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Who is covered and who under-reports: An empirical analysis of access to social insurance on the Egyptian labor market

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Abstract

This paper investigates the dynamics and determinants of having access to social insurance coverage on the Egyptian labor market among wage and non-wage workers. Using data from the 1998 Egypt Labor Market Survey and the 2006 Egypt Labor Market Panel Survey, the paper specifically tackles two questions: Who has social insurance coverage? and who has his/her basic wage underreported? The first question investigates the worker -and enterprise- level determinants of having access to social insurance. The second question analyzes the risk of underreporting insurable wage to the social security authority. The results show that men, older, married, better educated and white collar highly skilled workers are more likely to have social insurance coverage. Access to social insurance is more likely to exist in the public sector and in large private enterprises. Furthermore, acquiring social insurance coverage in the private wage work sector does not often come at first entry; but it takes some time to gain such access. In contrast, experience is not important for acquiring social insurance coverage among non-wage workers. Underreporting insurable wages is negatively correlated with levels of education and labor market experience. Also, the likelihood of underreporting increases with monthly basic salary and years to retirement age.

JEL Classification: H55, C34

Keywords: Social Security, Social Insurance, Social Protection, Endogeneity, Instrumental variables.

1. Introduction

In Egypt, as in many developing countries, the convergence of poverty and lack of social security places the working poor in a very vulnerable situation that has always mandated immediate action in research and programmatic interventions. Before the January 25th revolution, a focus on social security was relevant in view of the insecurities instigated by increasing market liberalization and the shrinking role of the state in services and employment. Nevertheless, the revolution and its aftermath heightened sense of insecurity and labor protests have mandated a serious re-evaluation of recent labor market policies and the whole social protection system in Egypt. This makes issues of social security, employment and household livelihood strategies of particular relevance now more than ever.

Egypt has a history of providing social security and social assistance projects. Following the socialist 1952 revolution, Egypt adopted a social insurance system that is considered to be a fully funded universal scheme. This system consisted of collecting contributions from employees during their work years, depositing it into a pension fund, investing the money, and then finally repaying back the money to the employee in the form of old age pension. However, in more recent years the system became increasingly dependent upon financial support from the Egyptian Treasury, and thus, has become only partially funded (EHDR 2005).

The participation of wage workers in the social security system is compulsory according to the law (79/1975), but voluntarily for non-wage workers (law 108/1976). Nevertheless, not all private sector employers follow the law.. The high social insurance contribution rates required from the employers cause many of them to either underreport the basic salary of their employees to the social insurance authority or not cover their workers at all (EHDR 2005). On the other hand, some wage workers queuing for public sector jobs may choose not to be insured in the private sector, thinking that this might minimize their opportunities in being employed in the public sector (Barsoum et al. 2009). Also, wage workers may negotiate, with their employers, higher pay in return for not having social insurance. Many others are quite ignorant about the whole system of social insurance and its benefits (see Sieverding 2012).

This paper aims to investigate the distribution and determinants of access to social insurance coverage using available data from two rich nationwide labor force sample surveys: the 1998 Egypt Labor market Survey (ELMS 98) and the 2006 Egypt Labor Market Panel Survey (ELMPS 06). More specifically, this paper tackles two questions: Who has social insurance coverage? and who has his/her basic wage underreported? The first question investigates the worker- and enterprise- level determinants of having social insurance coverage. The second question analyzes whether the worker's basic wage reported to the social insurance authorities is distinct from his/her actual wage. The aim of this last analysis is to shed light on the phenomenon of underreporting of the basic salary in the private wage sector in Egypt.

This paper is organized into seven sections. Following this introduction, Section 2 gives a brief background on the social insurance system in Egypt. Section 3 reviews the existing literature on social insurance and informal employment. Section 4 presents the data used in this paper. Section 5 presents descriptive results on the pattern and dynamics of social insurance coverage among wage and non-wage workers. The estimation methodology and results of the determinants of social insurance coverage and underreporting of basic wage are discussed in Sections 6 and 7. Conclusions and policy considerations are provided in Section 8.

2. Background: The Egyptian Social Insurance System

Social insurance schemes in the Middle East and North Africa region were drawn in the early 50s and are mainly managed nowadays as Defined-Benefits Pay-As-You-Go (DB-PAYG) system. Under this DB-PAYG scheme, the contributions of current active members are used to pay the pensions of the retired members, and the benefits are determined as a defined percentage of the average monthly wage earned in the last few years before retirement. These schemes usually cover workers in the public and the private sector, and include the military in Arab countries. The contributions to these schemes are paid jointly by workers, employers and the government (ILO 2009; SSA 2011).

Since the 1952 revolution, Egypt has implemented a new widely stratified social insurance system (SIS) operated as a fully funded scheme where employees pay their contributions that should be invested and repaid to them in the form of old age pensions. This system has gradually shifted to be a partially funded Pay-As-You-Go system, which receives support from the Treasury, with defined benefits scheme that is equal to a set percentage of the average monthly wage earned (UNDP 2005).[1]

The Egyptian SIS provides old-age, disability, survivors, sickness, maternity, work injury and unemployment benefits to workers and their dependants. The system is mainly regulated by four laws, which are law 79 for 1975 for wage workers, law 108 for 1976 for employers and self-employed, law 50 for 1978 for Egyptians working abroad, and law 112 for 1980 for workers who are not included in any of the previous schemes. Furthermore, prior to the January 25th, 2011 revolution, a significant reform of the social insurance system was passed through Law 135 of 2010, during the time of the old regime in Egypt, but the status of this law is still unclear due to the events of the revolution.

Law 79 for 1975 draws the general scheme for the system, insuring all government, public sector and private sector employees. Contributions are deducted from two types of monthly wage earnings: the basic and the variable monthly wages.[2] The basic monthly wage used for calculating contributions had a maximum bound of 775 EGP in 2008 (SSA 2009), and was raised to 875 EGP in 2011 (SAA 2011) as per the post-revolution reform measures that were applied by the Ministry of Finance. The maximum bound for the variable monthly wage was 500 EGP (Helmy 2004; SSA

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1 The overview of the Egyptian social insurance system in this section is based on Sieverding and Selwaness (2012).

2 The variable wage earnings are any earnings beyond the basic wage, including incentives, bonuses, etc.

2009), and was also raised to 1,050 EGP in 2011.[3] Additionally, in July 2012, the first post-revolution Minister of Social Solidarity passed law No. 102, which stipulates an annual increase of 15% on the maximum pensionable variable wage. This law also immediately raised the ceiling on the pensionable base wage to 900 EGP and on the pensionable variable wage to 1,200 EGP. Therefore, the total monthly pensionable wage have a maximum ceiling of 1275 EGP in 2006 (SSA 2007), 1,925 EGP in 2011 and is currently 2,100 EGP.

Contributions are set as a fixed percentage of the pensionable wage or the wage reported to the social insurance authority up to the above mentioned ceiling levels. The total contribution amounts to 41% of basic wage and 25% of variable wage, which is paid by employees, employers and the government. Employees contribute 14% and 10% of their base and variable earnings, respectively; while employers contribute 26% and 15% of the base and variable earnings, respectively. The government contributes only 1% of the base wage in addition to covering any deficit in the system (Helmy 2004). Hence, these benefits are mainly financed by the employers and employees contributions.[4]

Old age, invalidity and survivor pensions could be claimed for insured persons who meet the eligibility conditions: being 60 years old with 120 months of contributions or 50 years old with 240 months of contributions. Early retirement is possible under certain conditions. As mentioned above, the pensions are calculated on a defined benefit basis for the basic wage and the variable wage. Old-age base pensions represent usually a certain amount of the average monthly base earnings during the last two years for public sector employees and civil servants multiplied by the years of contribution up to 36 years. For private sector employees, the earnings upon which the base pension is calculated is the average monthly base earnings for the last two years or for the five years before the last two years multiplied by 1.4, whichever is lower - up to the base earning ceiling for the year of concern (e.g. 875 EGP in 2011) - then also multiplied by the years of contributions, up to 36 years. Variable pensions are calculated upon the reference variable earning which is the average monthly variable earning computed for the whole duration of contribution increased by 2%, up to the variable wage ceiling for the year of concern (e.g. 1,050 EGP in 2011). The total pension has a maximum bound and should not exceed 80% of the reference monthly total earnings (SSA 2011).[5]

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3   In October 1st 2012, one US dollar was about 6.10 EGP.

4   These contribution rates are considered to be very high, in comparison to rates applied in other MENA countries. For instance, the employers' and employees' contribution rates combined in the Maghreb countries and Jordan range from only 8 to 14% (Helmy 2008).

5   For more details, see SSA (2011) and Sieverding and Selwaness (2012).

On the other hand, the Law 108/1976 provides voluntary old-age, invalidity and death insurance to the non-wage workers who are 21 to 60 years old. The contributions rates are set lower than those of the general scheme law 79/1975, reaching 15% of the covered monthly payroll. Moreover, non-wage workers can choose the level of their insurable monthly earnings within the range of 50 to 900 EGP. Contributions represent 15% of such monthly declared income. The insured person has the right to change his earnings level under some conditions stated in the law. Workers aged 65 years whose contributions were paid during 120 months are eligible to retire. Likewise, early retirement is possible under certain conditions. The pensions are calculated as a share of the declared monthly income or as a share of its average in case of changes in income brackets, multiplied by the number of years of contribution, given that the pension does not exceed 80% of average monthly income and is not below 35 EGP (Maait et al. 2000).

According to law 50/1978, the system also covers Egyptians working abroad on a voluntary basis. Moreover, the SIS has two non-contributory schemes regulated by law 112/1980, which are the Comprehensive Social Insurance Scheme (CSIS) and the Sadat Pension Plan, to insure those who are not covered by any of the previously mentioned laws. These schemes aim at providing financial support and insurance for the working poor who have not been included in or covered by any of the previous schemes, like casual workers, in case of old age, disability, and survivorship. Sadat pension also cover individuals aged 65 and above who have no pensions and are considered as inheritors for deceased persons before 1980.

Nevertheless, several shortcomings of the SIS have often been highlighted in the literature. First, the high social insurance contribution rates, requested form both employees and employers, create a disincentive for participation. Second, the system acts as a regressive tax due to the presence of maximum ceiling on pensionable wage. This ceiling encourages wage workers to underreport their wages, in order to evade the high contributions they are paying. Also, by putting a maximum bound for the pensionable wage, the system loses a large part of the contributions that could have been collected from the high-income workers if there was no maximum ceiling on insurable earnings. Third, the fact that pension amount is based on the average monthly earnings during only the last few years in service encourages workers to underreport their pensionable wage during their first years of service, and then fully report their wages later near the end of their service to get high pensions. In other words, the way the pension is determined gives room for workers and employers to get around the system in order to pay lower contributions (Helmy 2008).

Accordingly, before the January 25th revolution, a new social insurance law (Law 135 of 2010) was scheduled to go into effect in January, 2012. However, due to the revolution this law has not been effective yet. The aim of this law is to avoid some of the shortcomings of the original system.

The main essence of this new law is to closely connect the worker paid contributions during his/her working years to what he/she gets as retirement pensions. This is a major change, since the earlier scheme only connected retirement payment to the last five years of contributions. This system implies the implementation of individual workers national accounts that should be gradually replacing the actual insurance PAYG system. National accounts are individual virtual accounts that will contain employees' contributions and will be then disbursed at the time of their claim with accumulated interest. According to this reform, the social insurance system will change from being based on defined benefits to be based on defined contributions. The new system is supposed to increase the contribution rate paid by the employees to an average of 16.5% and decrease the employers' contribution on behalf of their employees to an average of 10%. Employees would also have the right to pay higher contributions if they want. Under this reform, the retirement age would be 65 instead of 60 years old. This increase in age is supposed to occur gradually to reach 61 in 2015, 62 in 2018, 64 in 2024 and finally reaching 65 in 2027. Also, Law 135 introduced new measures to include workers in the informal economy and in activating unemployment pensions, which had been inactive in the earlier law (SSA 2010; Sabreen and Maait 2011).

3. Literature Review

Social insurance coverage in developing countries has been the main focus of several studies. Social insurance has been tackled in research on informality of labor markets, where informality is being defined as the lack of social security (Henley, Arabsheibano and Carneiro 2006; Pages and Madrigal 2008; Maloney and Bosch 2007; Bosch et al. 2007). Henley, Arabsheibano and Carneiro (2006) estimate the determinants of being informal using different definitions for informality. Some studies focus on whether informality is a free choice, or imposed by the labor market rules. Pages and Madrigal (2008) find that low-skilled workers may value the informal wage jobs and the self-employment jobs more than the formal ones since the latter imply paying social security contributions. The authors suggest that this could be due to several reasons: the non-affordability of deferring present consumption to the future for the low-skilled workers

who are in majority poor, having a shorter life expectancy along with more reliance on family safety nets (mainly through intergenerational transfers), or that these benefits are not considered cost-effective by those workers. Maloney and Bosch (2007) and Bosch et al. (2007) show that informality may be a preferred choice for self-employed workers, but a last resort for informal salaried workers, who cannot afford to stay unemployed until finding a formal sector job.

Other research has directly studied access to social insurance coverage. Auerbach et al. (2007) is one of the first empirical studies on social insurance that tries to explain the low participation rates of wage workers in the social security system, by comparing the determinants of coverage among wage-workers, whose participation is mandatory, to that of non-wage workers, whose participation is voluntary. This study finds that the weak law enforcement combined with the low willingness of workers to participate in the system is among the main reasons behind the low coverage rates. More specifically, low coverage is not only driven by demand factors (from the workers side), but also by employer's choice to insure their workers in the presence of weak law enforcement. Some studies attempt to evaluate the labor market distortion that is caused by the social protection system, with its two components: social insurance and social assistance programs. Cuesta and Olivera (2010) find that the presence of non-contributive systems that are free for poor informal workers may create incentives for workers to work informally (i.e. without contributing to the social insurance). In the same spirit, Cuesta and Bohorquez (2011) analyze labor market transitions during 2008-2009 in Columbia and its linkage to the social security coverage. The authors find that workers may equally value the non-contributive and the contributive schemes; and hence the presence of both schemes simultaneously may encourage workers to opt for informality to avoid paying social insurance contributions.

In the MENA countries, with the increasing trend of informalization witnessed during the late 1990s, the phenomenon of the lack of social security coverage has become more widespread. Tansel (1999) studies the wage differentials between the covered and uncovered wage workers in Turkey, accounting for the selection into four employment statutes: not working; covered wage-worker; uncovered wage worker; and other employment. Urdinola and Tanabe (2012) empirically estimates the determinants of labor informality in the MENA region, mainly defined as lack of social insurance coverage. In Egypt, empirical studies have mainly tackled the phenomenon of informality where it is mainly defined as the lack of both legal contract and social security coverage (Wahba 2009; Mokhtar and Wahba 2002). Wahba (2009) examines the effect of the new labor law of 2003. This law provides flexibility in the hiring and firing

procedures, since the inflexibility of the Egyptian labor market has often been seen as one of the major obstacles to job creation in Egypt. The author finds that the new law has increased formal employment, among those who were employed in 1998, in the private non-agricultural sector, but has no effect on new entrants to the labor market. Nevertheless, to our knowledge, there have been no studies investigating the linkage between the patterns of social insurance coverage and the SIS regulations in Egypt.

4. Data

The analysis of this paper relies on data from the 1998 Egypt Labor Market Survey (ELMS 98) and the 2006 Egypt Labor Market Sample Survey (ELMPS 06). The ELMS 98 and ELMPS 06 were conducted by the Economic Research Forum (ERF) in cooperation with the Egyptian Central Agency for Public Mobilization and Statistics (CAPMAS). The ELMS 98 was carried out on a nationally-representative sample of 4,816 households. The ELMPS 06 is a follow-up survey to the ELMS 98, representing a longitudinal survey that tracks the labor market and demographic characteristics of the households and individuals interviewed in 1998, and any new households that might have formed as a result of splits from the original households. The ELMPS 06 sample consists of a total of 8,349 households.[6]

This paper focuses only on the working age population (WAP), which is the age group 15-64. The analysis is also restricted to the sample of working men and women, based on the market definition of the labor force. The analysis mainly distinguishes between wage and non-wage workers, since as discussed above the social insurance scheme for each of these types of workers is different. The sample of wage workers is about 4,633 workers in the ELMS 98, and about 7,456 workers in the ELMPS 06; while the sample of non-wage workers is about 1,183 workers in the 1998 survey and 2,632 workers in the 2006 survey.

5. Social Insurance Coverage on the Egyptian Labor Market

This section presents a descriptive assessment of the patterns and dynamics of social insurance coverage in Egypt. It investigates the dynamics of social insurance coverage among wage and non-wage workers

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6   For more details on the data description, see Assaad (2007) and Assaad & Roushdy (2008).

(including employers and self-employed) over the last few decades. This section also examines how long it takes an individual to get access to social insurance coverage on the Egyptian labor market, the characteristics of covered workers and the extent of the issue of underreporting insurable earnings.

5.1 Dynamics of the Social Insurance

Access to social insurance among all workers declined from about 52% in 1998 to less than 42% in 2006 (Figure 1). As expected, wage workers are more likely to have social insurance compared to all types of non-wage workers, including employer, self-employed and unpaid family workers. In 2006, about 58% of wage workers had social insurance coverage; compared to only 22% of employers, 18% of self-employed and less than 2% of unpaid family workers.

The observed decline in access to social insurance in 2006 has been fairly broad, cutting across both wage and non-wage workers. Nevertheless, this decline has been more prominent among employers (13 percentage points decline) and self-employed (7 percentage points decline) relative to wage workers (5 percentage points decline).[7]

Figure 1: Percent of Workers (15-64 years old) who have Social Insurance Coverage by Employment Status in 1998, and 2006

Source: Constructed by the authors from ELMS 98 and ELMPS 06

7   These results do not contradict with the studies which showed that formality (defined as being employed with the benefit of either social security coverage or a legal contract) has increased due to the labor law No.12 issued in 2003 (see Wahba 2009). The 2003 law has brought flexibility in hiring and firing of workers; so its effects has been more obvious in the increasing number of legal contracts, rather than an increase in accesses to social insurance coverage.

Let us focus now on wage workers and explore more the evolution of social insurance in the private and public sector; using the individual-level retrospective information available in the ELMPS 06. Figure 2 presents the percentage distribution of first jobs for wage workers by year of entry into the labor market and sector of employment (public, private with social insurance coverage and private with no social insurance coverage), during the period 1960-2006.

The figure confirms that following the guaranteed employment scheme of the 1960s, the Egyptian public sector was the main creator of formal employment opportunities and typically the preferred sector by most new entrants to the labor market.[8] However, by late 1980s and early 1990's, the public sector jobs started to decline in favor of the informal private sector. This is the period during which the Economic Reform Structural and Adjustment Program (of 1991) was implemented with the World Bank and IMF. This economic reform has curbed new employment opportunities in the public sector and initiated a privatization program of existing public enterprises (Mokhtar and Wahba 2002). Nevertheless, as shown in Figure 2, the share of private sector wage workers who had access to social insurance during their first jobs, although growing, has continued to be very small during this period. In contrast, uninsured wage employment has been making up a substantial and growing share of total first jobs since late 1980s.

The share of private sector wage workers, who had no access to social insurance coverage during their first job, reached its peak of 52% of total first employment in 1999. This confirms the known fact about the failure of the private sector in Egypt, not only in absorbing all new entrants after the shrinking role of the government sector, but also in ensuring formality or social security coverage to all its entrants.

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8   This guaranteed employment scheme took place since the promulgation of law 14 in 1964, which was later
     amended by law 85 in 1973.

Figure 2: Distribution of First Job by Year of Entry and Employment Status, WAP (15-64), 1960 to 2005
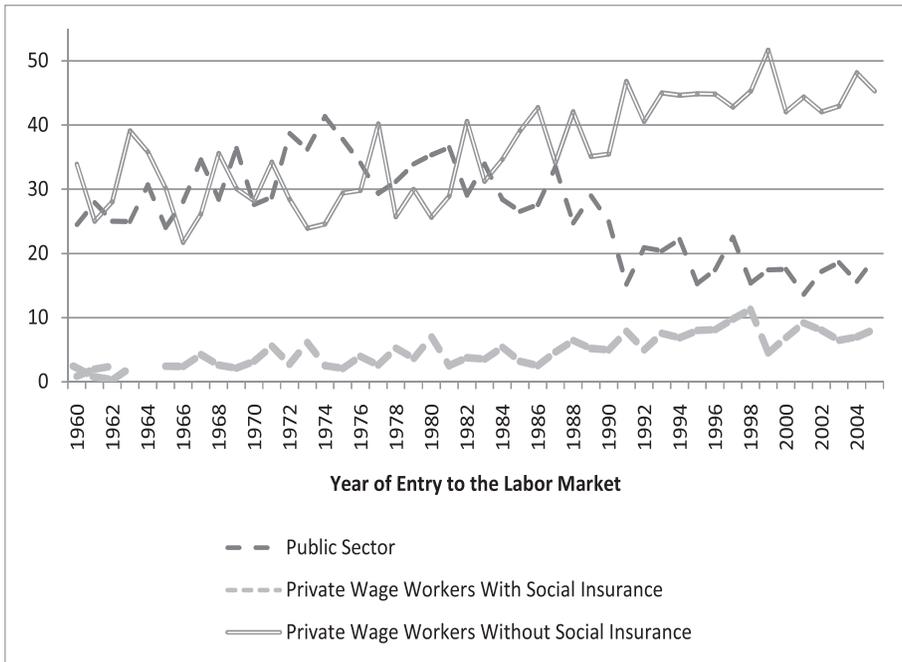
Figure 3 turns to exploring the role of job tenure in acquiring social insurance coverage. This figure compares the share of the private sector wage workers who had no access to social insurance among first entrants, among those with 5 years working experience and among those with 10 years of experience. The figure shows that, as expected, acquiring social insurance coverage in the private sector does not often come at first entry; gaining such access takes time. The share of private sector wage workers with no social insurance is highest among labor market first entrants, followed by those having 5 years of experience, and lowest among those with at least 10 years of working experience. However, as discussed above, the percent of those with no social insurance has been increasing over time among all the three working experience categories.
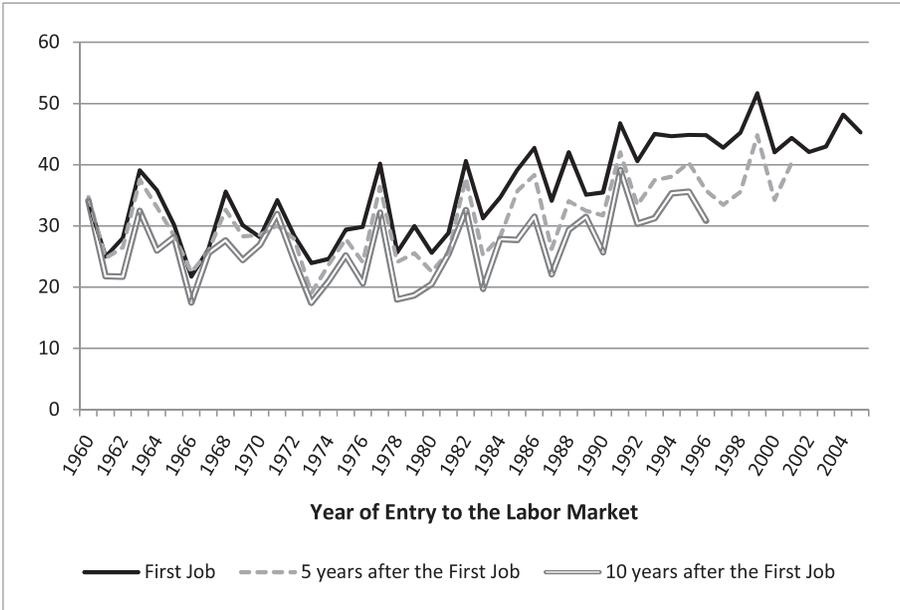
5.2 Characteristics of Socially Insured Wage and Non-wage Workers

This section explores the characteristics of workers, who have social insurance coverage, and their enterprise-specific characteristics. Table 1 presents the main characteristics of insured wage and non-wage workers. The table shows that the only groups which enjoyed an increase in their social insurance coverage between 1998 and 2006 are prime age wage workers (about 4.5 percentage points increase), wage workers in the private sector (2.7 percentage points increase) and those working for wage in the agriculture sector (4 percentage points increase).

Among wage workers, females are more likely to be covered (72%) than males (53%). This is expected, since generally more females are working in the public sectors than males in Egypt (see Assaad and Roushdy 2007).[9] In contrast, among non-wage workers, females (5%) are less likely to be covered than males (23%). Marriage, living in an urban neighborhood, and being the household heads increase the likelihood of having access to social insurance among both wage and non-wage workers. Also, age is

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9   In 2006, more than 70% of females were working in the public sector compared to only 40% of males wage workers.

strongly associated with acquiring social insurance coverage among both types of workers. In 2006, 83% of wage workers and 24% of non wage workers aged 50-64 have access to social insurance coverage, compared to only 30% of wage workers and 14% of non-wage workers aged 15-29.[10] Moreover, as discussed above (Figure 3), the percent of covered wage workers substantially increases with years of experience; but, as expected, this relationship is less pronounced among non-wage workers.

Education plays an important role in one's coverage status, particularly among wage workers. Only a third of wage workers with no education have social insurance coverage, compared to more than 80% among those with above intermediate education. This positive association between education and access to social insurance is less pronounced among non-wage workers.

Among wage workers, blue collar high and low skilled workers tend to have lower access to social security in comparison to the white collar occupation groups.[11] Also, access to social security among white collar wage workers substantially increases with skill, but this relation is surprisingly reversed among the blue collar group. In contrast, non-wage workers' access to social insurance is highest among the white-collar highly skilled occupation group followed by the blue collar low skill group. This result is discussed further in the next section. Table 1 shows that firm size substantially increases the likelihood of having access to social insurance benefits among wage workers. More than 66% of wage workers of large firms (50 or more workers) have social insurance coverage, compared to less than 25% among those working for wages in small firms (fewer than 10 workers). However, once again this relationship is much weaker among non-wage workers.

As highlighted in Figures 2 and 3, wage workers employed in the government sector or in state owned enterprises are almost four times as likely to have social insurance (more than 94% and 93% respectively) than those working in the private sector (less than 24%). There are no non-wage workers in the government or the public sector. Contrary to expectation, the percent of covered workers in the private sector is larger

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10   One should be careful in interpreting these data on the youngest age groups (15 – 29) as a large portion of individuals in this group might still be in school.

11   These skill groups are based on the ILO's International Standard Classification of Occupations (ISOC 1988). The major groups of ISOC-88 are condensed into the following 4 skill groups: (1) White-collar, high-skill (legislators, senior officials and managers, professionals, technicians and associate professionals); (2) White-collar, low-skill (clerks, service workers, and shop and sales workers); (3) Blue-collar, high-skill (skilled agricultural and fishery workers, and craft and related trade workers); and (4) Blue-collar, low-skill (plant and machine operators and assemblers and elementary occupations). Information on ISCO-88 can be found at http://laborsta.ilo.org/applv8/data/isco88e.html. Last accessed on October 10, 2012.

among non-wage workers (30%) than their wage worker counterparts (22%) in 1998, and is only 4 percentage points lower than their wage workers counterparts. The share of covered wage workers is highest in the transportation, storage and communication sector and the other services activity group, followed by the industry sector, and lowest among those working in agriculture. These patterns hold constant for non-wage workers.

The ELMS 98 and ELMPS 06 divide Egypt into six regions: Greater Cairo, Alexandria and the Suez Canal cities, Urban Lower Egypt, Urban Upper Egypt, Rural Lower Egypt, and Rural Upper Egypt. Among both wage and non-wage workers, access to social insurance is highest among firms located in Alexandria and Suez Canal followed by firms located in the urban Lower and urban Upper regions. The lowest access to social insurance is observed in rural Upper Egypt. Differences in law enforcement levels in the metropolitan and the urban regions, relative to rural areas, is probably the main reason behind these regional variations in access to social insurance coverage (Tansel, 1999). On the other hand, the individual's perception and knowledge of social insurance of those residing in rural areas generally varies from that of their urban counterparts. Also, rural workers often rely on their social networks and families as social safety nets rather than the social insurance system (see Sieverding 2012).

Table 1: Percent of Workers with Social Insurance, by Employment Status and Workers' Characteristics, WAP (15-64), 1998, 2006.

	Wage Work		Non-Wage Work	
	1998	2006	1998	2006
Total (%)	62.3	56.9	30.2	20.0
Worker's Characteristics				
Female	78.0	71.7	9.3	5.3
Male	58.5	53.2	32.8	22.8
Married	73.6	68.3	33.1	21.3
Not Married	39.5	31.4	16.2	13.3
Age				
15-29	33.8	29.9	11.1	13.8
30-49	76.1	70.5	31.0	20.8
50-64	77.9	82.3	37.8	23.1

Education Level				
Illiterate/ read or write[1]	35.4	31.9	19.9	11.2
Less than intermediate	49.9	40.9	37.4	26.1
Intermediate	70.7	57.7	37.6	23. 6
Above Intermediate	89.3	81.1	58.9	46.2
Years of Experience				
< 5 years	41.7	33.9	10.0	5.6
5 - 9 years	49.6	43.9	17.9	18.7
10-14 years	60.4	51.8	27.5	22.1
15 + years	72.7	69.61	33.7	20.8
Occupation				
White collar high skill	92.4	89.1	53.9	40.5
White collar low skill	73.3	57.2	22.1	19.5
blue collar high skill	22.5	17.2	10.6	7.6
blue collar low skill	55.7	43.9	37.1	33.6
Residence				
Urban	72.5	65.2	49.9	34.6
Rural	51.4	48.0	17.8	11.9
Household Head	72.0	67.5	36.3	23.5
Not Head	52.1	45.1	11.5	9. 9
Enterprise Characteristics				
Region				
Greater Cairo	73.4	66.0	46.3	34.1
Alexandria & Suez Canal	78.9	67.0	56.7	41.9
Urban Lower	74.6	66.7	54.9	36.6
Urban Upper	76.0	69.5	47.0	29.7
Rural Lower	59.6	53.6	25.0	12.4
Rural Upper	57.2	43.0	6.9	8.6
Firm Size				
< 10 workers	11.1	24.7	-	20.3
10-49 workers	31.1	33.5	-	20.0
50+ workers	66.9	66.2	-	25.6
Do not know	15.6	89.8	-	10.8
Sector of Ownership				
Government	96.7	95.0	-	-

State Own Enterprises	96.5	93.8	-	-
Private Sector	22.0	23.6	30.2	20.0
Economic Activity				
Agriculture & Fishing	11.6	14.7	7.8	3.2
Broad manufacturing group	54.4	54.3	40.1	30.0
Construction	19.4	15.9	18.1	9.3
Wholesale & retail trade, hotel & restaurant	35.3	24.7	39.4	29.3
Transp., storage & communication	75.2	58.8	63.9	49.5
Other services	87.6	87.0	58.7	42.6
Total number of workers	**4,636**	**7,389**	**1,184**	**2,630**

[1]Illiterate or can only read and write, but has no education certificate.

5.3 Underreporting Insurable Basic Salary

As discussed above, the high social insurance contribution rate expected from employers causes many of them to enroll their employees in the system at a lower basic wage than their actual salary, in order to reduce the amount of the contribution they pay. This section exploits a unique piece of information collected in the ELMPS 06, which is the wage reported by the employer to the social insurance authorities as distinct from the actual wage the worker is paid, to explore the phenomenon of reporting lower basic salary in the private wage work sector in Egypt.[12] The data show that in 2006, in the sample of 4,323 wage workers, about 23% had lower basic wage reported to the insurance system than they actually earn.

Table 3 shows that females are more likely to have their full basic wages reported. This does not come as a surprise; since, as mentioned above, more females are employed in the public sector. Also, the percentage of underreporting is fewer among married workers. There is no substantial difference in the likelihood of having full salary reported to the insurance authority by workers' urban\rural residence and household headship status.

The percent of underreporting of basic salary significantly increases with wage. Percent of underreporting is more than 31% among workers in the highest wage quintile, compared to less than 18% among those falling in the two lowest wage quintiles. This confirms that the social insurance system might be acting as a regressive tax where low-income workers pay contributions on their entire wage while high-income workers

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12 Information about wage reported by the employer to the social insurance authorities was not collected in the 1998 survey (ELMS 98).

pay contributions on only a part of their wage; since wages of the latter group exceed the maximum ceiling of the insurable earnings that the law stipulates (Sieverding and Selwaness 2012).

Underreporting is only slightly higher among the youngest group (26%), relative to the middle (22%) and prime age workers (23%). Also, underreporting only slightly increases with experience. This might be due to the above mentioned regressive tax characteristics, since workers' wages often increases with age and experience.

Those with intermediate or higher levels of education are more likely to have their full basic salary reported to the social insurance authority, relative to those with a lower education level. Also, white collar high and low skilled workers are more likely (more than 15 percentage points) to have their full basic salary reported, relative to their blue collar counterparts. Blue collar low skill workers have the highest percent of underreporting. This partially explains the surprising results observed above. The higher percent of access to social insurance among this latter group, relative to their blue collar high skill group, comes with a higher percentage of underreporting of basic salary.

Almost 40% of wage workers in the private sector have a lower salary reported to the insurance authority compared to about 18% among those working in the government or state owned enterprises.[13] Wage workers in the services sector are more likely to experience underreporting of their basic salary, followed by those working in manufacturing and construction. Surprisingly, wage workers of the agriculture sector are more likely to have their full basic salary reported to the system. Once again, this might be due to the lower salaries that are often observed in the agriculture and fishing sector compared to other economic activities.

Individuals working in Alexandria and Suez Canal (16%), and Lower Egypt (19%) regions are less likely to have their basic salary underreported to the social insurance system, while the highest percentage of underreporting is observed in rural and urban Upper Egypt (26%). The phenomenon of underreporting of basic salary is more common in small firms (fewer than 10 workers), as those firms are more likely to be working informally. Underreporting increases with firm size. Once again, this might be due to the fact that workers wages are generally higher in larger firms.

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13 This 18% of underreporting of basic salary in the public sector comes as a surprise. The phenomenon of reporting lower basic salary is expected not to exist in the public sector, since evasion of the law is practically impossible in this sector. Accordingly, we expect that many respondents might have misunderstood the question, or confused basic wage with their total wage that also includes the variable wage.

Table 2: Percent of Insured Wage Workers with Underreported Basic Salary to the Social Insurance Authority, WAP (15-64) in 2006

Characteristics	% Underreported Basic Salary
Total (%)	23.1
Worker Characteristics	
Female	17.3
Male	25.0
Married	22.3
Not Married	26.7
Age	
15-29	25.5
30-49	22.4
50-64	22.5
Education Level	
Illiterate/Read or write[1]	31.1
Less than intermediate	31.9
Intermediate	21.4
Above Intermediate	20.1
Years of Experience	
< 5 years	20.0
5 - 9 years	22.4
10-14 years	23.8
15 + years	23.5
Occupation	
White collar high skill	19.3
White collar low skill	22.0
Blue collar high skill	35.4
Blue collar low skill	39.5
Basic Monthly Wage	
Lowest Quartile	17.1
Second Quartile	17.6
Third Quartile	21.6
Fourth Quartile	31.3

Residence	
Urban	23.4
Rural	22.6
Household Head	23.6
Not Head	22.2
Enterprise Characteristics	
Region	
Greater Cairo	24.4
Alexandria & Suez Canal	16.1
Urban Lower	19.1
Urban Upper	26.6
Rural Lower	19.2
Rural Upper	26.4
Firm Size	
< 10 workers	38.1
10-49 workers	24.1
50+ workers	30.9
Do not know	18.2
Sector of Ownership	
Government	18.5
State Own Enterprises	17.8
Private Sector	39.7
Economic Activity	
Agriculture & Fishing	17.9
Broad manufacturing group	25.7
Construction	22.0
Wholesale & retail trade, hotel & restaurant	34.0
Transp., storage & communication	44.6
Other services	18.6
Total number of workers	**4,323**

[1]Illiterate or can only read and write, but has no education certificate.

6. Determinants of Access to Social Insurance Coverage

This section is devoted to investigating the workers and enterprise-specific determinants of social insurance coverage among wage and non-wage workers. The aim here is to explore more fully who gets social insurance, and where the jobs that offer social insurance coverage are found. This section also differentiate between wage workers and non-wage workers; since as discussed above, the laws regulating social insurance coverage are different for these two types of workers.

The following probit regression is estimated to model the likelihood of having access to social insurance coverage for all workers and separately for wage and non-wage workers. The dependent variable takes the value 1 if the worker, i, has access to social insurance coverage and zero otherwise. X_i is a vector of the workers' and household characteristics, while the vector E_i includes the enterprise-specific characteristics, and e_h is the error term.

$$\Pr(S_i = 1 \mid X'_i, E_i) = \Phi(X'_i \beta + E_i \gamma + e_h)$$

Worker-specific characteristics, include the following six variables: age, gender, marital status, education, years of experience, and occupation. A dummy for being female and another for being married are, respectively, used to control for gender and marital status. Age and its square are used to control for individual age. Similarly, years of experience and its square are used to investigate the time dimension in acquiring social insurance coverage on the labor market. Education is measured by three dummy variables (illiterate or can only read and write but has no certificate is the reference category): has less than an intermediate education, has an intermediate education, and has an above intermediate education. Occupation is measured by the three dummies indicating white collar low skill, blue collar high skill and blue collar low skill. The white collar high skill occupation group is the omitted category. Additionally, a dummy variable is included to account for whether the individual is the head of the household. The household structure is controlled for using a dummy for the presence of any other member in the household who has social insurance coverage, the share of members in the household who are out of the labor force grouped into three age categories (0-14, 15-64, and above 65), and the household size.

Moreover, in the all workers models, a dummy for being a wage worker is included (non-wage workers are the omitted category) to account for

employment status. Similarly, in the non-wage workers models a dummy for being an employer is included (self-employed is the omitted category).

On the other hand, the enterprise-specific characteristics, which are common for both wage and non-wage workers, consist of the two variables: the region where the enterprise is located and the enterprise economic activity. In the regression models the five regional dummies are included, where Greater Cairo is the omitted category: Alexandria and the Suez Canal cities, urban Lower Egypt, urban Upper Egypt, rural Lower Egypt, and rural Upper Egypt. The enterprise economic activity is captured by the five dummies indicating whether the enterprise belongs to (i) a broad manufacturing and mining group that includes mining and quarrying, manufacturing, electricity, gas and water supply activities; (ii) construction; (iii) a broad trade group, including wholesale and retail trade, hotels, and restaurants; (iv) transportation, storage, and communication; and (v) other services. The agriculture and fishing activity group is the reference category.

Furthermore, in the wage worker equation the enterprise sector and size is captured by a sector-size composite variable that consists of four groups: government or public enterprises (omitted category), private enterprises with 50 or more workers, private enterprises with 10–50 workers, and private enterprises with fewer than 10 workers.[14]

A methodological concern arises here when empirically modeling access to social insurance coverage. In the all workers model, endogeneity of employment status may be encountered from the fact that workers may self-select themselves into wage and non-wage work depending on how they value social insurance and their expectation of getting access to social insurance in each of these two types of employment.[15] For instance, if an individual who values social insurance has   higher expectation of having social insurance coverage in wage work, he/she may decide to wait for a wage job that offers social insurance benefits rather than opting for a non-wage job. In contrast, an individual with less interest in social insurance might opt for non-wage work. This would cause a statistically significant correlation to be observed between social insurance and wage work, but which should not be interpreted as a causal impact of wage work on access

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14   This variable could not be included in the non-wage workers equation. There are no non-wage workers in the government and public sector enterprises. Also the percent of non-wage workers working in enterprises with more than 10 workers is very small (2.6%), which prevented the ivprobit model from converging.

15   One might argue that the endogeneity of labor force participation needs to be taken care of first. However, this paper focuses on modeling access to social insurance among the employed group of individual, who have already decided to join the labor market and found a job. In other words, the analysis and results of this paper only holds for this group of employed workers, and not for all types of individuals who are often observed on the labor market (including the unemployed and the out of labor force).

to social insurance. The same applies for employment status in the non-wage worker models.

Furthermore, enterprise-specific characteristics (such as sector and firm size) might also be endogenous to social insurance coverage, since enterprise or sector choices and getting access to social insurance may often be made simultaneously.[16] For instance, an individual who values social insurance may self-select into the public sector or in a large private sector enterprise.[17] Once again this reverse-causality may challenge the consistency of the model, by causing the enterprise characteristics to be correlated with unobserved determinants of access to social insurance. Hence, for an accurate econometric estimation, one needs to correct for this possible endogeneity.

Instrumental variables (IV) technique is often used as a remedy for this endogeneity problem. To apply IV technique, a set of instrumental variables are needed, which are correlated with the individual choices of employment status, sector, and enterprise size but uncorrelated with access to social insurance coverage. In the literature, parents' education and their employment characteristics have been occasionally used to instrument for these individual job choices.

Accordingly, in the following, in addition to estimating the single equation probit model, a two-stage IV probit model (using the ivprobit command in STATA) and a two-stage least square model (2SLS) are estimated, separately for all workers, wage workers and non-wage workers.[18] In the first-stage of each of the two-equation models, the employment status (sector-size) decision is estimated. The worker's parents' education level, employment status and sector of employment are used as instrumental variables. These instruments are expected to be good proxies for workers'

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16   One can argue here that this possible endogeneity might also apply to other enterprise-specific character-istics included in the model. However, we believe that neither the enterprise economic activity, nor its loca-tion is endogenous in the context of Egypt. Nevertheless, we have separately investigated the endogeneity of each of these two variables, for wage and non-wage workers, and could not accept their endogeneity (results are available upon request).

17   In Egypt small enterprises may be able to violate the law and work informally to avoid the cost of regis-tration including paying social insurance for its worker. However, working informally is generally hard for large firms. The literature shows that enterprises with more than 10 employees are very unlikely to work informally.

18   Although ivprobit command in STATA assumes continuous endogenous regressors and both the employ-ment status and sector-size variables are categorical, the econometrics literature proved that ivprobit es-timation would still provide consistent estimates in such occasions that outperform the two-stage linear model (2SLS) estimates (see Newey (1987)). Nevertheless, later on, Angrist (1991) proved that a 2SLS model in case of a binary dependent outcome and binary endogenous variables can perform well under certain conditions (Acosta, 2006).

employment status (sector-size) choice, since parents education and work experience often affects one's own work choices, but do not directly affect his/her access to social insurance coverage.

In the IV probit specifications, the exogeneity of employment status (sector-size) variable to access to social insurance is tested. The null hypothesis here is that the correlation between the error terms of the social insurance equation and the employment status (sector-size) choice equation, *rho,* is zero. If this null hypothesis cannot be rejected, then we cannot reject that employment status (sector-size) choice is exogenous to social insurance coverage (i.e., the error terms are uncorrelated). In such case, the results of the single equation probit model would be more efficient than those of the IV probit model. On the other hand, if the error terms are correlated (i.e., the unobservables that affect the social insurance coverage status also influence the employment status (sector-size) choice), the size of the coefficient of the employment status (sector-size) variable is expected to be substantially larger in the two-equation models than in the single equation model.

Additionally, the 2SLS estimation allows for performing an over-identification test, a weak instruments test, the Wooldridge's (1995) score and the regression-based tests of endogeneity. The Sargen's test for over-identification of the instrumental variables tests the null hypothesis that both instruments are valid; i.e. could be excluded from the social insurance equation. A statistically significant Sargen's test statistic indicates that the instruments may not be valid. On the other hand, the test of the weakness of instruments is based on the Cragg Donald minimum eigenvalue statistic created by Cragg and Donald (1993). The value of this statistic is compared to critical values provided by Stock and Yogo (2005). This test provides measures of goodness of fit of the first-stage equation (employment status and sector-size). It also uses an F-statistic to test the null hypothesis that the coefficients on the instruments are equal to zero in the first-stage equation. The F-statistic is often compared in the literature to the threshold of 10 which is suggested by Staiger and Stock (1997). An F-statistic below the threshold of 10 suggests the existence of a weak-instrument problem.

6.1 Estimation Results

Tables 3, 4 and 5 presents the probit (Model 1), ivprobit (Model 2) and 2SLS (Model 3) models estimates of the social insurance equation, respectively, for all workers, wage workers and non-wage workers. Additionally, for wage workers (Table 4), two alternative specifications are presented. The first three models control for the sector-size variable,

while the last three models (Models 4, 5 and 6) control only for working in the public sector.[19,20]

In the all workers (Table 3) and the wage workers (Table 4) 2SLS models specifications, Sargen's test for over-identification of the instruments does not reject the null hypothesis that the instruments are valid (p-values are substantially higher than the 10% level). Additionally, for both models, the weak identification test provides an F-statistic that is substantially higher than the threshold rule of thumb of 10. All the R^2 statistics of the first-stage regressions are also relatively high, so they do not imply a weak-instrument problem. Hence, the null hypothesis that the instruments are weak in both the all workers and wage workers models cannot be accepted. Furthermore, in all the 2SLS models of Table 3 and 4, both the Wooldridge's (1995) score and the regression-based tests of endogeneity reject the null hypothesis that wage work, public sector and sector-size variables are exogenous to social insurance coverage (p-values are smaller than 1% in all models).

Moreover, the ivprobit estimation of both the all workers and wage workers models leads to a p-value smaller than 0.01 for the Wald-test of significance of rho. Hence, the null-hypotheses that *rho=0* cannot be accepted at 1% significance level. In other words, we cannot reject that the error term of each of the employment status, public sector and sector-size equations is correlated with the error term of the social insurance equation. In such case, the results of the two-equation models would be more efficient than those of the single equation probit model. Accordingly, in the following the focus will be on the results of the ivprobit estimation.

The all worker single equation model (Table 3) shows that wage workers are more likely to have social insurance coverage than their non-wage workers counterparts; however, when the employment status is instrumented for, the effect of wage work on access to social insurance is no longer significant. Contrary to the bivariate results, when controlling for worker and enterprise characteristics, females are less likely to have access to social insurance coverage relative to males. Marriage increases the likelihood of having social insurance. As expected, age and experience have an inverse U-shape relationship with access to social insurance. The probability of access to social insurance significantly increases with education level. Having a below intermediate education, relative to no education degree, increases the likelihood of having social insurance coverage by 38 percentage points, by 74 percentage points for having intermediate

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19 Marginal effects are reported in all tables with robust standard errors in parentheses. Marginal effects are based on marginal change for continuous variables and change from 0 to 1 for dummy variables. Coefficients are available upon request.

20 First stage estimation results of the ivprobit and 2SLS models are available upon request.

education and by 87 percentage points for above intermediate education. Blue collar high and low skill workers are less likely to have access to social security in comparison to the white collar occupation groups. These findings confirm the bivariate results. Furthermore, the presence of other socially insured members in the household positively increases the likelihood of having access to social insurance coverage. This might be due to the spread of awareness regarding the importance of having social insurance and how to attain such access among the household members.[21] The share of household members aged 15-64 who are out of the labor force also increases the likelihood of workers' access to social insurance.

Only working in Alexandria and Suez Canal, relative to Greater Cairo, significantly increase the probability of having social insurance coverage. In contrast, individuals working in rural Upper and rural Lower Egypt are less likely to have social insurance. As mentioned above, this may be due to the difference in the enforcement level of social insurance laws that exist in the capital city compared to that in rural areas; and to how the urban workers value social insurance relative to their rural counterparts (see Sieverding 2012). Compared to agriculture and fishing, the likelihood of having access to social insurance is higher among workers of all other economic activity groups, except for the wholesale and retail occupation group. It is highest among those working in the services sector followed by the broad manufacturing group, and then comes the construction group.

For wage workers (Table 4), the probit results (Model 1 and 4) show that working in the private sector, relative to the public sector, decreases the likelihood of having social insurance. Also, as expected, this likelihood decreases with firm size (Model 1). Similar effects are obtained after correcting for endogeneity. The ivprobit (Model 2) and the 2SLS (Model 3) estimation results show that the sector-size variable has a negative and strongly significant effect on access to social insurance among wage workers. Also, the ivprobit and 2SLS specification of Model 5 and 6 confirms the positive effect of working in the public sector, relative to the private sector, on social insurance access among wage workers. The ivprobit and the 2SLS estimation results are very similar, but substantially vary from the uncorrected single equation probit results. Among wage workers, men and married workers are more likely to have access to social insurance in all model specifications. Experience, but not age, has an inverse U-shape relationship with social insurance. Surprisingly, correcting for endogeneity, not all education levels have a significant effect on access to social insurance, relative to no education, among wage workers. Only having an above intermediate education (Model 3, 5 and 6), relative to

21   The lack of awareness has often been pointed out as one of the main reasons of non-compliance to the social insurance system in qualitative research (see Barsoum et al. 2009 and Sieverding 2012).

no education, shows some positive effects on access to social insurance. In all models specifications, working in rural Upper Egypt decreases the likelihood of being socially insured. Also, working in rural Lower Egypt has a negative effect on social insurance only in Model 5 and 6. Relative to agriculture and fishing economic activity group, in all model specifications, the likelihood of having access to social insurance is significantly higher in the wholesale and retail trade, and hotel and restaurants economic activity group. In contrast, wage workers in the other services economic activity group are less likely to be socially insured.

Table 5 shows the estimation results of the non-wage worker models. In contrast to the all workers model, the endogeneity tests cannot reject the null hypothesis that employment status variable is exogenous to social insurance coverage for non-wage worker. Also, the ivprobit estimation leads to a p-value higher than 0.10 for the Wald-test of significance of *rho*. Hence, the null hypothesis that the error term of each of the employment status equations is uncorrelated with the error term of the social insurance equation cannot be rejected. In such case, the results of the probit model would be more efficient than those of the two-equation models. Accordingly, in the following the focus will be on the results of the probit estimation.

The probit results of the non-wage worker model are very similar to the probit results of both the all worker and wage worker models. An exception is that, as one would expect, experience does not matter for non-wage worker. Marital status does not affect access to social insurance among non-wage workers. Also, the region of work shows different effects in the non-wage worker model. Working in urban Upper Egypt, relative to greater Cairo, increases the likelihood of having social insurance access.

7. Determinants of Underreporting of Basic Salary

This section explores the individual and enterprise characteristics that might motivate the decision to report a lower basic wage for social security deductions. A probit specification is used here. The dependent variable takes the value 1 if the worker's wage reported to the social insurance authorities is lower than the actual wage the worker is paid; and zero otherwise. The explanatory variables consist of the same set of workers and enterprise characteristics included in the above social insurance wage workers models. The workers basic monthly wage and years to retirement age of 64 are also controlled for here.

The regression results are presented in Table 6. Models 1, 2 and 3 present the regression results for all wage workers, while Models 4, 5 and 6 focus only on private sector wage workers. Three model specifications

are investigated here. Model 1 and 4 includes all individual and enterprises characteristics except monthly basic wage. Basic wage is controlled for in Model 2 and 5. In Model 3 and 6, the age is replaced by years to retirement age of 64. The table shows that gender and marital status do not have any significant effect on the probability of having an underreported basic wage to the social security authority. Education is only significant when controlling for basic monthly earnings. In Model 2, having an above intermediate education significantly decreases the likelihood of underreporting basic wage. In contrast, among private sector wage workers only (Model 3 and 4), having intermediate or below education level has a negative effect on the probability of underreporting. This result is expected, since public sector workers constitute a large group of the wage works sample, and underreporting is unlikely to exist in the public sector. Age is not a significant determinant of under reporting; but, experience has an inverse U-shape relationship with the probability of underreporting. Also, years to retirement has a positive and significant effect on the probability of underreporting (Model 3 and 6). In other words, workers tend to underreport their basic wages during their early years of service, than start to fully report their wages near their retirement age. These results confirm one of the major shortcomings of the Egyptian social insurance system. As highlighted above, basing the pension on average monthly earnings during the last few years of service encourages workers and employers to get around the system regulations.

Wage workers in Alexandria and Suez Canal governorates, relative to Greater Cairo, are more likely to have their basic salary fully reported. Controlling for wage (Model 3 and 4), rural regions also have a positive and significant effect on the probability of underreporting. Compared to agriculture and fishing, the probability of underreporting, in Model 1, is higher among all economic activity groups, except construction. When controlling for basic wage (Model 3), the wholesale and retail occupation group losses its significant effect. In contrast, among private sector wage workers (Model 2 and 4), only transportation, storage and communication group has significantly higher probabilities of under reporting.

As expected, among all wage workers, the probability of underreporting is significantly higher in the private sector, regardless of firm size, relative to the public sector. Within the private sector this probability is highest among workers of small size firms (10 or below) followed by large size firms (50 and above), and is lowest among middle size firms. This also holds when controlling for monthly wage and years to retirement age (Model 2 and 3). In contrast, among private sector wage worker (Model 4, 5 and 6), only small size firms had a positive and significant effect on the likelihood of underreporting.

Finally, confirming the above findings, monthly basic salary is positively correlated with the probability of underreporting in both the all workers and private sector workers models.

8. Conclusion and Policy Implication

This paper contributes to the growing literature on informality and access to social insurance. To our knowledge, it is the first to investigate the pattern and dynamics of social insurance coverage in the Egyptian labor market and its determinants among wage and non-wage workers. The paper is also one of the few studies that focus on the phenomenon of underreporting salaries to the social security administration.

The analysis shows that wage workers are more likely to have social insurance compared to all non-wage workers. In 2006, around 57.5% of wage workers had social insurance coverage compared to only 20% of non-wage workers (22% of employers and 18% of self-employed). Access to social insurance among all workers declined from about 52% in 1998 to about 42% in 2006. Both wage and non-wage workers have suffered from this observed decline. This decline is often been attributed to the decline of public sector hiring in Egypt and the high cost of participation in the social insurance system, both of which resulted in an expansion of informal employment.

The multivariate analysis of the determinants of access to social insurance revealed that men, more educated, white collar, older and more experienced wage workers tend to have social security coverage. The results among non-wage workers are slightly different than that of wage workers in terms of the impact of marital status and experience on the likelihood of having social insurance. The findings confirm the stylized fact that experience on the job market is important for acquiring social insurance coverage among wage workers, but has no effect among non-wage workers. Also, married wage workers are more likely to be covered, but marital status does not affect access to social insurance among non-wage workers. On the enterprise front, access to social insurance is more likely to exist in the public sector, in large private enterprises and in the service economic activity group. Finally, working in rural Upper Egypt relative to Greater Cairo decreases the likelihood of being socially insured among wage workers, but has no effect among non-wage workers.

On the reported insurable earnings front, in 2006, about 23% of wage workers had lower basic wage reported to the insurance system than they actually earn. Underreporting insurable wage is negatively correlated with education level. Experience in the labor market has an inverse U-shape

relationship with the probability of underreporting. Also, underreporting increases with years to retirement age. In other words, workers tend to underreport their pensionable wage during their first years of service, and then fully report their wages near the end of their service. These results provide evidence to the fact that the way the pension is determined, based on the average monthly earnings during only the last few years of service, gives room for workers and employers to get around the system in order to pay lower contributions.

Furthermore, enrolling employees in the social insurance system at lower basic salary is highest in rural areas relative to the metropolitan governorates. This is probably due to the difference in law enforcement levels that exist in the metropolitan and the urban regions, relative to rural areas. It could also be due to how the urban workers value social insurance relative to their rural counterparts. Finally, the likelihood of underreporting increases with the worker's monthly basic salary. In other words, low-income workers may be paying contributions on their entire wage, while high-income workers are paying contributions on only a part of their wage.

These results confirm several shortcomings of the Egyptian social insurance system, which has often been highlighted in the literature. The high contribution rates requested from both the employer and employee, combined with the presence of maximum ceiling of pensionable earnings, basing benefits on wage during the last few years of service, and weak law enforcement, encourages employers and employees to either not participate in the social insurance system or contribute on amounts that are lower than their actual wage (Sieverding and Selwaness 2012).

The findings of this paper call for a set of inter-related reforms to the social insurance regulation in Egypt. The ceiling on pensionable wage should be removed and retirement payment should be connected to the worker's paid contributions during all of his/her working years. Also, overall reduction in contribution rates is needed to encourage more participation, particularly among the working poor. Finally, these reforms should be supported by a more rigorous enforcement of social insurance law and awareness-raising campaigns, particularly among women and youth.

Table 3: Determinants of Having Access to Social Insurance, all workers, 2006

Variables	(1) Probit	(2) Ivprobit	(3) 2SLS
Wage worker	0.305***	-0.299	0.004
	(0.018)	(0.346)	(0.074)
Female[1]	-0.045*	-0.206***	-0.046***
	(0.024)	(0.076)	(0.016)
Married[2]	0.130***	0.327***	0.087***
	(0.021)	(0.069)	(0.014)
Age	0.043***	0.056**	0.019***
	(0.007)	(0.025)	(0.004)
Age square	-0.000***	-0.000*	-0.000***
	(0.000)	(0.000)	(0.000)
Less than intermediate[3]	0.156***	0.384***	0.104***
	(0.023)	(0.066)	(0.016)
Intermediate[3]	0.243***	0.737***	0.169***
	(0.022)	(0.066)	(0.018)
Above Intermediate[3]	0.256***	0.871***	0.195***
	(0.026)	(0.082)	(0.022)
Experience[3]	0.011***	0.038***	0.006***
	(0.003)	(0.009)	(0.002)
Experience square[3]	-0.000*	-0.000***	-0.000*
	(0.000)	(0.000)	(0.000)
White collar low skill[4]	-0.196***	-0.219**	-0.059***
	(0.020)	(0.096)	(0.019)
Blue collar high skill[4]	-0.387***	-0.949***	-0.297***
	(0.022)	(0.084)	(0.021)
Blue collar low skill[4]	-0.289***	-0.731***	-0.209***
	(0.025)	(0.098)	(0.023)
Household (HH) head	0.078***	0.109	0.019
	(0.025)	(0.082)	(0.016)
HH members with SI coverage	0.170***	0.406***	0.069***
	(0.018)	(0.056)	(0.011)
Share of HH members age 0-14	0.091*	0.132	0.036
	(0.047)	(0.124)	(0.026)
Share of HH members age 65+	0.208**	-0.114	-0.049
	(0.092)	(0.457)	(0.086)

Share of HH members age 15-64 and out of the labor force	0.202***	0.509***	0.091***
	(0.044)	(0.124)	(0.026)
HH size	-0.014***	-0.011	-0.003
	(0.004)	(0.012)	(0.002)
Alexandria & Suez Canal[5]	0.070***	0.165**	0.045***
	(0.024)	(0.072)	(0.017)
Urban Lower[5]	0.026	0.019	-0.005
	(0.023)	(0.073)	(0.017)
Urban Upper[5]	0.051**	0.090	0.013
	(0.022)	(0.070)	(0.015)
Rural Lower[5]	-0.053**	-0.224***	-0.063***
	(0.025)	(0.078)	(0.019)
Rural Upper[5]	-0.075***	-0.360***	-0.073***
	(0.029)	(0.091)	(0.021)
Broad manufacturing group[6]	0.355***	1.231***	0.273***
	(0.022)	(0.093)	(0.029)
Construction[6]	0.122***	0.478***	0.062**
	(0.036)	(0.125)	(0.029)
Wholesale & retail trade, hotel & restaurant[6]	0.100***	0.122	-0.044*
	(0.032)	(0.104)	(0.023)
Transp., storage & communication[6]	0.384***	1.457***	0.344***
	(0.020)	(0.113)	(0.030)
Other services[6]	0.472***	1.696***	0.385***
	(0.025)	(0.113)	(0.037)
Observations	8,959	7,056	7,056
Wald chi2(26)	3356***	2680***	17173***
Pseudo R-squared	0.475		.
R-squared			0.522
rho		0.375***	
Wald-test of rho=0 (p-value)		0.002	
Sargen›s test of over-identification (p-value)			0.9797
Test of weak Instruments			25.391
min eigenvalue statistic			0.4187
R^2			0.4158
Adjusted R^2			22.72***
F-test			

Tests of endogeneity	
Robust score chi2	0.009
(p-value)	
Robust regression F-test	0.009
(p-value)	

Notes: Marginal effects are reported and robust standard errors in parentheses

(d) for discrete change of dummy variable from 0 to 1

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

[1] reference category: males

[2] reference category: unmarried

[3] reference category: no educational certificate (illiterate or read or write)

[4] reference category: White collar high skill

[5] reference category: Greater Cairo

[6] reference category: Agriculture & Fishing

Table 4: Determinants of Having Access to Social Insurance, Wage Workers, 2006

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Probit	Ivprobit	2SLS	Probit	Ivprobit	2SLS
Female[1]	-0.048*	-0.210**	-0.061***	-0.045*	-0.201**	-0.068***
	(0.027)	(0.089)	(0.019)	(0.026)	(0.078)	(0.021)
Married[2]	0.078***	0.096	0.038**	0.095***	0.146*	0.064***
	(0.024)	(0.089)	(0.019)	(0.024)	(0.077)	(0.020)
Age	0.030***	-0.051*	-0.002	0.033***	-0.018	0.007
	(0.009)	(0.029)	(0.007)	(0.008)	(0.024)	(0.007)
Age square	-0.000***	0.000	-0.000	-0.000***	0.000	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Less than intermediate[3]	0.073***	-0.085	-0.008	0.076***	-0.135*	-0.027
	(0.025)	(0.100)	(0.024)	(0.023)	(0.080)	(0.029)
Intermediate[3]	0.136***	0.035	0.005	0.157***	0.048	0.014
	(0.027)	(0.122)	(0.025)	(0.024)	(0.100)	(0.027)
Above Intermediate[3]	0.156***	0.211	0.047*	0.183***	0.308***	0.095***
	(0.031)	(0.134)	(0.025)	(0.028)	(0.116)	(0.026)
Experience[3]	0.012***	0.047***	0.007***	0.010***	0.021**	0.001
	(0.004)	(0.011)	(0.003)	(0.003)	(0.010)	(0.003)
Experience square[3]	-0.000*	-0.001***	-0.000**	-0.000*	-0.000**	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
White collar low skill[4]	-0.119***	0.026	0.016	-0.133***	0.103	0.042
	(0.026)	(0.102)	(0.021)	(0.025)	(0.089)	(0.029)
Blue collar high skill[4]	-0.209***	0.656***	0.118*	-0.289***	0.471**	0.077

	(0.036)	(0.237)	(0.070)	(0.035)	(0.190)	(0.077)
Blue collar low skill[4]	-0.160***	0.321	0.071	-0.161***	0.639***	0.181**
	(0.040)	(0.198)	(0.051)	(0.037)	(0.166)	(0.080)
Household (HH) head	0.040	-0.081	-0.032	0.056**	-0.026	-0.014
	(0.028)	(0.091)	(0.021)	(0.027)	(0.077)	(0.022)
HH members with SI coverage	0.134***	0.102	0.001	0.142***	0.096	0.006
	(0.019)	(0.087)	(0.014)	(0.018)	(0.076)	(0.017)
Share of HH members age 0-14	0.084	0.037	-0.024	0.084*	-0.100	-0.065*
	(0.053)	(0.140)	(0.030)	(0.051)	(0.123)	(0.038)
Share of HH members age 65+	0.157	0.140	0.010	0.160*	0.004	-0.026
	(0.097)	(0.496)	(0.099)	(0.093)	(0.418)	(0.111)
Share of HH members age 15-64 and out of the labor force	0.174***	0.183	0.018	0.191***	0.198	0.035
	(0.049)	(0.149)	(0.030)	(0.047)	(0.136)	(0.036)
HH size	-0.011***	-0.023*	-0.005*	-0.011***	-0.026**	-0.008**
	(0.004)	(0.012)	(0.003)	(0.004)	(0.010)	(0.003)
Alexandria & Suez Canal[5]	0.037	0.038	0.008	0.042*	-0.040	-0.011
	(0.024)	(0.081)	(0.018)	(0.023)	(0.075)	(0.025)
Urban Lower[5]	0.001	0.057	0.005	-0.019	-0.056	-0.026
	(0.025)	(0.071)	(0.016)	(0.024)	(0.064)	(0.020)
Urban Upper[5]	-0.009	0.031	0.002	-0.010	-0.043	-0.017
	(0.024)	(0.068)	(0.016)	(0.023)	(0.063)	(0.020)
Rural Lower[5]	-0.098***	-0.031	-0.019	-0.130***	-0.236***	-0.084***
	(0.030)	(0.078)	(0.016)	(0.030)	(0.067)	(0.019)
Rural Upper[5]	-0.181***	-0.248**	-0.055***	-0.222***	-0.393***	-0.115***
	(0.040)	(0.115)	(0.021)	(0.038)	(0.099)	(0.022)
Broad manufacturing group[6]	0.184***	-0.012	0.011	0.219***	0.202	0.099***
	(0.026)	(0.172)	(0.036)	(0.022)	(0.141)	(0.031)
Construction[6]	0.032	0.035	0.006	0.057	0.081	0.034
	(0.041)	(0.121)	(0.029)	(0.036)	(0.107)	(0.031)
Wholesale, retail trade, hotel & restaurant[6]	0.097***	0.974***	0.210***	0.041	0.591***	0.138***
	(0.034)	(0.127)	(0.054)	(0.036)	(0.107)	(0.051)
Transportation, storage & communication[6]	0.211***	0.288	0.079*	0.186***	-0.142	-0.015

	(0.020)	(0.244)	(0.042)	(0.022)	(0.192)	(0.061)
Other services[6]	0.176***	-0.509**	-0.120**	0.154***	-0.851***	-0.242***
	(0.038)	(0.207)	(0.059)	(0.036)	(0.164)	(0.089)
50+ workers[7]	-0.326***					
	(0.036)					
10-49 workers[7]	-0.551***					
	(0.027)					
< 10 workers[7]	-0.712***					
	(0.018)					
Sector-firm size		-1.431***	-0.442***			
		(0.031)	(0.061)			
Public Sector				0.530***	3.595***	1.283***
				(0.017)	(0.055)	(0.208)
Observations	6,336	4,807	4,807	6,513	4,939	4,939
Wald chi2(26)	2445***	4958***	7099***	2232***	.	7169***
Pseudo R-squared	0.612			0.579	.	
R-squared			0.485			0.260
rho		0.801			-0.867***	
Wald-test of *rho=0*		0.000			27.770***	
(p-value)						
Sargen›s test of over-identification (p-value)			0.591			0.819
Test of weak Instruments						
min eigenvalue statistic			15.438			13.488
R[2]			0.594			0.568
Adjusted R[2]			0.591			0.5644
F-test			14.990***			13.43***
Tests of endogeneity						
Robust score chi2			0.000			0.000
(p-value)						
Robust reg. F-test			0.000			0.000
(p-value)						

Notes: Marginal effects are reported and robust standard errors in parentheses

(d) for discrete change of dummy variable from 0 to 1

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

[1] reference category: males

[2] reference category: unmarried

[3] reference category: no educational certificate (illiterate or read or write)

[4] reference category: White collar high skill

[5] reference category: Greater Cairo

[6] reference category: Agriculture and Fishing

[7] reference category: Government and Public sector

Table 5: Determinants of Having Access to Social Insurance, Non-wage Workers, 2006

Variables	(1) Probit	(2) Ivprobit	(3) 2SLS
Employer[7]	0.112***	0.969*	0.188*
	(0.016)	(0.512)	(0.096)
Female[1]	-0.106***	-0.335	-0.001
	(0.020)	(0.305)	(0.045)
Married[2]	0.009	0.129	0.052**
	(0.024)	(0.144)	(0.023)
Age	0.017**	0.062*	-0.003
	(0.007)	(0.035)	(0.006)
Age square	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)
Less than intermediate[3]	0.076***	0.285**	0.075***
	(0.025)	(0.111)	(0.025)
Intermediate[3]	0.082***	0.409***	0.109***
	(0.027)	(0.112)	(0.024)
Above Intermediate[3]	0.146***	0.693***	0.228***
	(0.042)	(0.150)	(0.037)
Experience[3]	-0.000	0.001	0.007***
	(0.003)	(0.015)	(0.003)
Experience square[3]	-0.000	-0.000	-0.000**
	(0.000)	(0.000)	(0.000)
White collar low skill[4]	-0.038**	-0.031	-0.060
	(0.019)	(0.168)	(0.039)
Blue collar high skill[4]	-0.073***	-0.127	-0.064
	(0.024)	(0.143)	(0.039)
Blue collar low skill[4]	-0.075***	-0.167	-0.107*
	(0.022)	(0.320)	(0.058)
Household (HH) head	0.036	0.186	0.021
	(0.027)	(0.200)	(0.031)
HH members with SI coverage	0.057**	0.192*	0.047*
	(0.025)	(0.111)	(0.024)
Share of HH members age 0-14	-0.001	-0.085	0.038
	(0.047)	(0.238)	(0.050)
Share of HH members age 65+	0.128	0.993	0.164
	(0.098)	(0.804)	(0.168)

Share of HH members age 15-64 and out of the labor force	0.126***	0.645***	0.159***
	(0.044)	(0.220)	(0.048)
HH size	-0.008*	-0.028	-0.007*
	(0.004)	(0.024)	(0.004)
Alexandria & Suez Canal[5]	0.052	0.242	0.072
	(0.035)	(0.149)	(0.047)
Urban Lower[5]	0.036	0.189	0.041
	(0.029)	(0.128)	(0.040)
Urban Upper[5]	0.075**	0.312**	0.067*
	(0.033)	(0.135)	(0.040)
Rural Lower[5]	-0.002	0.023	-0.013
	(0.027)	(0.137)	(0.038)
Rural Upper[5]	0.021	0.165	0.025
	(0.031)	(0.154)	(0.039)
Broad manufacturing group[6]	0.449***	1.504***	0.271***
	(0.048)	(0.154)	(0.039)
Construction[6]	0.164**	0.755**	0.078
	(0.071)	(0.369)	(0.065)
Wholesale & retail trade, hotel & restaurant[6]	0.323***	1.521***	0.256***
	(0.039)	(0.200)	(0.049)
Transp., storage & communication[6]	0.744***	2.499***	0.580***
	(0.056)	(0.273)	(0.075)
Other services[6]	0.467***	1.685***	0.327***
	(0.071)	(0.237)	(0.066)
Observations	2445	2112	2112
Wald chi2(26)	526.7***	489.6***	761.9***
Pseudo R-squared	0.304	.	.
R-squared			0.272
rho		-0.213	
Wald-test of rho=0 (p-value)		0.337	
Sargen›s test of over-identification (p-value)			0.215
Test of weak Instruments			
min eigenvalue statistic			8.890
R^2			0.367
Adjusted R^2			0.356
F-test			8.35***

Tests of endogeneity	
Robust score chi2	0.369
(p-value)	
Robust regression F-test	0.372
(p-value)	

Notes: Marginal effects are reported and robust standard errors in parentheses

(d) for discrete change of dummy variable from 0 to 1

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

[1] reference category: males

[2] reference category: unmarried

[3] reference category: no educational certificate (illiterate or read or write)

[4] reference category: White collar high skill

[5] reference category: Greater Cairo

[6] reference category: Agriculture & Fishing

[7] reference category: self-employed

Table 6: Determinants of Underreporting Basic Salary, Wage Workers, 2006

Variables	All Wage Workers			Private Sector Wage Workers		
	(1)	(2)	(3)	(4)	(5)	(6)
Female[1]	-0.032	-0.011	-0.011	-0.028	0.011	0.015
	(0.020)	(0.021)	(0.021)	(0.063)	(0.067)	(0.066)
Married[2]	-0.020	-0.023	-0.021	0.038	0.039	0.033
	(0.021)	(0.021)	(0.021)	(0.064)	(0.066)	(0.065)
Age	-0.005	-0.000		-0.019	-0.017	
	(0.007)	(0.007)		(0.020)	(0.021)	
Age square	0.000	-0.000		0.000	0.000	
	(0.000)	(0.000)		(0.000)	(0.000)	
Less than intermediate[3]	0.022	0.008	0.006	-0.128*	-0.133**	-0.131*
	(0.029)	(0.028)	(0.027)	(0.066)	(0.067)	(0.067)
Intermediate[3]	-0.005	-0.041	-0.042	-0.181***	-0.186***	-0.183**
	(0.027)	(0.026)	(0.026)	(0.070)	(0.071)	(0.072)
Above Intermediate[3]	0.018	-0.052*	-0.052*	-0.058	-0.125	-0.124
	(0.031)	(0.031)	(0.031)	(0.096)	(0.096)	(0.096)
Experience[3]	0.008***	0.006*	0.006**	0.022**	0.018*	0.015*
	(0.003)	(0.003)	(0.003)	(0.009)	(0.009)	(0.008)
Experience square[3]	-0.000**	-0.000	-0.000*	-0.000**	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

White collar low skill[4]	0.000	0.017	0.017	0.010	0.044	0.045
	(0.019)	(0.019)	(0.019)	(0.062)	(0.064)	(0.064)
Blue collar high skill[4]	0.096***	0.097***	0.096***	0.177**	0.182**	0.183**
	(0.033)	(0.034)	(0.034)	(0.078)	(0.079)	(0.079)
Blue collar low skill[4]	-0.027	-0.016	-0.017	-0.084	-0.071	-0.071
	(0.027)	(0.028)	(0.028)	(0.069)	(0.070)	(0.070)
Household (HH) head	-0.021	-0.029	-0.028	-0.033	-0.090	-0.090
	(0.023)	(0.022)	(0.022)	(0.070)	(0.073)	(0.073)
HH members with SI coverage	-0.011	-0.020	-0.021	-0.029	-0.067	-0.061
	(0.015)	(0.015)	(0.015)	(0.052)	(0.053)	(0.052)
Share of HH members age 0-14	0.020	0.028	0.031	0.020	0.044	0.043
	(0.041)	(0.041)	(0.040)	(0.129)	(0.131)	(0.132)
Share of HH members age 65+	0.095	0.075	0.080	0.127	0.042	0.030
	(0.082)	(0.081)	(0.080)	(0.237)	(0.244)	(0.245)
Share of HH members age 15-64 and out of the labor force	-0.029	-0.057	-0.058	0.185	0.143	0.154
	(0.038)	(0.038)	(0.038)	(0.130)	(0.129)	(0.126)
HH size	0.002	0.004	0.004	0.000	-0.002	-0.002
	(0.004)	(0.004)	(0.004)	(0.012)	(0.012)	(0.012)
Alexandria & Suez Canal[5]	-0.097***	-0.087***	-0.087***	-0.119**	-0.107**	-0.107**
	(0.016)	(0.016)	(0.016)	(0.048)	(0.049)	(0.049)
Urban Lower[5]	-0.025	-0.008	-0.008	-0.041	-0.015	-0.014
	(0.018)	(0.019)	(0.019)	(0.055)	(0.058)	(0.058)
Urban Upper[5]	-0.001	0.019	0.019	0.028	0.034	0.035
	(0.018)	(0.019)	(0.019)	(0.054)	(0.055)	(0.055)
Rural Lower[5]	-0.031	0.004	0.004	0.143	0.175*	0.180*
	(0.021)	(0.023)	(0.023)	(0.105)	(0.105)	(0.106)
Rural Upper[5]	0.025	0.067**	0.067**	0.072	0.113	0.114
	(0.029)	(0.032)	(0.032)	(0.135)	(0.140)	(0.142)

Broad manufacturing group[6]	0.100*	0.089	0.089	0.110	0.126	0.129
	(0.055)	(0.054)	(0.054)	(0.125)	(0.126)	(0.125)
Construction[6]	0.038	0.015	0.016	0.135	0.114	0.115
	(0.066)	(0.062)	(0.063)	(0.156)	(0.157)	(0.156)
Wholesale, retail trade, hotel & restaurant[6]	0.102	0.077	0.077	0.150	0.142	0.145
	(0.064)	(0.061)	(0.061)	(0.136)	(0.137)	(0.136)
Transportation, storage & communication[6]	0.179***	0.140**	0.140**	0.318**	0.280**	0.281**
	(0.067)	(0.065)	(0.065)	(0.138)	(0.143)	(0.142)
Other services[6]	0.077*	0.087**	0.087**	0.038	0.085	0.085
	(0.041)	(0.039)	(0.039)	(0.137)	(0.143)	(0.142)
50+ workers[7]	0.125***	0.074**	0.074**	0.030	0.027	0.028
	(0.031)	(0.030)	(0.030)	(0.050)	(0.051)	(0.051)
10-49 workers[7]	0.103***	0.045	0.046			
	(0.038)	(0.035)	(0.035)			
< 10 workers[7]	0.389***	0.309***	0.308***	0.269***	0.252***	0.253***
	(0.039)	(0.040)	(0.040)	(0.055)	(0.056)	(0.055)
Ln Basic monthly wage		0.158***	0.158***		0.190***	0.191***
		(0.011)	(0.011)		(0.033)	(0.033)
Years to retirement age of 64			0.004**			0.004
			(0.002)			(0.006)
Observations	4,104	4,104	4,104	736	736	736
Wald chi2(26)	291.5	493.2	493.9	131.6	156.5	153.5
Pseudo R-squared	0.0708	0.129	0.128	0.148	0.187	0.187

[1] reference category: males

[2] reference category: unmarried

[3] reference category: no educational certificate (illiterate or read or write)

[4] reference category: White collar high skill

[5] reference category: Greater Cairo

[6] reference category: Agriculture and fishing

[7] reference category: Government and public sector

References

Assaad, Ragui and Rania Roushdy. 2007. "Poverty and the Labor Market in Egypt: A Review of Developments in the 1998–2006 period," Background Paper for Arab Republic of Egypt: Poverty Assessment Update, The World Bank.

Auerbach, Paula, María Eugenia Genoni and Carmen Pagès. 2007. "Social Security Coverage and the Labor Market in Developing Countries," IZA Discussion Paper, No. 2979, Institute for the Study of Labor (IZA).

Bailey, Clive and John Turner. 2001. "Strategies to Reduce Contribution Evasion in Social Security Financing," *World Development* (February), pp. 385-393.

Baslevent, Cem & Fatma El-hamidi. 2009. "Preferences for Early Retirement among Older Government Employees in Egypt," *Economics Bulletin*, Vol. 29(2), pp. 554-565.

Behrendt, Christina; Tariq Haq and Noura Kamel. 2009. "The Impact of the Financial and Economic Crisis on Arab States: Considerations on Employment and Social Protection Policy Responses," ILO Regional Office for Arab States.

Bosch, Mariano, Edwin Goni and William F. Maloney. 2007. "The Determinants of Rising Informality in Brazil: Evidence from Gross Worker Flows," IZA Discussion Papers, No. 2970, Institute for the Study of Labor (IZA).

Bosch, Mariano and William Maloney. 2010. "Comparative Analysis of Labor Market Dynamics using Markov Processes: An Application to Informality," *Labor Economics*, Elsevier, Vol. 17(4), pp. 621-631.

Cuesta, Jose and Camilo Bohorquez. 2011. "Labor Market Transition and Social Security in Columbia," Policy Research Working Paper, No. 5650, The World Bank.

Cuesta, Jose and Olivera, Mauricio. 2010. "Social Security Distortions onto the Labor Market: Estimates for Colombia," Policy Research Working Paper Series, No. 5390, The World Bank.

Gatti, Roberta. 2011. "Striving for Better Jobs: The Challenge of Informality in the Middle East and North Africa Region," The World Bank.

Helmy, Omneia. 2004. Development of the pension system in Egypt (in Arabic). Working Paper, Egyptian Center for Economic Studies.

Helmy, Omneia. 2008. "Towards a More Efficient and Equitable Pension System in Egypt," in *The Egyptian Economy: Current Challenges and Future Prospects*, Hanaa Kheir-El-Din (Ed.), American University in Cairo Press, pp. 201-220.

Holzmann, Robert and Steen Jørgensen. 2000. "Social Risk Management: A New Conceptual Framework for Social Protection and Beyond." Social Protection Discussion Paper, No. 0006, Social Protection Unit, Human Development Network, The World Bank.

International Labor Office ILO (2009), "Building Adequate Social Protection Systems and Protecting People in the Arab Region," Thematic Background Paper for the Arab Employment Forum, Arab Employment Forum, Beirut, 19-21 October.

Kattaa, Maha and Sattouf Al Sheikh Hussein. 2010. "Women's Access to Social Protection in Syria," *European Journal of Social Sciences,* Vol. 13 (4), pp. 591-604

MAAIT, Mohamed, Ahmed Gala and Zaki Khorasanee. 2000. "The Effects of Privatization and Liberalization of the Economy on the Actuarial Soundness of the Egyptian Funded and Defined Benefits Social Security Scheme," paper presented in The Year 2000 International Research Conference on Social Security: Social Security in the Global Village, Helsinki, 25-27 September.

Maddala, G. S. 1983. *Limited-Dependent and Qualitative Variables in Economics*, New York: Cambridge University Press.

Pages, Carmen and Lucia Madrigal. 2008. "Is Informality a Good Measure for Job Quality? Evidence from Job Satisfaction Data," Inter-American Development Bank.

Myers, Robert. 1992. "Chile's Social Security Reform, After Ten Years," *Benefits Quarterly*, (Third Quarter) pp. 41-55.

Pradhan, Menno and Arthur van Soest. 1995. "Formal and Informal Sector Employment in Urban Areas of Bolivia," *Labour Economics*, Elsevier, Vol. 2(3): 275-297.

Ridao-Cano, C. 2001. "Evaluating the Impact of Working while in School on School Progress: the Case of Rural Bangladesh," Working Paper, PAC2001-0002, Institute of Behavioral Science, Population Aging Center.

Robalino, David, Edward Whitehouse, Anca Mataoanu, Alberto Musalem, Elisabeth Sherwood and Oleksiy Sluchynsky. 2005. "Pensions in the Middle East and North Africa: Time for Change," Orientations in Development Series. The World Bank.

Semjen A. and Istvan Janos Toth. 2002. "Unofficial Economic Activities and Fiscal Discipline in Hungary as Mirrored in Consecutive Enterprise Surveys on Tax Behavior," IEHAS Discussion Papers, No. 0211, Institute of Economics, Hungarian Academy of Sciences.

Social Security Administration (SSA). 2009. *Social Security Programs around the World: Africa, 2009*, Social Security Administration.

Social Security Administration (SSA). 2011. *Social Security Programs around the World: Africa, 2011*, Social Security Administration.

Stewart, Fiona. 2011. "Pensions in MENA: Potential for Reform," Insurance Pension Update.

Tansel, Aysit, 1999. "Formal Versus Informal Sector Choice of Wage Earners and their Wages in Turkey," ERF Working Papers, No. 9927, ERF.

Wahba, Jackline. 2002. "Labor Mobility in Egypt: Are the 1990s any Different from the 1980s?" in *The Egyptian Labor Market in an Era of Reform*, Ragui Assaad (Ed.), American University in Cairo Press, pp.258-286.

Wahba, J. and May Mokhtar. 2002. "Informalization of Labor in Egypt," in *The Egyptian Labor Market in an Era of Reform*, Ragui Assaad (Ed.), American University in Cairo Press, pp. 131-157.

Wahba, Jackline. 2009. "The Impact of Labor Market Reforms on Informality in Egypt," Gender and Work in the Mena Region Working Paper Series, No. 3, Population Council, Egypt Country office.