

Older Workers Employment Under Economic Reform and Structural Adjustment: Evidence from Egypt *

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Abstract

This paper investigates how the labor supply of older workers, in Egypt, was affected by the introduction of Economic Reforms and Structural Adjustment Policies in the 90's. Using cross-sectional Egyptian databases conducted in 1988, 1998 and 2006, a multivariate probit is estimated to evaluate evolution in the relationship between age and three labor variables: Labor force participation (LFP), legal status of employment (formal versus informal) and weekly hours-of-work. Results indicate that older workers (50 or more) have experienced a decline in their LFP as well as in their opportunities of formal employment in 1998 and 2006, i.e. after reform policies, as compared to 1988, their situation before.

JEL classification: J14, J21, J26

Keywords: Older Workers Labor Supply, Structural Adjustment Programs, Formal/Informal Employment.

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1 Introduction

Since the early 90s, Egypt, as many other developing countries, has introduced an Economic Reform and Structural Adjustment Program (ERSAP). It was found that the ERSAP, in those countries, was often associated with a change in labor market conditions; mainly labor shedding from the public sector and contractions in its job opportunities. For example, given that the Public Sector (PS) was the main employer for fresh graduates of secondary school and university and since the 60's, a first reform was to decrease its hiring commitment in order to cut public expenses and to reduce the PS role in the economy. Moreover, ERSAP involved privatization of Stated Owned Enterprises (SOEs); however as a consequence of the PS employing task, SOEs accumulated workers in excess and hence Downsizing the public sector and restructuring its surplus labor was a second necessary reform in order to prepare its targeted companies for sale and privatization. Therefore, to apply this reform, the Egyptian government has introduced a voluntary redundancy scheme by providing early retirement incentives, inducing older workers to voluntarily quit their jobs.

One could expect that these two set of examples concerning ERSAP reforms - contracting recruitment of fresh graduates in the public sector and its downsizing as a path toward privatization - has impacted labor supply of some workers' categories, *a priori*, new entrants (15-29) and older workers (50-64).

In the same time, the formal private sector has shown a limited ability to absorb the integrity of new entrants and the labor supply shifted from the public sector (older workers) during 1988-1998. Therefore, along with the inflexible labor laws and regulations, these limited formal job opportunities contributed in accelerating labor movement to unprotected jobs with flexible entry, i.e. informal employment. (Assaad, 2002; Wahba and Mokhtar, 2002)

The purpose of this research is to study the change in older workers' labor force participation, their probability of having formal employment and their hours-of-work in a period of economic reforms. More specifically, the first aim is to analyze the evolution between age and labor force participation - before and after the economic reform implementation - with special concern to the age category (50-64) as compared to (30-49). Moreover, as a consequence of downsizing and probable movements

of older workers out of the public sector, one could wonder if they were more reported to informal employment? Thus the second aim of the paper is to study the evolution of the legal status of older workers' employment (formal/informal), relative to younger ones. Last but not least, the change in the relationship between age and hours-of-work is considered.

Literature concerning Structural Adjustment Policies and its impact on the labor market in developing countries were various. Some studies gave importance to gender dimensions of this impact, e.g. the change in the relative situation of women in the labor market and differenced gender outcomes. Cerrutti (2000) has found that Argentinean women experienced an increase in their labor force participation, mainly paid employment, during the Structural Adjustment Policy era due to an added-worker effect. In this context, women are constrained to work in order to maintain household income when primary earners become unemployed or when household incomes are falling (Catagay and Osler, 1995). This trend was observed in Latin America and Southeast Asia. Meanwhile, in the Middle East and North Africa, studies have shown a de-feminization of nongovernmental paid employment and higher contribution of women in informal non-wage employment. Assaad (2005) attributes this trend in Egypt to the constrained geographical mobility facing new female entrants, thus preventing them to have access to nongovernmental paid employment. Likewise and more generally, other studies were concerned by the evolution of poverty and living standards after reform policies (Handa and King, 1997). Meanwhile, to the best of my knowledge, no studies have tackled the impact of structural reforms on older workers' labor supply in developing countries or its impact on the age structure of the working labor force, mainly the representation of older workers relative to prime-age workers in the labor force. This paper presents a first step towards clarifying the impact of Economic Reform and Structural Adjustment Program on older workers in Egypt, one of the countries concerned by those policies.

For this purpose, I estimate a multivariate probit model on a sample of male workers aged 30 to 64 years, extracted from three comparable household surveys carried out in 1988, 1998 and 2006. The model shows simultaneously how the age impacts probabilities of labor force participation, of having formal employment and

the number of weekly hours-of-work before reforms implementation - in 1988 - and after, in 1998 and 2006. Results present evidence confirming that older men in their fifties (50-57) and their late fifties and early sixties (58-64) had a lower probability of LFP in 1988 that becomes more lowered in 1998 as well as 2006. Likewise, they have experienced a decline in their access to formal employment. On the other hand, the prime-age working men (30-49), having less chances to formal employment as well as older workers, did not experience any change in their LFP in those years. This result indicate that prime-age workers were more reporting to informal employment over time than older ones who, by their turn, were more reported to inactivity.

The paper is organized as follows. Section 2 provides a brief idea on the impact of ERSAP in the light of the Egyptian context. Data, principal definitions are presented in Section 3, followed by descriptive statistics in section 4. Methodology used is described in section 5. Section 6 is devoted to Estimation Results and finally section 7 concludes.

2 Egyptian labor market Context in the Light of ERSAP

2.1 Labor Force Participation

An explicit objective of ERSAP was the reorientation of the economy towards the market and a reduction in the role of the state, including its role as a dominant employer. As a matter of fact, since the early sixties, the state has assumed responsibility for hiring all university as well as vocational secondary school graduates within two or three years after graduation, respectively, in government offices (local or central) or in Stated-Owned Enterprises (SOEs). The Public Sector “PS” (the government and Stated Owned Enterprises “SOEs”) remained the main employer, by providing more than one third of total employment opportunities and more than half of non-agricultural paid employment. Such a hiring responsibility led to a labor excess in SOEs, estimated to be about 30% to 60% of their work force. (CARANA, 2002)

In the light of the ERSAP, the slowdown in the PS hiring as well as its downsizing seemed to be crucial. On the one hand, the slowdown in PS hiring was important to reduce the role of the state, to alleviate pressure on SOEs and to cut public expenses. It was introduced gradually by increasing waiting periods for new entrants and fresh graduates (Assaad, 1997). On the other, The PS downsizing was also crucial for labor restructuring in SOEs, thus restoring their profitability and efficiency, and making a step towards their privatization. In order to carry on public sector downsizing, the Egyptian government implemented, among other tools, a program of early retirement incentives which might encourage eligible older workers to quit voluntarily their job.

Concerning older workers in public and private sector, they are eligible for early retirement, provided 20 years of contributions and being aged of 50 years old. However, it is being widely common that early retirement pensions, which are reduced, can be paid at any age with at least 240 months of contribution. The base pension is reduced according to the insured's age at the date of claim for the pension: the reduction is at 15% if younger than age 45; 10% if younger than age 50; 5% if younger than age 55 and there is no reduction if aged 55 or older. Eventually, employers and self-employed workers could also claim for their earlier old age pensions, i.e. early withdrawal from the labor force, conditional on being 65 years old with contributions payments during 120 months (10 years). (El Hamidi, 2007; Maait et al., 2000)

Stylized facts conclude that during the period 1990 to 2001 about 200,000 workers in over 200 SOEs were retired through the Early Retirement Program. Since 1996, when the program became fully operational, till 2001, about 180,000 workers elected and were granted early retirement (Carana, 2002).¹ Moreover, Assaad (2007) notices that there was a trend for early retirement among urban men in their forties and fifties between 1988 and 1998 and this trend have been reversed during 1998 and 2006 but still prevailing for males in their late fifties and sixties. Concerning rural ones, during 1988-1998, a trend for early retirement was also observed for males above

¹A special study on Privatization and Early Retirement Campaign was conducted by CARANA

fifty years old which was reversed during 1998-2006. To resume, those findings could testify that there was a decline in male labor force participation after the introduction of Economic Reforms.²

Hence, the first question of this papers concerns LFP: to analyze if there is any particular pattern associated with age and labor force participation and if this pattern has experienced a change over time.

2.2 Formal or Informal employment

Simultaneously, but also consequently to the previous strategies for reducing the role of state, the trend of informalization had begun to spread. Informality could be manifested within two frames, whether in wage employment in the public or the private sector, or in non-wage employment in the latter sector.

For the first frame of informality, El Mahdi (2002) and Assaad (2002) discuss that, in a context of highly restrictive labor regulations, informality has spread to the formal economy where workers became employed without contracts mainly in the private sector. Job seekers were hired on an informal basis (without contract) or with a contract but conditional on being always ready to sign and submit their resignation to the employer. This practice secured - from the employers' perspective - the ability to fire workers whenever the business situation requires it and to escape labor regulations, thus achieving the flexibility they need. These hiring practices, though illegal, have become the norm. Moreover, one of the main drivers of informal employment spread in the private sector is the continuous growth of micro and small enterprises, whose majority are informal. El Mahdi (2002) mentioned that 82 per cent of micro and small enterprises in Egypt are informal as well as Assaad (2007) who argues that the proportion of informal employment, in firms of less than ten workers, exceeds 80%. This enterprises' behaviour could prevail to escape either restrictive labor laws, mentioned above, or taxes.

However, it is worth mentioning that a new labor law, adopted in 2003, has introduced greater flexibility for employers in hiring and firing, in order to reduce potential causes of informal hiring practices. Consequently, Assaad (2007) states

²In order to conduct a general investigation of the ERSAP impact on all Egyptian older workers' LFP, i assume that changing labor market conditions influenced all older workers, not only those in public sector.

that the share of informal private wage employment in the private sector declined from 75% to 70% of overall employment in this sector, over the period 1998 to 2006. Yet, Increasing trend of informal employment, still observed in the Egyptian private sector, might be simply due to common and used practices of employers - not to formalize their workers - or to a lack of credibility in the new law.

Concerning the second frame of informality, that is the growth of non-wage employment in the private sector, Assaad (2007) found that the share of household enterprises increases from 19% in 1998 to 25% of overall employment. Household enterprises are being defined as any non-wage workers (employers, self-employers or unpaid family workers) who are members of a household that includes other non-wage workers.

Thereby, growth of informal employment raises the second question: how does the age structure of formal employment change during the time of reforms, with special concern to older workers.

2.3 Expected Impact of ERSAP on Older workers

Evolution of labor force participation and the spread of informality after economic reforms are two separate phenomena that could both influence older workers. In this setting, the aim of this research is to empirically test the significance of this influence. One could wonder if older workers' labor force participation have significantly declined after reforms era, i.e. older workers are more prompt now to be out of the Labor Force? In the same time, if their labor force participation did not change, are they more reporting to informal employment after public sector downsizing campaign?. Therefore, in order to test these expected impacts, the paper aims to simultaneously model those two phenomena, i.e. labor force participation and employment legal status, over time and distinguishably by individuals ages. Methodology used consists, hence, of estimating a multivariate probit model on three cross-section samples different in time (LFSS 1988, ELMS 1988 and ELMPS 2006) to describe how labor force participation, employment legal status and hours-of-work changed over time - before and after the economic reform - and separately by individuals age categories - mainly older ones.

3 Egyptian Databases and Main Definitions

I rely 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 27628, 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 labor market characteristics and the demographic ones 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 representative. The questionnaire for the three datasets is almost the same, with slight modifications in the most recent questionnaire.

To the best of my knowledge, the Labor Force Sample Survey (LFSS 1988), the Egyptian Labor Market Survey (ELMS 1998) and the Egyptian Labor Market Panel Survey (ELMPS 2006) have not been yet exploited under the perspective of an econometric study about older workers employment.

Samples used in this analysis are composed of men aged between 30 to 64 years in 1988, 1998 and 2006 who have ever worked before, whether currently employed or not or out of labor force. These are cross-sectional samples, composed of 3693, 3765 and 5865 in 1988, 1998 and 2006 respectively. Women are not taken into consideration as their sample is not large enough to perform precise estimations.

While I am interested in studying the impact of ERSAP on labor supply behaviors of the older working class (50-64), the prime age working population (30-49) serves as the control group. The youth labor force (15-29) is not taken into consideration as the trend in their labor force participation as well as in their employment legal status need special focus that is beyond the scope of this paper and in order to avoid any bias that could result from including them in the analysis.³

³Egyptian youth have also experienced major changes during the same period; for more readings

Concerning main concepts, first, older workers are defined to be those aged between 50 and 64 years old. At 50, most of insured workers are eligible to claim for their early retirement pensions. Although the mandatory age is at 60 years old for most of workers, the upper limit is being chosen at 64, to insure comparability with other international definitions and studies. Thus the age period 50 to 64 might reflect, for all kind of workers ⁴, a decision-making period or a turning point in their professional career.

Second, labor force participation (LFP) is meant to be the employment-to-population ratio. The former includes employed and unemployed persons in the numerator while the latter only includes the employed and therefore LFP is slightly larger than the employment-to-population ratio. However, unemployment rates in Egypt tend to be low for the for the sample used (30-64) and data confirm the fact that the differences between those two concepts are almost none; therefore employment-to-population ratio is used to represent labor force participation.

Moreover, employment is defined according to the extended labor force definition (Assaad, 2002; Assaad, 2007). In effect, 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). This means that employment, defined by the extended labor force definition, includes those who work according to the market labor force definition in addition to those who are engaged in subsistence activities in agriculture, animal husbandry or the processing of agricultural goods. The selection of extended labor force definition instead of the market one, in defining the participation variable, is crucial in order to take into account

see (Assaad, 2002; Assaad, 2007 and Amer, 2002)

⁴wage-workers, employers, self-employed

informal workers involved in non-wage employment (almost concerning unpaid family workers, who are mainly involved in subsistence activities) and to compare with previous Egyptian studies relying on this definition criterion. Instead, the market labor force definition would count informal workers as economically inactive population.

Third, according to the definition in (Wahba and Mokhtar, 2002, Wahba, 2000, El Mahdi, 2000), formal employment is defined here as employment where the worker either has a registered employment contract or social insurance coverage. Workers having neither the first criterion nor the second are considered informal. If the worker has at least one of both conditions, he is considered formally employed. This definition does not only correspond to employment in informal sector firms, informal employment could also occur in formal sector firms.

To recall and to link those definitions to the purpose of the paper, I estimate a set of three reduced-form equations using a multivariate probit model; the first is the Labor force participation (that is the employment-to-population ratio, in my research framework), the second is the legal status of employment which varies between formal or informal (formal means having at least a legal contract or a social security coverage) and finally the number of weekly hours-of work. The objective of such estimation is to assess the evolution in the relationship between age and the three variables of interest (employment vs. non-employment, legal status of work and hours performed) over time, thus concluding about the impact of ERSAP on older workers labor supply.

Before moving to the model description and estimation results, in the next section, some descriptive statistics are discussed.

4 Descriptive Statistics : Characteristics of the Sample

4.1 Trends in LFP and Formal/Informal Employment over time

Figure 1 shows the evolution over-time of employment-to-population ratio for three age categories (30-49), (50-57) & (58-64) and for men.

[Figure 1 is about here]

Generally, higher participation rates are always observed for younger age categories. Thus, workers aged of 30 to 49 years have higher participation rates than older ones (50-57) whom rates are, in turn, higher than the older age category (58-64). Thus, younger men workers (30-49), which is the control group, have the highest employment-to-population ratio and this situation remained for 1988, 1998 and 2006. Older workers (50-57) and (58-64) have experienced a decline in their employment-to-population ratio in 1998, as compared to 1988. In 2006, this decline has been reversed but very slightly for the (50-57) age class, however has continued for the second older age category.

Likewise, Figure 2 describes the evolution over-time of the proportion of formal employment for age categories (30-49), (50-57) and (58-64) and for men.

[Figure 2 is about here]

It is interesting to see the projection of the employment-to-population ratio evolution on the proportion of formal employment. Workers aged of 50 to 57 have the highest formal employment proportion, as compared to other age classes. Furthermore, in any age category, workers experienced an increase in their formal employment in 1998, relatively to 1988. However, the intensity of this change differs according to age categories, e.g. those being 50 to 57 years old experienced the highest increase in the formal employment proportion, followed by those being 58 to 64 and finally, by prime-age workers who have the lowest positive variation. Then, in 2006, this increasing trend observed in 1998 has been reversed and the proportion of formal

employment decreased from 1998 to 2006 for all age categories. In general, The proportion of formal employment reached a lower level in 2006 than in 1988, except for the (50-57) category whose percentage of formal employment remained higher than its level in 1988, yet lower than 1998.

4.2 Characteristics of Workers Vs. Non-workers

[Table 1 is about here]

The characteristics of non-working and working men aged 30 to 64 years old are shown in Table 1, for the three years of study (1988, 1998 and 2006). Working persons are more likely to be younger (30-49), as their share in the working population was at about 68% in 1988 and increased to 73% for the two following years. The incidence of working decreases as one grows older: only 19% of working men in 1988 are aged of 50 to 57 years and 11% are aged of 58 to 64. Also, it is observed that the share of working men being 58 to 64 years old decreases over time.

Men who are out of LF are very less likely to be at their prime age. Their share in the out of labor force population was 38% and it decreases through time: to 29% in 1998 and to 17% in 2006. On the other hand, the propensity not to work has almost doubled for the age category (50-57) between 1988 and 1998, passing from 12% to 24%. The most important observation is that those who are out of LF are very likely to be aged of 58 to 64, as their share was around 50% of all non working men; It has decreased a bit between 1988 and 1998 but increased significantly from 1998 to 2006.

There are four educational levels: Illiterate or know how to read or/and write, less than intermediate, intermediate or above than intermediate. In 1988, more than the half of working and non-working individuals were illiterate ⁵, with the example of 62.1% of working men who are illiterate or read/write without any sort of diploma. The share of this level of education among working and non-working men has substantially decreased in 1998 and 2006: almost the third of those who are working are illiterate nowadays. While this means that the chosen population aged of 30 to 65 become more educated - testified by the increase in the share of

⁵either illiterate, or knowing to read or/and write

other educational levels - yet illiterate working individuals has the highest share in employment.

Moreover, non-working individuals are more likely to be illiterate than working individuals as the share of illiterates in the out of LF population is higher than their share in the working population, for 1988, 1998 and 2006. On the other hand, Working individuals are more likely to have an intermediate or higher educational level than non-working individuals.

Concerning household variables, the marital status does not show a strong pattern with the decision of working or not over time, with married ones being slightly more likely to work. The head status surprisingly shows that household heads are slightly more likely to be out of labor force, a fact constantly observed through time (for 1988, 1998 and 2006). Last but not least, mean weekly hours has increased significantly from 1988 to 2006.

4.3 Characteristics of Formal Workers Vs. Informal Ones

[Table 2 are about here]

There are significant differences between formal and informal workers according to many variables, as shown in Table 2. The first variable of interest is the educational level. In 1988, the majority of informal workers were illiterate with a share of 81.4% among other educational levels. In 1998 and 2006, they became more educated, as the share of illiterates decreased to 63.6% and 54%, respectively. Yet, the educational composition of male informal workers is mainly dominated by illiterates. As for formal employment, the half of workers were illiterate, however this pattern has changed substantially in 1998 and 2006: formal workers are more likely than informal workers to have an intermediate level or above than intermediate level, representing around 65% of all formal workers.

Therefore, one can conclude that formal workers are more educated than informal ones, but the latter is getting educated with time.

Household heads are likely to be formally employed as the percentage of head among formal workers is slightly higher than their percentage among informal ones. Constantly over time Formal workers tend to be married more than informal ones.

Formally employed workers tend to perform higher number of weekly hours than informally employed ones in 1988. This was reversed in 1998 and 2006. More hours are performed by informal than formal workers.

Informal male workers are more concentrated in rural areas - whether upper or lower Egypt; in a constant and continuously increasing trend. Nevertheless, one should note that in these areas, the percentage of formal workers have increased over time as well.

5 The Model : Multivariate Probit Model

Three issues are studied regarding older workers: the labor force participation, their employment legal status which varies between formal and informal and weekly hours they perform. Through applying a Joint Multivariate Probit Model, I simultaneously estimate the probability of labor force participation, of having formal employment as well as the number of weekly hours-of-work. Active employed Individuals might have unobserved characteristics which could influence their allocation into formal or informal employment. Likewise, There might be unobserved heterogeneity who determines the legal status of employment and, in the same time, hours of work performed. Therefore, for the reason of selection bias and unobserved characteristics (Heckman, 1983), this model is chosen. It contains three reduced-form-equations: The first is the probability of labor force participation implying two choices, either to work or not to work. Then, once the individual is observed as working, the second equation treats the probability of having a formal or an informal job. The third is hours-of-work conditional on being working and the legal status of employment. Thus, when estimating the probability of having formal employment, the probability of not working is taken into account. Furthermore, when hours of work are being estimated, the probability of having formal employment is taken into account. In this setting, the complete log-likelihood function will contain three main components, the probability of non participation in the labor force, the probability of being employed in a formal job and finally the probability of informal job, with hours distribution being analyzed taking into account last two probabilities.

1. Participation Equation:

$$P^* = X\beta + \epsilon_p \quad (1)$$

$$\begin{aligned} P &= 1 \text{ if } P^* \geq 0 \\ P &= 0 \text{ if } P^* < 0 \end{aligned} \quad (2)$$

Labor Force Participation P is a binary variable taking on two values: '0' for non working individuals or inactive persons and '1' for working active ones. Unemployed persons are included in the non working category '0'. The latent variable P^* might reflect the difference in utilities of working and non working, respectively.

2. Formal/Informal Equation :

$$F^* = Z\gamma + \epsilon_f \quad (3)$$

If and only if $P^* \geq 0$;

$$\begin{aligned} F &= 1 \text{ if } F^* \geq 0 \\ F &= 0 \text{ if } F^* < 0 \end{aligned} \quad (4)$$

Formal employment 'F' is observed if and only if individuals are working (i.e. $P^* \geq 0$) and it is also a binary variable where '0' stands for informal employment while '1' is for formal one.

3. Hours-of work Equation :

$$H = K\theta + \epsilon_h \quad (5)$$

Weekly Hours 'H' are only observed for working individuals and for both formal and informal employment.

The complete log-likelihood function is ⁶:

$$LL = \begin{cases} \sum_{P=0} [\ln \Phi(-X\beta)] \\ + \sum_{P=1, F=0} \ln \left(\frac{1}{\sigma_h} \phi \left(\frac{H-K\theta}{\sigma_h} \right) \right) + \ln \left(\Phi_2 \left(-\frac{Z\gamma + \mu_f^*}{\sigma_f^*}, \frac{X\beta + \mu_p^*}{\sigma_p^*}, -\rho_{pf}^* \right) \right) \\ + \sum_{P=1, F=1} \ln \left(\frac{1}{\sigma_h} \phi \left(\frac{H-K\theta}{\sigma_h} \right) \right) + \ln \left(\Phi_2 \left(\frac{Z\gamma + \mu_f^*}{\sigma_f^*}, \frac{X\beta + \mu_p^*}{\sigma_p^*}, \rho_{pf}^* \right) \right) \end{cases} \quad (6)$$

The model is estimated by maximizing this log-likelihood function.

Among control variables used in the model three equations ⁷, i introduce dummy variables for age categories (50-57) and (58-64); dummy variable for time (1998) and (2006) and interactions between age and time dummy variables. Thereby, i could see how the impact of age has changed over time. Hence and as for example, the participation equation is :

$$P = \alpha + D_{age_i} \beta_{age_i} + D_{time_j} \beta_{time_j} + (D_{age_i} * D_{time_j}) \beta_{agetime_{ij}} + X\beta + \epsilon_p \quad (7)$$

Where:

- α is the constant in the participation equation.
- Age Category is represented by “ i ”, which can be either 50 – 57 or 58 – 64.
- The time, that is the year of the survey, is represented by “ j ”, which can be either 1998 or 2006.

Thus, D_{age_i} is the dummy variable taking on 1 if age_i occurs; 0 other wise. D_{time_j} indicates the year of the sample used, it takes on 1 if the period is $time_j$. $D_{age_i} * D_{time_j}$ measures the interaction between an age category and a certain year and necessitates particular attention when analyzing the meaning of its coefficients ($D_{agetime_{ij}}$). For example, the interaction between age categories and years (e.g. $D_{50-57} * D_{1998}$, etc ...) enables to analyze either the evolution of the same age cohort within two different years; or the difference between two age cohorts within the same year. On the one hand, by combining the coefficient of the interaction term “ $D_{50-57} * D_{1998}$ ” and the coefficient of “ D_{50-57} ”, the sum will give the difference between age cohorts (workers

⁶See Appendix for full details of the multivariate probit model

⁷Participation, formal employment and hours

aged of (50-57) versus workers aged of (30-49)) within the same year 1998. On the other, by combining the coefficient of the Interaction term “ $D_{50-57} * D_{1998}$ ” and the coefficient of “ D_{1998} ”, the sum will give the evolution between 1988 and 1998, for one particular age cohort (50-57).⁸.

6 Estimation Results

Table 3 shows results of multivariate probit model estimated for men’s samples used. The reference category is an unmarried illiterate man, aged between 30 and 49 years and living in greater Cairo -the capital- in 1988. Consequently, coefficients of time dummies ($D_{time1998}$ and $D_{time2006}$), in the three reduced-form equations, explain changes over time for the reference category, that is the prime-age population (30-49). Likewise, Coefficients of age categories dummies ($D_{age50-57}$ and $D_{age58-64}$ explain the difference between the reference age category (30-49) and each of these categories, in 1988.

Estimated Results for 1988, by age category

[Table 3 are about here]

The non-significance of the (50-57) dummy coefficient (β_{50-57} in the LFP equation) shows that, in 1988, there was no difference in LFP between workers aged of 50 to 57 and the prime age workers (30-49). Meanwhile, during the same year, workers aged of 58 to 64 years had lower probabilities of participating in the labor market than the reference category, shown by the negative significant age dummy coefficient.

By examining coefficients of age categories estimated for the equation of formal employment and hours-of-work, workers aged of 50 to 57 had more opportunities of formal employment, in 1988, than the reference category while workers aged of 58 to 64 years had same opportunities as the reference. The (50-57) workers perform as many hours as prime-age workers in 1988, however the (58-64) workers had fewer hours.

⁸See Appendix 2 for detailed proof of the interaction effect

To resume, in 1988, workers aged of 50 to 57 participated in the LF as likely as younger ones and performed as many hours, but they had more probability to be formally employed. Furthermore and as compared to the reference, workers aged of 58 to 64 years had lower probabilities to work, performed fewer hours but they had same opportunities of formal employment.

Evolution Trends for Workers

First, coefficients of both year dummies ($D_{time_{1998}}$ and $D_{time_{2006}}$) are non significant in the LFP equation, significantly negative in the formal employment equation and positive in the hours of work one. Thereby workers (30-49) did not experience any change in their labor force participation in 1998 and 2006, relatively to 1988. However, in both years, they become more probable to occupy informal employment along with performing higher number of hours.

Second, workers (50-57) have experienced a decrease in their LFP between 1988 and 1998. This is proven by combining the coefficient of " D_{1998} " with the interaction term " $D_{50-57} * D_{1998}$ ", which gives the coefficient of the evolution of LFP (employment-to-population ratio) for this age cohort (50-57) between 1988 and 1998 and it is of -0.76. To recall, coefficients magnitude in such family of models are not meaningful but one can conclude about the sign of the difference. Hence, results show a decline in their LFP between those two years. Moreover, they become less formally employed in 1998 than in 1988. Between 1988 and 2006, the same evolution as between 1988-1998 : a decline in employment to population ratio with an increase in informality. However, hours of work performed by this age cohort (50-57) have increased significantly.

Thus, during 1988 to 2006, prime age workers have kept their employment-to-population ratio unchanged while reporting more to informal employment while older workers (50-57) were not only reporting to informal employment but also becoming out of labor force, testified by a decrease in their employment-to-population ratio. If older workers would have not experienced any change in their employment-to-population ratio while having less chances of formal employment, one could argue

that they were only more reporting to informal as prime age workers without the risk of being inactive. Meanwhile, the parallel trend of the decline in LFP and in formal employment means that there have two pathways: informal and out of the labor market. I observe that higher hours of work are performed in 1998 and 2006, for higher probability of informal employment.

Third, workers aged of 58 to 64 have experienced a decrease in their LFP between 1988 and 1998, as well as between 1988 and 2006. Their access to formal employment have decreased between 1988 and 1998, but re-increased in 2006. Hours of work have decreased between 1988 and 1998 and there was no difference between 1988 and 2006. Thus, as well as workers aged of 50 to 57, the 58-64 category have experienced an increase in informality and in inactivity in the same time.

These results confirm findings of Wahba (2000) indicating that ages 50-59 were the primary group to be pushed out of the labor market during adjustment period, as she finds that this group had higher mobility rates between 1991-1998 than between 1981-1988.⁹

In general, the evolution trend in LFP (employment-to-population ratio) concluded by descriptive statistics - presented in section 4.1 - is coherent with model's result, i.e. older workers experienced a decline in 1998 and in 2006 as compared to 1988. However, i can find some differences between descriptive statistics and results of the model: since the model takes into account other individual characteristics in analyzing relationship between LFP and both age and time, therefore the effect of age and year on LFP is net of any other factors effects which could influence the trend of LFP in a simple descriptive statistic framework.

Correlations Analysis

[Table 4 are about here]

As shown in table 4, correlation between working and being a formal worker is significantly negative, i.e. individuals who choose not to participate in the labor market have unobserved characteristics which raise their probability of formal employment. Inversely, those who continue to be active have more probability to work informally

⁹Wahba's study (2002) were based on LFSS 1988 and ELMS 1998

as compared to those who does not continue. Thereby, i can state that this is the result of reform policies who were targeting formal workers - who opted to move out of Labor Force - inducing them to face, nowadays, lower probability to work. On the other hand, those who have more probability to work are more getting more probably to informal jobs. Moreover, there is a negative correlation between the probability of being a formal worker and hours performed, i.e. an informal worker tends to work more hours. This was testified by the significant increase in hours always occurring with a parallel increase in informality (examples of workers (30-49) in 1998 and 2006, and workers (50-57) in 2006). Last 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. This finding seems logical since those who have more probability to be employed have less chances to be formally working and thus perform higher number of weekly hours.

7 Conclusion

Older workers (50-64) in developing countries might have been affected after Structural Adjustment Programs which were applied during 80s and 90s in Latin America and Middle East countries, respectively. 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 Egyptian labor laws and norms. The second is to restructure labor through implementing an early retirement incentives program, targeted to older workers for they quit voluntarily their jobs.

This paper represents the stepping stone towards analyzing older workers labor supply in Egypt. It examined the impact of these policies on the representation of older workers (50-64) in the labor force, their access to work, the legal status of this work (formal versus informal) as well as hours performed, relative to prime-age workers (30-49). Using Three cross-sectional Egyptian databases in three points of

time (before, during and after reforms), a multivariate probit model is estimated to capture the evolution of the age structure of labor force participation, of formal jobs and of hours-of-work in 1988, 1998 and 2006. I found that there is a decline in labor force participation of older men as well as an increase in their informal employment probability. This means that besides shifting to self-employment or to other sorts of informal employment, older workers tends to move out of the LF so that their LFP levels have decreased. On the other hand, prime-age workers shift to informal employment while keeping their participation levels unchanging. This difference in findings between older and younger workers could suggest a given pattern where informal work is first demanding or preferring younger workers, then demanding older workers whose labor supply exceeds, thus they go out of the labor force. Therefore first questions to raise are if there are any barriers for older workers to work in informal employment; if it is more demanding younger ones rather than older workers; if there is any substitution between younger and older in informal employment. The negative relationship between the probability of working and the probability of being a formal worker provides further witness to this phenomenon: that those who were pushed out of the labor force were formal workers - older workers - while those who are remaining in the LF - younger workers in the majority of cases and older workers to a less extent - are more probably to be informal workers. This could illustrate an effect of the Structural Adjustment Program on the labor supply of older workers. Likewise, it is worth studying the reason that older workers move out of labor force if informal employment represents an alternative to continue in the labor force. in other sense, is going to inactivity a free choice or a forced one?. All these questions represent future researches concerning older workers in Egypt.

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Figure 1: The Evolution of Employment-to-Population Ratio during 1988-2006, for men aged of 30-65

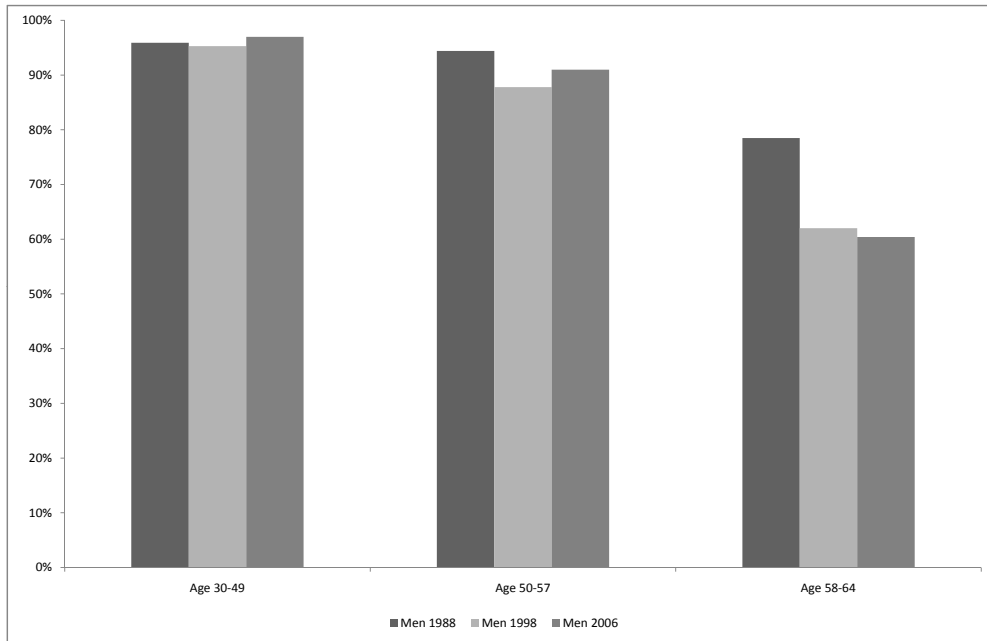


Figure 2: The Evolution of Formal Employment Proportion during 1988-2006, for men aged 30-64

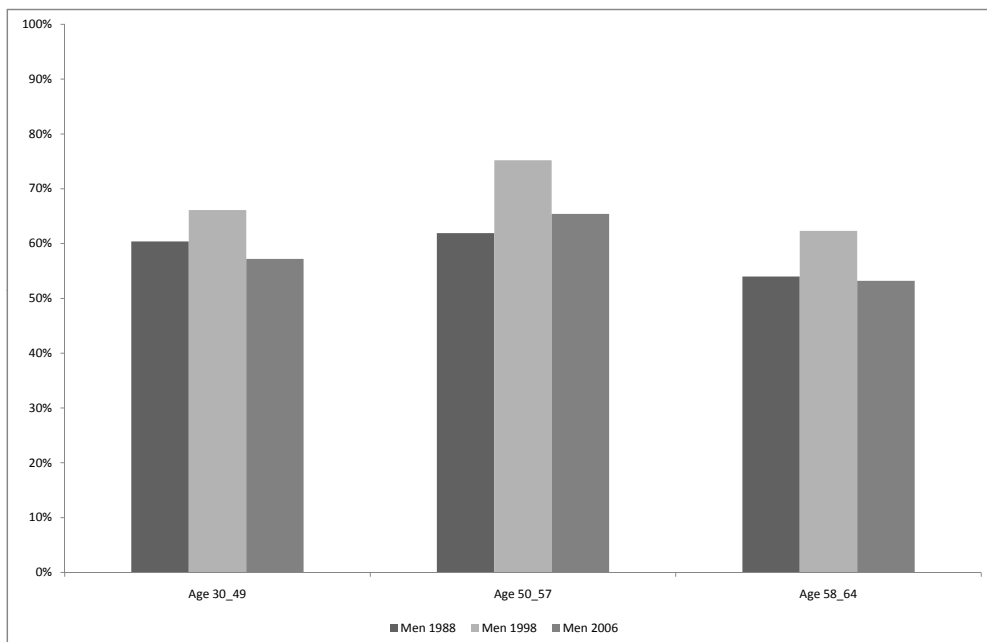


Table 1: Characteristics of Employment, Men aged 30-64, LFSS 88, ELMS 98 & ELMPS 06

	1988	1998	2006
Age 30-49			
Out of LF	0,38	0,292	0,175
Employed	0,68	0,73	0,738
Age 50-57			
Out of LF	0,127	0,243	0,232
Employed	0,19	0,188	0,192
Age 58-64			
Out of Lf	0,494	0,466	0,594
Employed	0,111	0,083	0,071
Perc. Illiterate OR Read and Write			
Out of LF	0,663	0,469	0,345
Employed	0,621	0,359	0,334
Perc. Less Than Intermediate			
Out of LF	0,163	0,188	0,219
Employed	0,106	0,181	0,159
Perc. Intermediate			
Out of LF	0,09	0,188	0,214
Employed	0,115	0,202	0,267
Perc. Above than Intermediate			
Out of LF	0,084	0,155	0,222
Employed	0,159	0,258	0,241
Perc. Married			
Out of LF	0,898	0,897	0,924
Employed	0,931	0,902	0,928
Perc. Head			
Out of LF	0,886	0,899	0,946
Employed	0,846	0,853	0,876
Hourly Wage (mean)			
Out of LF			
Employed	0,801	1,843	4,137
Weekly Hours (mean)			
Out of LF	-	-	-
Employed	46,82	48,807	50,57
Perc. Greater Cairo			
Out of LF	0,355	0,275	0,249
Employed	0,238	0,198	0,139
Perc. Alexandria and Canal cities			
Out of LF	0,133	0,191	0,177
Employed	0,097	0,13	0,109
Urban Lower Egypt			
Out of LF	0,193	0,172	0,18
Employed	0,13	0,164	0,13
Urban Upper Egypt			
Out of LF	0,072	0,12	0,14
Employed	0,105	0,177	0,178
Rural Lower Egypt			
Out of LF	0,139	0,147	0,168
Employed	0,253	0,199	0,256
Rural Upper Egypt			
Out of LF	0,108	0,095	0,086
Employed	0,178	0,132	0,188

Notes: (i) Tabulations made by the author
(ii) Perc. notes for Percentage
(iii) In 1988, Perc. Illiterate OR Read or/and Write is 0.663 for men out of labor force means that 66.3 % of inactive men are illiterate or knows to read or/and write. For example, Perc. Alexandria and Canal Cities for employed in 1988 is 0.097, i.e. 9.7% of employed men lives in Alexandria or Canal Cities

Table 2: Characteristics of informal/formal sectors, Men aged 30-64, LFSS 88, ELMS 98 & ELMPS 06

	1988	1998	2006
Age 30-49			
Informal	0,692	0,761	0,761
Formal	0,705	0,715	0,721
Age 50-57			
Informal	0,181	0,143	0,16
Formal	0,196	0,209	0,215
Age 58-64			
Informal	0,128	0,096	0,079
Formal	0,1	0,076	0,064
Perc. Illiterate OR Read and Write			
Informal	0,814	0,636	0,539
Formal	0,492	0,226	0,188
Perc. Less Than Intermediate			
Informal	0,078	0,191	0,174
Formal	0,125	0,176	0,149
Perc. Intermediate			
Informal	0,05	0,101	0,209
Formal	0,158	0,251	0,308
Perc. Above than Intermediate			
Informal	0,059	0,073	0,079
Formal	0,225	0,346	0,356
Perc. Married			
Informal	0,926	0,876	0,918
Formal	0,934	0,915	0,935
Perc. Head			
Informal	0,805	0,794	0,838
Formal	0,874	0,881	0,903
Hourly Wage (mean)			
Informal	0,635	1,56	2,542
Formal	0,842	1,92	4,69
Weekly Hours (mean)			
Informal	46,42	49,41	52,42
Formal	47,04	48,52	49,27
Perc. Greater Cairo			
Informal	0,182	0,147	0,098
Formal	0,275	0,222	0,169
Perc. Alexandria and Canal cities			
Informal	0,074	0,083	0,078
Formal	0,113	0,153	0,13
Urban Lower Egypt			
Informal	0,091	0,137	0,121
Formal	0,156	0,177	0,137
Urban Upper Egypt			
Informal	0,081	0,159	0,137
Formal	0,121	0,186	0,207
Rural Lower Egypt			
Informal	0,336	0,258	0,302
Formal	0,197	0,17	0,223
Rural Upper Egypt			
Informal	0,237	0,216	0,264
Formal	0,139	0,092	0,134

Notes: (i) Tabulations made by the author
(ii) Perc. notes for Percentage
(iii) In 1988, Perc. Illiterate OR Read or/and Write is 0.814 for informally employed means that 81.4 % of informal workers are illiterate or know to read or/and write

Table 3: Multivariate Probit Model Results for Egyptian Men

VARIABLES	(1) Employment	(2) Formal Employment	(3) Weekly Hours
D1998	-0.181 (0.188)	-0.500*** (0.101)	1.555* (0.798)
D2006	0.250 (0.195)	-0.587*** (0.0930)	4.981*** (0.705)
Age 50_57	0.0536 (0.111)	0.175*** (0.0625)	-0.285 (0.732)
Age 50_57*D1998	-0.588*** (0.134)	0.420*** (0.0918)	-1.580 (1.021)
Age 50_57*D2006	-0.662*** (0.132)	0.420*** (0.0799)	-2.511*** (0.926)
Age 58_64	-0.803*** (0.0913)	0.116 (0.0726)	-4.893*** (0.897)
Age 58_64*D1998	-0.502*** (0.121)	0.412*** (0.113)	-2.796** (1.326)
Age 58_64*D2006	-0.791*** (0.117)	0.868*** (0.127)	-4.802*** (1.422)
Regions dummies	Yes	Yes	
Regions dummies*D1998	Yes	Yes	
Regions dummies*D2006	Yes	Yes	
Married	Yes		
Married*D1998	Yes		
Married*D2006	Yes		
Nb of persons aged between 0_14*D1988	Yes		
Nb of persons aged between 0_14*D1998	Yes		
Nb of persons aged between 0_14*D2006	Yes		
Education level	Yes	Yes	Yes
Education level*D1998	Yes	Yes	Yes
Education level*D2006	Yes	Yes	Yes
Constant	1.290*** (0.151)	0.0886 (0.0657)	47.05*** (0.504)
Observations	13025	13025	13025
Log Likelihood	-59304	-59304	-59304
Wald chi2 (38)	1149	1149	1149

Notes: (i.) Standard errors in parentheses.

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

Table 4: Correlations

Sigma_ Hours	16.168*** (0.118)
Rho12_Employment/Formal	-0.623*** (0.038)
Rho13_Employment/Hours	0.701*** (0.021)
Rho23_Formal/Hours	-0.01*** (0.013)

Table 5: Variables Definition

Year dummies	
D1988	1 = if the year is 1988 0 = otherwise
D1998	1 = if the year is 1998 0 = otherwise
D2006	1 = if the year is 2006 0 = otherwise
Age dummies	
Age 30-49	1 = if the individual is between 30 and 49 years old 0 = otherwise
Age 50-57	1 = if the individual is between 50 and 57 years old 0 = otherwise
Age 58-64	1 = if the individual is between 58 and 64 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

Appendix 1: The Multivariate Probit Model

There are three main variables :

1. Participation Equation:

$$P^* = X\beta + \epsilon_p \quad (8)$$

2. Formal/Informal Equation :

$$F^* = Z\gamma + \epsilon_f \quad (9)$$

3. Hours-of work Equation :

$$H = K\theta + \epsilon_h \quad (10)$$

where $(\epsilon_p, \epsilon_f, \epsilon_h)$ are jointly normally distributed;

$$\begin{pmatrix} \epsilon_p \\ \epsilon_f \\ \epsilon_h \end{pmatrix} \sim N \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}, \Sigma$$

Three probabilities are being estimated in the log likelihood function :

1. The probability of being inactive or not working:

$$\begin{aligned} l_{notworking} &= Pr(P^* < 0) \\ &= \Phi(-X\beta) \end{aligned} \quad (11)$$

2. The probability of having a formal job, hours being observed:

$$l_{formalworking} = Pr(K\theta + \epsilon_h = H, Z\gamma + \epsilon_f \geq 0, X\beta + \epsilon_p \geq 0)$$

According to Bayes' rule:

$$l_{formalworking} = Pr(K\theta + \epsilon_h = H) \times Pr(Z\gamma + \epsilon_f \geq 0, X\beta + \epsilon_p \geq 0 | K\theta + \epsilon_h = H) \quad (12)$$

3. The probability of having an informal job, hours being observed:

$$l_{informalworking} = Pr(K\theta + \epsilon_h = H) \times Pr(Z\gamma + \epsilon_f < 0, X\beta + \epsilon_p \geq 0 | K\theta + \epsilon_h = H) \quad (13)$$

- With $\epsilon_p = \frac{\rho_{ph}}{\sigma_h} \epsilon_h + \xi$; $\xi \perp \epsilon_h$ and $var(\xi) = 1 - \rho_{ph}^2$

$$\begin{aligned} l_{formalworking} &= Pr(K\theta + \epsilon_h = H) \times \\ &Pr\left(\xi \geq -\frac{Z\gamma + \mu_f^*}{\sigma_f^*}, \xi \geq -\frac{X\beta + \mu_p^*}{\sigma_p^*}\right) \\ &= \frac{1}{\sigma_h} \phi\left(\frac{H - K\theta}{\sigma_h}\right) \times \Phi_2\left(\frac{Z\gamma + \mu_f^*}{\sigma_f^*}, \frac{X\beta + \mu_p^*}{\sigma_p^*}, \rho_{pf}^*\right) \end{aligned} \quad (14)$$

- With $\epsilon_f = \frac{\rho_{fh}}{\sigma_h} \epsilon_h + \xi$; $\xi \perp \epsilon_h$ and $var(\xi) = 1 - \rho_{fh}^2$

$$\begin{aligned} l_{informalworking} &= Pr(K\theta + \epsilon_h = H) \times \\ &Pr\left(\xi < -\frac{Z\gamma + \mu_f^*}{\sigma_f^*}, \xi \geq -\frac{X\beta + \mu_p^*}{\sigma_p^*}\right) \\ &= \frac{1}{\sigma_h} \phi\left(\frac{H - K\theta}{\sigma_h}\right) \times \Phi_2\left(-\frac{Z\gamma + \mu_f^*}{\sigma_f^*}, \frac{X\beta + \mu_p^*}{\sigma_p^*}, -\rho_{pf}^*\right) \end{aligned} \quad (15)$$

- Where conditional means and variances are : (Greene, 1997)

$$\begin{aligned} \mu_p^* &= \mu_{p|\epsilon_h - K\theta = H} = \frac{\rho_{ph}}{\sigma_h} (\epsilon_h) = \frac{\rho_{ph}}{\sigma_h} (H - K\theta) \\ \sigma_p^* &= \sigma_{p|\epsilon_h - K\theta = H} = \sqrt{1 - \rho_{ph}^2} \end{aligned}$$

$$\begin{aligned}
\mu_f^* &= \mu_{f|\epsilon_h-K\theta=H} = \frac{\rho_{fh}}{\sigma_h}(\epsilon_h) = \frac{\rho_{fh}}{\sigma_h}(H - K\theta) \\
\sigma_f^* &= \sigma_{f|\epsilon_h-K\theta=H} = \sqrt{1 - \rho_{fh}^2} \\
\rho_{pf}^* &= \rho_{pf|\epsilon_h-K\theta=H} = \frac{\rho_{pf} - \rho_{ph}\rho_{fh}}{\sigma_p^*\sigma_f^*}
\end{aligned} \tag{16}$$

Thus, one could write the Log likelihood function as written above in the Model section:

$$LL = \begin{cases} \sum_{P=0} [\ln \Phi(-X\beta)] \\ + \sum_{P=1, F=0} \ln \left(\frac{1}{\sigma_h} \phi \left(\frac{H-K\theta}{\sigma_h} \right) \right) + \ln \left(\Phi_2 \left(-\frac{Z\gamma + \mu_f^*}{\sigma_f^*}, \frac{X\beta + \mu_p^*}{\sigma_p^*}, -\rho_{pf}^* \right) \right) \\ + \sum_{P=1, F=1} \ln \left(\frac{1}{\sigma_h} \phi \left(\frac{H-K\theta}{\sigma_h} \right) \right) + \ln \left(\Phi_2 \left(\frac{Z\gamma + \mu_f^*}{\sigma_f^*}, \frac{X\beta + \mu_p^*}{\sigma_p^*}, \rho_{pf}^* \right) \right) \end{cases} \tag{17}$$

Appendix 2: Interaction between Two Dummy variables

If there are two age categories (age category1 and age category2) and two years of study (1988 and 1998); then the probability of labor force participation is:

$$\begin{aligned} Prob(P = 1) = & \alpha + D_{age_2}\beta_{age_2} + D_{time_{1998}}\beta_{time_{1998}} + (D_{age_2} * D_{time_{1998}})\beta_{age_{time_{ij}}} \\ & + X\beta + \epsilon_p \end{aligned}$$

Proof

$$\begin{aligned} P_{age_{188}} &= a \equiv \alpha_{188} \\ P_{age_{288}} &= a + b \equiv \alpha_{288} \\ &\Rightarrow b = \alpha_{288} - \alpha_{188} \end{aligned} \tag{18}$$

- “*b*” is the coefficient of the dummy variable indicating the occurrence of the event *age₂* and it represents the difference in the probability of LFP between *age₁* et *age₂* in 1988

$$\begin{aligned} P_{age_{198}} &= a + c \equiv \alpha_{198} \\ &\Rightarrow c = \alpha_{198} - \alpha_{188} \end{aligned} \tag{19}$$

- “*c*” is the coefficient of the dummy variable indicating the occurrence of the event “1998” and it represents the evolution of the probability of LFP between 1998 et 1988 for one age category - i.e. *age₁*

$$\begin{aligned} P_{age_{298}} &= a + b + c + e \equiv \alpha_{298} \\ &\Rightarrow e = \alpha_{298} - a - b - c \end{aligned}$$

- “ e ” is the coefficient of the interaction between dummy variables of age_2 and $time_{1998}$.

$$\begin{aligned}
 b + e &= \alpha_{298} - (a + c); \quad Or \quad a + c = \alpha_{198} \\
 \Rightarrow b + e &= \alpha_{298} - \alpha_{198}
 \end{aligned} \tag{20}$$

- “ $b + e$ ” is the sum of the coefficient of age_2 dummy variable and the interaction coefficient. This sum indicates the difference between 2 age categories for a given year, i.e. 1998, illustrated by $\alpha_{298} - \alpha_{198}$

$$\begin{aligned}
 c + e &= \alpha_{298} - (a + b); \quad Or \quad a + c = \alpha_{288} \\
 \Rightarrow c + e &= \alpha_{298} - \alpha_{288}
 \end{aligned} \tag{21}$$

- “ $c + e$ ” is the sum of the coefficient of $time_{1998}$ dummy variable and the interaction coefficient. This sum indicates the evolution through time (between 1988 and 1998) of the probability of LFP for a particular age category, i.e. age category 2, illustrated by $\alpha_{298} - \alpha_{288}$