it implies that there is a part of them who, by getting discouraged to find a formal job, move to

inactivity. Second, the other category keeping hopes to find a better job other than the informal ones remain unemployed. This is actually confirmed in the stylized facts presented earlier where the male youth unemployment rate almost doubled in 1998. By remaining unemployed, they may experience better chances of getting formal jobs than by accepting informal ones, through two possibilities: either by waiting for the public job or by having a better-tuned and more effective job-search while unemployed than while employed in an informal job. The effectiveness of the job-search in unemployment state was argued in Fields (1990) who found that those who accept an informal job have less time to search for better jobs than those unemployed. From the older individuals' side, they were more pushed towards inactivity after the contraction of formal jobs, confirming the finding of Maloney (2004). This can be also confirmed by the stylized facts, where older unemployment rate did not change and was very small.

Moreover, there is a negative correlation between the probability of being a formal worker and the hours-of-work, i.e. an informal worker tends to perform longer hours. This was clearly seen in the results where the hours happen to increase whenever the probability of formal employment declines and vice-versa. Since the public sector (government and SOEs) recruits higher share of formal workers than the private sector and since it has shorter hours of work, thus hours will be positively correlated with formal status. The unobservable here may reflect the regulations in each sector. This was endorsed in the second specification results (Table 11). Lastly but not least, there is a positive correlation between employment and hours, which means that those who have more chances to work, perform higher number of weekly hours. Since those who have more probability to be employed have less chances to be formally working, they consequently perform higher number of weekly hours.

6 Conclusion

This paper conducts an empirical analysis of the males' employment evolution after the Economic Reforms and Structural Adjustment Program in the 1990s, as well as after the passage to a new labor law in 2003. Economic Reform and Structural Adjustment Program usually leads to public sector downsizing through two ways: either by the slowdown in hiring mechanisms, or by restructuring its labor. In this sense, the Egyptian government has put in place a plan for such downsizing, which was built on two axes. The first is to limit the access to public sector employment which was guaranteed to secondary and university graduates according to the Egyptian social contract. The second is to restructure labor through implementing an early retirement incentives program, targeted to older workers for they voluntarily quit their jobs. After the change in the share of employment in the public and the private sector over the period of reforms (1988 to 2006), employment may have changed differently for the following categories: the young age (15-29), the prime age (30-49), and the older age (50-59). This analysis studies the evolution of employment-to-population ratio, informality, and employment distribution by sector, and hours-of-work using three cross-sectional Egyptian databases in three points of time (before, during and after reforms, namely in 1988, 1998 and 2006). In a first specification, the probability of working, having a formal job were estimated simultaneously with the weekly hours-of-work. In

the second one, the probability of working, of having a public job and the corresponding hours-of-work were also jointly estimated.

The period during which the structural adjustment program was implemented has witnessed a decline in employment for the young (15-29) and the older (50-59) males. The former group has high incidence of working in informal jobs that grew significantly in 1998 than in 1988. The 50-59 did not see their probability of informality increasing significantly. As to the prime age category, they were always working, and hence they were also affected by the informalization trend. The drop in their formality probability was important even exceeding the drop for the young. These results are in difference, meaning that the prime age's probability of being formal has always remained higher than the young's one.

Results show that effectively and according to what the literature on the Egyptian market mentions, growth in the private sector employment did not outweigh the decline in the public sector guaranteed employment that was translated by pushing new entrants towards unemployment or inactivity if they don't work in informal jobs.

The law 2003 did not have a shown positive impact for the formality status of the young, except that it stopped their widening gap towards the prime age. It seems that flexibilizing contracts have translated into more employment. However, this result should be taken with precaution since the business cycle in this period was very favorable.

This paper is considered as a first step towards investigating the impact of several policies and reforms. Yet, the witnessed evolution cannot be considered with certitude as the direct impact of the reforms since there are many other factors like the business cycle who can play simultaneously. The proposed difference-in-difference methodology can however eliminate some of these business cycle effects. However, the need to have another year of study before the reforms is crucial in order to ensure that the underlying trends in the outcome variables are the same between the prime age groups and both young and older age groups.

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Table 1 Employment-to-Population Ratio by Individual Characteristics, Age (15-59), LFSS 88, ELMS 98 & ELMPS 06

	Total			Males		
	1988	1998	2006	1988	1998	2006
Male	73.92	68.88	76.58			
Female	39.87	42.28	42.52			
Age 15-29	45.06	39.45	44.91	54.23	45.59	58.65
Age 30-49	70.56	73.4	76.91	96.13	95.76	96.95
Age 50-59	64.6	65.44	69.41	94.6	87.8	90.23
Illiterate or RW	61.19	63.8	68.05	88.32	88.3	91.67
Less than intermediate	36.07	40.72	44.62	48.34	52.6	59.62
Intermediate	52.57	47.38	57.34	61.35	57.33	75.88
Above intermediate	70.65	70.25	65.5	78.02	81.93	84.31
University & Above	77.94	76.38	68.58	85.96	85.02	83.32
Greater Cairo	46.81	45.37	48.38	71.24	67.5	74.1
Alex, Suez Canal Cities	47.95	42.48	48.15	71.66	65.45	73.6
Urban Lower Egypt	48.52	51.88	52.56	68.97	68.83	73.72
Urban Upper Egypt	47.18	57.19	53.99	68.71	70.18	75.23
Rural Lower Egypt	67.24	60.68	65.74	77.45	69.43	77.21
Rural Upper Egypt	63.51	62.37	66.56	76.31	70.06	80
Urban	47.38	48.31	50.87	70.66	67.87	74.24
Rural	65.44	61.39	66.09	76.90	69.69	78.40
Total	56.78	55.56	59.41	73.92	68.88	76.58
Sample	8156	7536	13246	5319	4807	8621

Source: Tabulations are constructed by the author

Table 2 The Distribution of the Share of Formal Employment by Main individual Characteristics, Age (15-59), LFSS 88, ELMS 98 & ELMPS 06

	Total			Males		
	1988	1998	2006	1988	1998	2006
Male	52.75	50.58	44.77			
Female	33.95	23.64	24.11			
Age 15-29	31.66	21.69	21.18	31.57	26.1	24.69
Age 30-49	58.11	50.37	47.52	65.51	61.93	55.79
Age 50-59	55,17	50,63	48,07	64,21	67,74	63,64
Illiterate or RW	30.48	16.52	15.17	41.4	31.02	26.72
Less than intermediate	47.29	34.84	27.9	48.66	43.81	35.03
Intermediate	73.54	56.07	43.38	67.85	58.47	45.6
Above intermediate	82.4	80.24	72.59	81.01	75.84	71.09
University & Above	87.47	87.16	79.79	86.33	87.14	79.47
Greater Cairo	69.81	68.47	65.29	69.23	66.88	62.74
Alex, Suez Canal Cities	63.93	71.48	63.37	62.08	70.22	60.56
Urban Lower Egypt	63.11	54.62	49.33	64.99	60.45	52.01
Urban Upper Egypt	64.51	52.62	54.52	61.42	60.04	55.89
Rural Lower Egypt	30.47	31.41	29.08	40.76	44.81	39.94
Rural Upper Egypt	34.92	19.56	19.44	41.76	31.87	28.97
urban	66.89	62.35	57.89	66.26	64.76	57.9
rural	32.33	26.35	24.9	41.23	39.41	35.14
Total	47.2	39.9	36.83	52.75	50.58	44.77
Sample	3238	3570	5258	2546	2691	3960

Source: Tabulations are constructed by the author

Table 3 Simultaneous Equations Results for Egyptian Men (15-59)

VARIABLES	Excluding the Currently Enrolled in School			Including the Currently Enrolled in School		
	Working	Formal Job	Weekly Hours	Working	Formal Job	Weekly Hours
D_1988	0.0600 (0.141)	0.426*** (0.0981)	-5.798*** (1.172)	0.440*** (0.128)	0.391*** (0.0962)	-4.924*** (1.147)
D_2006	0.316*** (0.111)	-0.200** (0.0947)	3.929*** (1.130)	0.230** (0.104)	-0.192** (0.0925)	4.410*** (1.114)
Age Group 15_29	-1.087*** (0.0545)	-0.774*** (0.0533)	-2.434*** (0.572)	-1.729*** (0.0512)	-0.513*** (0.0734)	0.218 (0.755)
Age Group 50_59	-0.516*** (0.0689)	0.485*** (0.0616)	-2.169*** (0.678)	-0.591*** (0.0714)	0.481*** (0.0610)	-0.983 (0.676)
Age 15_29*D1988	0.675*** (0.100)	-0.191*** (0.0690)	0.567 (0.779)	0.762*** (0.0915)	-0.388*** (0.0759)	-2.830*** (0.843)
Age 15_29*D2006	0.175** (0.0701)	0.0666 (0.0576)	0.305 (0.659)	0.122* (0.0680)	0.0557 (0.0556)	-1.358** (0.657)
Age 50_59*D1988	0.703*** (0.155)	-0.380*** (0.0845)	2.476** (0.974)	0.733*** (0.162)	-0.374*** (0.0840)	0.993 (0.959)
Age 50_59*D2006	-0.00681 (0.0910)	0.0564 (0.0772)	-0.780 (0.862)	-0.0243 (0.0947)	0.0584 (0.0764)	-0.801 (0.852)
Less than Intermediate	0.0146 (0.0623)	0.386*** (0.0560)	0.648 (0.678)	-0.580*** (0.0527)	0.527*** (0.0548)	-0.579 (0.688)
Less than Intermediate*D1988	-0.225* (0.116)	0.0631 (0.0835)	-0.731 (1.012)	-0.399*** (0.0879)	-0.00897 (0.0792)	-3.109*** (0.963)
Less than Intermediate*D2006	-0.0926 (0.0837)	0.00290 (0.0724)	-0.729 (0.872)	-0.0621 (0.0689)	-0.0106 (0.0700)	-2.061** (0.853)
Intermediate	-0.273*** (0.0555)	0.866*** (0.0555)	-3.378*** (0.642)	-0.484*** (0.0526)	0.902*** (0.0541)	-2.935*** (0.646)
Intermediate*D1988	0.140	-0.0587	0.771	-0.0191	-0.0747	-0.517

	(0.115)	(0.0841)	(0.964)	(0.0973)	(0.0812)	(0.941)
Intermediate*D2006	0.105	-0.142**	1.017	0.276***	-0.186***	0.761
	(0.0731)	(0.0686)	(0.797)	(0.0680)	(0.0669)	(0.793)
Above than Intermediate	-0.0681	1.137***	-4.425***	0.0733	1.077***	-4.271***
	(0.0928)	(0.0927)	(1.023)	(0.0963)	(0.0922)	(1.017)
Above than Intermediate*D1988	0.0847	-0.113	-0.929	0.0590	-0.0656	-1.468
	(0.239)	(0.165)	(1.784)	(0.257)	(0.161)	(1.721)
Above than Intermediate*D2006	-0.141	-0.0240	1.081	-0.239*	0.0112	0.956
	(0.128)	(0.119)	(1.343)	(0.128)	(0.116)	(1.332)
University	0.0260	1.416***	-5.028***	0.107	1.367***	-5.284***
	(0.0720)	(0.0745)	(0.743)	(0.0731)	(0.0744)	(0.734)
University*D1988	0.257	-0.504***	2.104*	0.202	-0.433***	1.213
	(0.183)	(0.109)	(1.115)	(0.181)	(0.106)	(1.077)
University*D2006	-0.397***	-0.0196	-1.215	-0.262***	-0.0408	-0.439
	(0.0909)	(0.0904)	(0.938)	(0.0914)	(0.0882)	(0.927)
Nb of dependents 0_14	0.0175			-0.0387**		
	(0.0207)			(0.0187)		
Nb of dependents 0_14*D1988	-0.0627			-0.0686**		
	(0.0391)			(0.0322)		
Nb of dependents 0_14*D2006	0.0995***			0.0662***		
	(0.0287)			(0.0253)		
Hhsize	-0.0103	-0.0359***	0.0113	0.00728	-0.0363***	0.00570
	(0.0104)	(0.00765)	(0.0874)	(0.00930)	(0.00747)	(0.0862)
Hhsize*D1988	0.0405**	-0.00729	0.215**	0.0186	-0.00372	0.183*
	(0.0191)	(0.00972)	(0.109)	(0.0155)	(0.00948)	(0.107)
Hhsize*D2006	-0.0477***	-0.00333	-0.304***	-0.0397***	-0.00136	-0.288***
	(0.0135)	(0.0100)	(0.113)	(0.0120)	(0.00977)	(0.111)

If any formal workers		0.254***			0.243***	
		(0.0321)			(0.0307)	
If any formal workers*D1988		-0.00718			-0.0139	
		(0.0456)			(0.0433)	
If any formal workers*D2006		0.0413			0.0385	
		(0.0414)			(0.0394)	
Region	Yes	Yes	Yes	Yes	Yes	Yes
Region*Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	1.689***	0.163**	53.77***	1.837***	0.167**	54.70***
	(0.0817)	(0.0729)	(0.873)	(0.0775)	(0.0713)	(0.864)
Sigma	2.794***			2.769***		
	(0.00714)			(0.00557)		
Rho12	-0.722***			-0.840***		
	(0.0579)			(0.0960)		
Rho13	0.747***			0.129***		
	(0.0417)			(0.0486)		
Rho23	-0.118***			-0.0332**		
	(0.0122)			(0.0145)		
Observations	19,937	19,937	19,937	23,450	23,450	23,450
Log-Likelihood	-88922	-88922	-88922	-94396	-94396	-94396

Notes: (i.) Standard errors in parentheses.

(ii.) ***, ** and * represent respectively statistical significance at the 1%, 5% and 10% levels.

(iii.) The reference is a male aged 30 to 49 years in 1998 living in Greater Cairo, illiterate or can read or write, not head of his household and who has no formal workers in his household

Table 4 Estimated Coefficients and DID Estimates of the Effect of Age Groups on the Probability of Working

	1988	1998	2006	Difference between (1998-1988)	Difference between (2006-1998)
30-49	1,749	1,689	2,005	-0,06	0,316
15-29	0,617	-0,118	0,373	-0,735	0,491
50-59	1,936	1,173	148,219	-0,763	0,30919
Difference between Young and Prime	-1,132	-1,807	-1,632	-0,675*** (DID)	0,175** (DID)
Difference between Old and Prime	0,187	-0,516	-0,5228	-0,703*** (DID)	-0,00681 (DID)

*Source: Constructed by the author basing on the estimations results on the out-of-schools men sample given in Table 3. Note: *** represent statistical significance at the 1% for the DID estimate, as shown in the estimation results*

Table 5 Estimated Coefficients and DID Estimates of the Effect of Age Groups on the Probability of Working

	1988	1998	2006	Difference between (1998-1988)	Difference between (2006-1998)
30-49	0,589	0,163	-0,037	-0,426	-0,2
15-29	-0,376	-0,611	-0,7444	-0,235	-0,1334
50-59	0,694	0,648	0,5044	-0,046	-0,1436
Difference between Young and Prime	-0,965	-0,774	-0,7074	0,191***(DID)	0,0666(DID)
Difference between Old and Prime	0,105	0,485	0,5414	0,38***(DID)	0,0564(DID)

*Source: Constructed by the author basing on the estimations results on the out-of-schools men sample given in Table 3. Note: *** represent statistical significance at the 1% for the DID estimate, as shown in the estimation results*

Table 6 Simultaneous Equations Results for Egyptian Men (15-59), excluding the Enrolled in School

Variables	Working		
D_1988	-0.0147 (0.135)	0.400*** (0.0969)	-5.678*** (1.181)
D_2006	0.286*** (0.108)	-0.212** (0.0953)	4.050*** (1.138)
Age Group 15_29	-1.054*** (0.0537)	-0.486*** (0.0512)	-2.977*** (0.560)
Age Group 50_59	-0.516*** (0.0672)	0.443*** (0.0542)	-2.315*** (0.683)
Age 15_29*D1988	0.726*** (0.0976)	-0.379*** (0.0692)	1.031 (0.777)
Age 15_29*D2006	0.192*** (0.0684)	-0.0688 (0.0572)	0.441 (0.661)
Age 50_59*D1988	0.661*** (0.149)	-0.410*** (0.0780)	2.637*** (0.982)
Age 50_59*D2006	-0.00162 (0.0886)	0.166** (0.0695)	-0.802 (0.869)
Less than Intermediate	0.00703 (0.0612)	0.364*** (0.0568)	0.683 (0.683)
Less than Intermediate*D1988	-0.222** (0.111)	0.145* (0.0842)	-0.790 (1.020)
Less than Intermediate*D2006	-0.0724 (0.0823)	0.0122 (0.0755)	-0.788 (0.879)
Intermediate	-0.295*** (0.0545)	0.873*** (0.0546)	-3.410*** (0.646)
Intermediate*D1988	0.177 (0.111)	0.282*** (0.0820)	0.806 (0.972)

Intermediate*D2006	0.129*	-0.138**	1.025
	(0.0718)	(0.0695)	(0.802)
Above than Intermediate	-0.0765	1.200***	-4.427***
	(0.0906)	(0.0842)	(1.030)
Above than Intermediate*D1988	0.0779	0.173	-0.911
	(0.229)	(0.148)	(1.800)
Above than Intermediate*D2006	-0.118	-0.0806	0.962
	(0.125)	(0.110)	(1.353)
University	0.00617	1.136***	-4.973***
	(0.0701)	(0.0630)	(0.748)
University*D1988	0.298*	0.00659	2.086*
	(0.176)	(0.0943)	(1.125)
University*D2006	-0.370***	0.119	-1.375
	(0.0885)	(0.0800)	(0.945)
Hhsize	-0.0120	-0.0179**	0.0152
	(0.0101)	(0.00744)	(0.0879)
Hhsize*D1988	0.0366**	-0.00231	0.212*
	(0.0183)	(0.00968)	(0.110)
Hhsize*D2006	-0.0462***	0.0109	-0.317***
	(0.0131)	(0.00995)	(0.114)
Nb of dependents 0_14	0.0122		
	(0.0197)		
Nb of dependents 0_14*D1988	-0.0387		
	(0.0376)		
Nb of dependents 0_14*D2006	0.105***		
	(0.0273)		
If any formal workers		0.165***	
		(0.0285)	
If any formal workers*D1988		-0.101**	
		(0.0416)	

If any formal workers*D2006		0.00500	
		(0.0374)	
Region	Yes	Yes	Yes
Region*Year Dummies	Yes	Yes	Yes
Constant	1.725***	-0.740***	53.57***
	(0.0795)	(0.0722)	(0.878)
<hr/>			
Sigma	2.805***		
	(0.00677)		
Rho12	-1.030***		
	(0.0543)		
Rho13	0.856***		
	(0.0353)		
Rho23	-0.342***		
	(0.0124)		
<hr/>			
Observations	19,933	19,933	19,933
ll		-88204	

Notes: (i.) Standard errors in parentheses.

(ii.) ***, ** and * represent respectively statistical significance at the 1%, 5% and 10% levels.

(iii.) The reference is a male aged 30 to 49 years in 1998 living in Greater Cairo, illiterate or can read or write, not head of his household and who has no formal workers in his household

Table 7 Estimated Coefficients and DID Estimates of the Effect of Age Groups on the Probability of Working

	1988	1998	2006	Difference between (1998-1988)	Difference between (2006-1998)
30-49	1.7103	1.725	2.011	0.0147	0.286
15-29	1.3823	0.671	1.149	-0.7113	0.478
50-59	1.8553	1.209	1.49338	-0.6463	0.28438
Difference between Young and Prime	-0.328	-1.054	-0.862	-0.726***(DID)	0.192***(DID)
Difference between Old and Prime	0.145	-0.516	-0.518	-0.661***(DID)	-0.00162(DID)

Source: Constructed by the author basing on the estimations results on the out-of-schools men sample given in Table 6

*Note: *** represent statistical significance at the 1% for the DID estimate, as shown in the estimation results*

Table 8 Estimated Coefficients and DID Estimate of the Effect of Age Groups on the Probability of Having a Public Job

	1988	1998	2006	Difference between (1998-1988)	Difference between (2006-1998)
30-49	-0.34	-0.74	-0.952	-0.4	-0.212
15-29	-1.205	-1.226	-1.5068	-0.021	-0.2808
50-59	-0.307	-0.297	-0.343	0.01	-0.046
Difference between Young and Prime	-0.865	-0.486	-0.5548	0.379***(DID)	-0.0688(DID)
Difference between Old and Prime	0.033	0.443	0.609	0.410***(DID)	0.166***(DID)

Source: Constructed by the author basing on the estimations results on the out-of-schools men sample given in Table 6

*Note: *** represent statistical significance at the 1% for the DID estimate, as shown in the estimation results*

Table 9 Variables Definition

Year dummies	
D1988	1 = if the year is 1988, 0 = otherwise
D2006	1 = if the year is 2006, 0 = otherwise
Age dummies	
Age 15-29	1 = if the individual is between 15 and 29 years old, 0 = otherwise
Age 50-59	1 = if the individual is between 50 and 57 years old, 0 = otherwise
Educational Levels	
Less than Intermediate	1 = if the individual has a less than intermediate education level, 0 = otherwise
Intermediate	1 = if the individual has an intermediate education level, 0 = otherwise
Above than Intermediate	1 = if the individual has an above than intermediate education level, 0 = otherwise
Marital Status	
Married	1 = if the individual is married, 0 = otherwise
Household Characteristics	
Number of persons of age 0_14	Number of present individuals in the household and aged of 0 to 14 years old
Region dummies	
Region 1	Greater Cairo
Region 2	Alexandria and Canal Cities
Region 3	Urban Lower Egypt
Region 4	Urban Upper Egypt
Region 5	Rural Lower Egypt
Region 6	Rural Upper Egypt

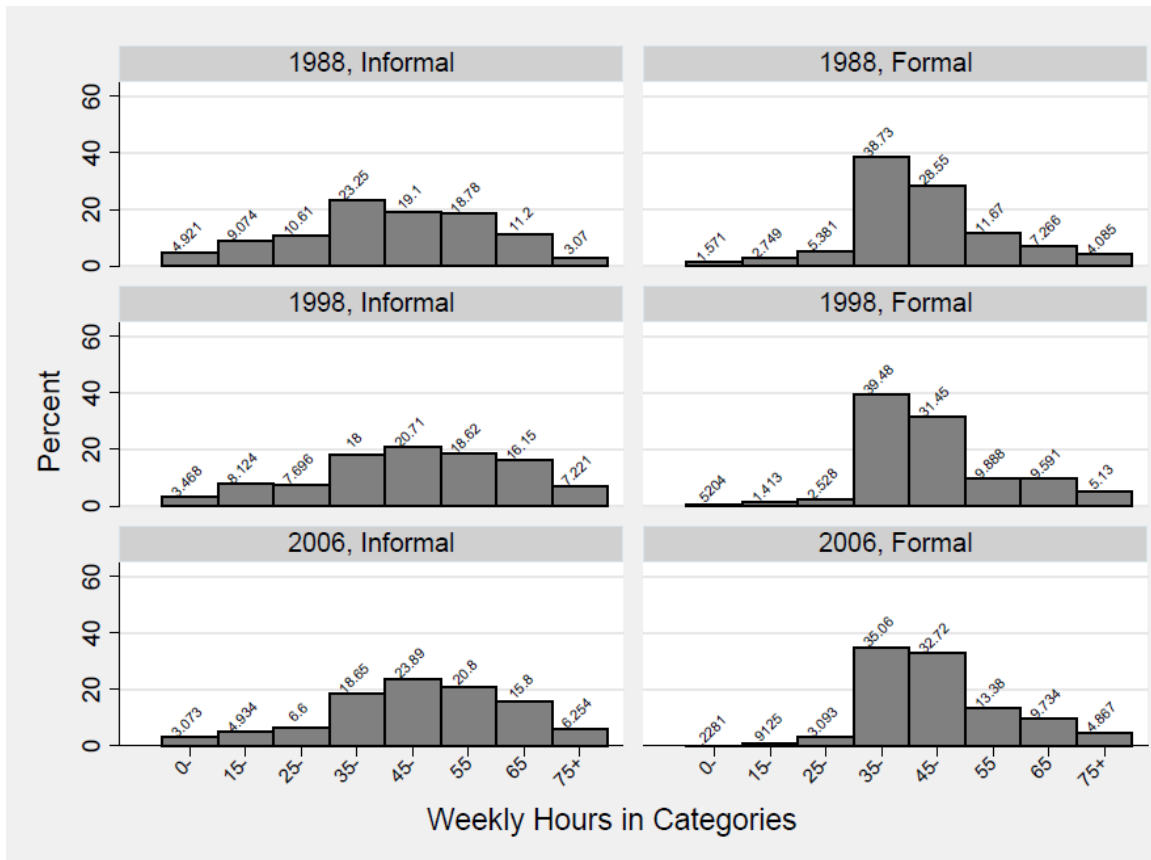


Figure 1 The Distribution of Weekly Hours for Working Men (15-59), By Year and Formality
Source: Constructed by The Author using LFSS88, ELMS98 and ELMPS06

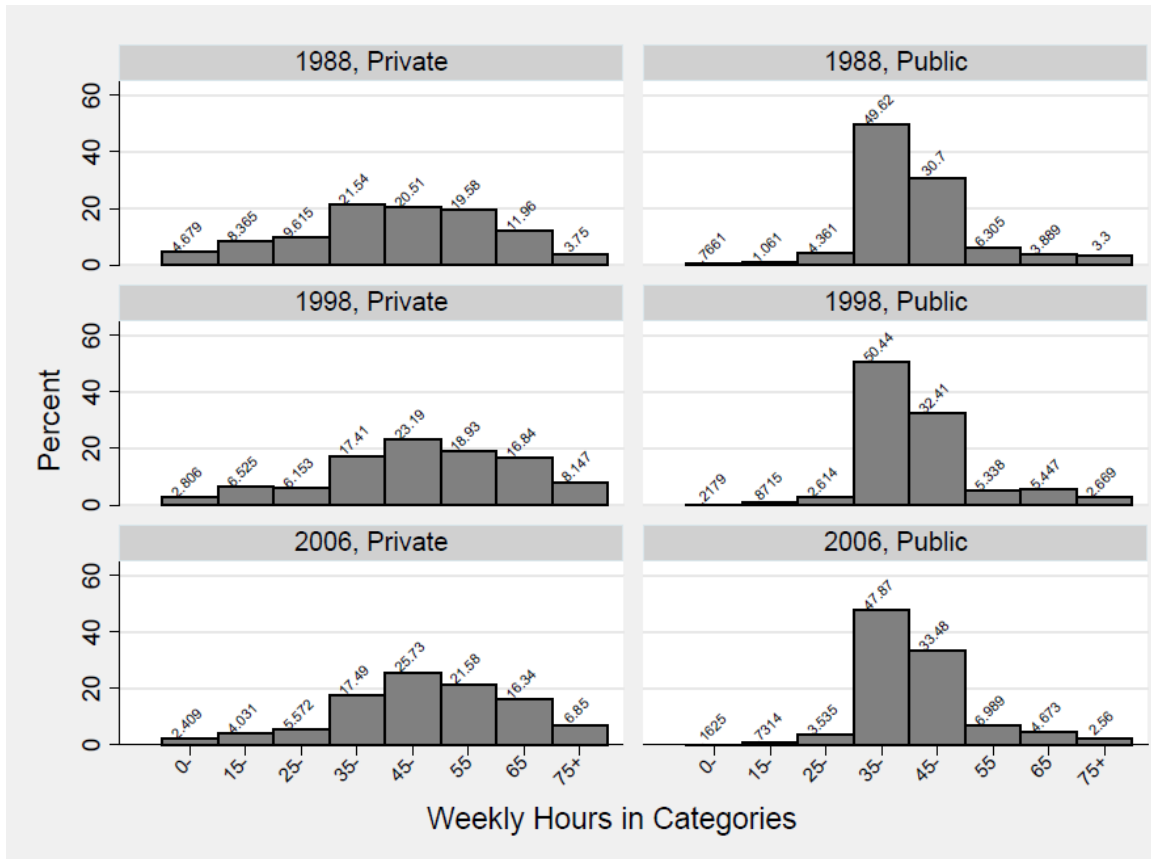


Figure 2 The Distribution of Weekly Hours for Working Men (15-59), By Year and Sector of Work
Source: Constructed by The Author using LFSS88, ELMS98 and ELMPS06

Appendix

The model is estimated by maximizing the above log-likelihood function. In this setting, the complete log-likelihood function will contain three main components:

$$\begin{aligned}
 \text{Log}L &= \sum_{P=0} \ln \Pr(P_i = 0) \\
 &+ \sum_{P=1, F=0} \ln \Pr(P_i = 1, F_i = 0, H_i = H^*) \\
 &+ \sum_{P=1, F=1} \ln \Pr(P_i = 1, F_i = 1, H_i = H^*)
 \end{aligned} \tag{5}$$

Where H^* indicate the observed hours of work. Equation 5 can be written as such:

$$\begin{aligned}
 \text{Log}L &= \sum_{P=0} \ln \Pr(\varepsilon_{pi} \leq -X'_i\beta) \\
 &+ \sum_{P=1, F=0} \ln \Pr(\varepsilon_{pi} \geq -X'_i\beta, \varepsilon_{fi} \leq -Z'_i\gamma \mid \varepsilon_{hi}) \cdot f_h(h_i) \\
 &+ \sum_{P=1, F=1} \ln \Pr(\varepsilon_{pi} \geq -X'_i\beta, \varepsilon_{fi} \geq -Z'_i\gamma \mid \varepsilon_{hi}) \cdot f_h(h_i)
 \end{aligned} \tag{6}$$

Where $f(h_i)$ is the probability density function for the hours-of-work variable and can be

written as $\frac{1}{\sigma_h} \phi\left(\frac{H_i - K_i\theta}{\sigma_h}\right)$.

Then, the complete log-likelihood function can be written as:

$$LL = \begin{cases} \sum_{P=0} [\ln \Phi(-X'_i\beta)] \\ + \sum_{P=1, F=0} \ln\left(\frac{1}{\sigma_h} \phi\left(\frac{H_i - K_i\theta}{\sigma_h}\right)\right) + \ln\left(\Phi_2\left(-\frac{Z'_i\gamma + \mu_f^*}{\sigma_f^*}, \frac{X'_i\beta + \mu_p^*}{\sigma_p^*}, -\rho_{pf}^*\right)\right) \\ + \sum_{P=1, F=1} \ln\left(\frac{1}{\sigma_h} \phi\left(\frac{H_i - K_i\theta}{\sigma_h}\right)\right) + \ln\left(\Phi_2\left(\frac{Z'_i\gamma + \mu_f^*}{\sigma_f^*}, \frac{X'_i\beta + \mu_p^*}{\sigma_p^*}, \rho_{pf}^*\right)\right) \end{cases} \tag{7}$$