

When Formality Is Costly and Informality Is Legal: Social Insurance Design Woes at A Time of Economic Crises

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WHEN FORMALITY IS COSTLY AND INFORMALITY IS LEGAL: SOCIAL INSURANCE DESIGN WOES AT A TIME OF ECONOMIC CRISES¹

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Abstract

This paper examines the extent to which the institutional framework for social insurance (SI) might constrain access to contributory schemes and explain workers' coverage gaps. We use nationally representative microdata from Egypt to test how the design leads to the exclusion of specific categories of workers. We show that the legal framework for SI allows certain types of workers (the self-employed and employers in unregistered enterprises) to opt out of the SI system, thus legalizing and legitimating employment informality. Although the law explicitly highlights the objective of including informal workers, the difficulty of the required documentation and the focus on specific occupations show that it fails to recognize the diversity of this group. Our findings also show that the lack of SI coverage happened even among workers who should be covered by law, i.e., regular wage workers, due to the substantial increases in the minimum insurable wage upon which contributions are calculated, rendering the scheme less attractive for both employers and employees. The paper demonstrates that the conditions of enrollment, cost, and benefit design for SI schemes disincentivize both employers and employees from contributing to the system.

Keywords: Social insurance, informality, institutional framework, Egypt.

JEL Classifications: H55, J46, J38, J32, J26, O17.

ملخص

تبحث هذه الورقة في المدى الذي قد يؤدي فيه الإطار المؤسسي للتأمين الاجتماعي إلى تقييد الوصول إلى المخططات القائمة على الاشتراكات وشرح فجوات تغطية العمال. نستخدم البيانات الجزئية التمثيلية على المستوى الوطني من مصر لاختبار كيف يؤدي التصميم إلى استبعاد فئات محددة من العمال. ويظهر أن الإطار القانوني للمؤسسة الدولية يسمح لأنواع معينة من العمال (العاملين لحسابهم الخاص وأرباب العمل في المؤسسات غير المسجلة) بالانسحاب من نظام SI، وبالتالي إضفاء الشرعية وإضفاء الشرعية على العمل غير الرسمي. وعلى الرغم من أن القانون يسلط الضوء صراحة على هدف إشراك العمال غير الرسميين، فإن صعوبة التوثيق المطلوب والتركيز على مهن محددة يظهران أنه لا يعترف بتنوع هذه الفئة. تظهر النتائج التي توصلنا إليها أيضًا أن الافتقار إلى تغطية SI حدث حتى بين العمال الذين يجب أن يشملهم القانون، أي العمال ذوي الأجور العادية، بسبب الزيادات الكبيرة في الحد الأدنى للأجور القابلة للتأمين التي يتم على أساسها حساب الاشتراكات، مما يجعل المخطط أقل جاذبية لكل من أرباب العمل والموظفين. توضح الورقة أن شروط التسجيل والتكلفة وتصميم المزايا لمخططات SI تثنى أرباب العمل والموظفين عن المساهمة في النظام.

1. Introduction

Access to contributory social insurance (SI) coverage among Egyptian workers, which defines informal employment (ILO, 2022),⁴ has been eroding. This has been the case among both self-employed and salaried workers (Selwaness and Ehab, 2022; Amer, Selwaness, and Zaki, 2021; Roushdy and Selwaness, 2019). Less than half of all jobs in Egypt provide SI coverage. Our analysis shows that access to jobs with SI coverage declined steadily in Egypt from 42 percent in 2009 to 36 percent in 2021, even when growth patterns improved. For instance, real per capita GDP exhibited positive annual growth rates of 2.1 percent to 2.2 percent between 2015 and 2017, peaking at 3.3 percent and 3.7 percent in 2018-19. However, the proportion of workers with SI coverage continued to decrease from 40 percent in 2015 to 35 percent in 2019. Access to SI has been particularly low in the private sector compared to the public sector (Assaad and Barsoum, 2019), but it is also decreasing. While only 24 percent of workers in the private sector had SI coverage in 2009, this proportion further decreased to 20 percent in 2021. A key dimension of lack of access to SI is that it is also common among the non-poor, with Lopez et al. (2023:244) showing that workers who are not poor but are informally employed (i.e., without SI coverage) constitute 40 percent of workers in Egypt.

This low and decreasing proportion of workers with SI coverage is critical and has a significant impact on social and economic development for three reasons. First, this coverage gap means that a broad range of workers (and their households) are vulnerable across their lifecycles, such as at times of sickness, disability, job loss/unemployment, maternity, and old age (Jiang et al., 2018). This is especially critical in contexts where there is no universal social pension for individuals with no contributory SI coverage as in the case of Egypt (Selwaness and Ehab, 2022). Second, maintaining the stream of SI contributions from the working-age population is pivotal to the financial sustainability of the system. Third, although youth constitute 40 percent of the population in Egypt, today's working-age population will represent a huge "elderly" bulge in the coming 30 years (Assaad, 2022). Their increasing lack of SI coverage will pose a serious problem both in terms of old-age poverty and increased fiscal pressures on the government budget to provide social transfers.

Previous work on Egypt analyzed the recent SI legal reforms (Law 148/2019), which created a unified framework for the four main laws that regulated SI coverage. The new law also introduced parametric and systemic changes to encourage workers' participation in the scheme (Barsoum and Selwaness, 2022). Some of these changes included a reduction in the contribution rate, the promise of a pension benefit that is indexed to inflation, and increased employer penalties for evasion. While these were changes in the right direction, some workers remain less likely to enroll in SI. This raises questions regarding the inclusiveness of the SI scheme despite the reforms, especially regarding some types of workers who were previously excluded from the schemes, such as irregular workers or gig/platform workers (Barsoum and Selwaness, 2022). The previous Egyptian SI scheme also specified minimum and maximum

⁴ The defining characteristic of formal jobs is SI coverage. We also show that even for non-wage workers, SI coverage still acts as a signal for whether or not their business is formal. Therefore, the paper uses informality and lack of SI coverage/coverage gap interchangeably as equivalent terms.

bounds of the monthly wage to calculate contributions. These were subject to increases of 10 percent, nearly every year or two, with corresponding ministerial decrees. Previous studies discussed that the scheme acted as “a regressive tax” for low-wage earners because of the maximum cap on insurable wages, which means that workers in lower wage quintiles pay proportionally more SI contributions than workers in higher wage quintiles (Barsoum and Selwaness, 2022; Helmy, 2008). Workers whose total wages were below or equal to the maximum wage were likely to underreport their insurable wages to avoid paying contributions on their full wages (Roushdy and Selwaness, 2019; Selwaness, 2012). In July 2016, the minimum insurable wage/income substantially increased by 150 percent and was subject to a scheduled increase of 25 percent every fiscal year starting 2017. Although the new law reduced contribution rates, it further sustained the increase of the minimum insurable wage, thus posing a key challenge to affordability and coverage.

The paper applies an institutional perspective to understand the trade-offs between benefits and costs related to registration in the SI scheme in Egypt, drawing on the analysis of the legal framework of the SI schemes, labor law, and yearly ministerial decrees). In this paper, we designate key elements related to the SI scheme design that can lead workers to be technically excluded (despite their *de jure* coverage in the law) or opt out of SI because of these constraints. These elements include documentation requirements for enrollment and the eligibility conditions for benefit entitlements. We also examine the cost of enrollment, both in terms of contribution rates and the minimum insurable wage, and how the latter evolved relative to different levels of wages. Using multivariate analysis, the paper estimates the determinants of enrollment in the scheme, controlling for the various effects of these institutional constraints. Our covariates of interest are (1) the employment type as a key measure for exclusion; (2) the yearly minimum insurable wage (in real terms) to capture the effect of the cost of the scheme over time, net of inflation; and (3) occupations as an indicator of eligibility for benefit entitlements for regular workers, and the ease of the required documentation for irregular/non-wage workers. We also focus on the effect of gender to examine how the scheme’s design interacts with women’s labor market realities.

Our analysis shows that even with the new unified legal framework, the provisions for system inclusion differ according to employment status, acting as an *employment status-based* welfare regime (see Jiang, Qian, and Wen, 2018, for an analysis of the situation in China). While the coverage gap/informality for regular wage workers is illegal and reflects the discretion of their employers not to enroll their regular employees (whether based on a mutual agreement with the workers or not), increases to the minimum insurable wage imply that the scheme became less affordable (to workers and their employers) over time. We also find that irregular wage workers, despite the legal provisions to include them, are excluded from the scheme because the required documentation to enroll in the scheme is a serious hurdle.

The paper offers three contributions. First, it enriches the growing literature on the performance of contributory (Bismarckian) SI programs in low- and middle-income countries in recent years (Winkler, Ruppert Bulmer, and Mote, 2017; Van Den Heever, 2021), and how the institutional

constraints and design features (e.g., the eligibility requirement for enrollment, affordability, or benefit entitlement) can affect the behaviors of both employers and employees (Jiang, Qian, and Wen, 2018; Ringen and Ngok, 2017; Lopez-Acevedo et al., 2023). Second, by focusing on Egypt as a case study, this paper bridges a gap in the literature, as most studies have focused on Latin American countries or South-East Asian countries. Third, the paper provides additional evidence that contributory SI coverage is eroding even among wage workers that should be de jure covered or in formal firms (Ulyssea, 2020), raising important questions on how to maintain and improve the sustainability and role of these SI programs in the economy. This is especially crucial with the emergence of new modes of employment, such as ‘gig’ and platform workers (ISSA, 2023), and the potential risks of job losses that can happen either due to technological transformation or climate change.

Following this introduction, we present our hypotheses in section two, and data and methodologies in section three. Section four shows stylized facts on SI coverage. Section five provides an institutional analysis of the SI scheme in Egypt, showing the different treatments by type of workers based on employment status and/or occupation. Section six provides the results of the multivariate analysis, and section seven concludes.

2. Study hypotheses

The paper tests two hypotheses as follows:

[H1] The scheme is *employment status-based*, and institutional constraints, such as the requirements for enrollment, make some groups of workers mechanically excluded from the SI scheme. In that sense, these workers’ informality or lack of SI is ‘legal’ (Lopez-Acevedo et al., 2023). The patterns of Egypt’s sectoral growth toward non-tradable low-productivity sectors led to the expansion of such types of work in recent years, fueling a persistent rise in informality (Amer et al., 2021). These groups of workers include irregular wage workers and those outside of establishment but also extend to employers and the self-employed. Further, eligibility conditions for entitlement to benefits favor those whose careers are steady and have no fluctuations, penalizing workers who are unlikely to accumulate the minimum vesting period to receive a retirement pension, e.g., women. Also, in the context of distrust in public institutions and insurance programs, employers may find it too costly to pay for these workers, given their high propensity of not receiving any benefit entitlement.

[H2] The series of increases in the minimum insurable wage upon which contribution is calculated has made enrollment in the scheme more costly and represents a major reason behind the rapid decline in SI coverage since 2016.

3. Data and methodologies

We use nationally representative microdata from labor force surveys (LFS) annual waves between 2009 and 2021⁵ to show a descriptive analysis of patterns of SI coverage across

⁵ OAMDI (2016a, 2016b, 2016c, 2017, 2018a, 2018b, 2018c, 2018d, 2019a, 2021a, 2021b, 2022, 2023)

different employment statuses over time. Then, we estimate the probability of SI enrollment using logit models. The main outcome is a binary variable that is (1) if the worker is covered by SI or (0) if they are not covered. Because the legal framework provides different provisions by employment status, we estimate three sets of models:

1. All workers' model: The universe is the sample of all workers in the private sector between 2009 and 2021, aged 15-64 years old, with non-zero hours of work, and non-missing observations for their occupations. The key covariate for H1 is employment status to show how the institutional design of the scheme acts as an employment status-based regime with differential treatments by employment type. Employment status is categorized into regular wage workers (the reference group), irregular wage workers, employers, and the self-employed. Another key covariate for H1 is occupation, which is categorized into legislators and senior officials (the reference), professionals, associate professionals, clerks, trade and service workers, skilled agricultural and fishery workers, plant operators, and elementary occupations; gender; and tenure. This is to examine which workers are least likely to enroll given the features of the scheme.
2. Employees⁶ model: The universe is the sample of wage workers. We estimate two separate models: one for regular employees and the second for irregular employees. For regular employees, the key covariate for H1 is occupation to check which occupations among regular wage workers are the most vulnerable in terms of coverage [H1]. The main covariate for H2 is the yearly real minimum insurable wage to capture the changes to the cost of the scheme and its affordability, net of yearly inflation. We opt for controlling for the real minimum insurable wage (for wage workers) as a categorical variable (with the value in 2009 as the reference) rather than as a continuous variable to show the differentiated impact by year. Our interest also lies in the effect of firm size. For irregular employees, our interest lies in the effect of occupation as an indicator of the ease of required documentation, and the effect of cost, captured by the real minimum insurable wage.
3. Employers, the self-employed, and unpaid family workers: The universe is the sample of non-wage workers who are employers, self-employed, and unpaid family workers. Our interest lies in the effect of the occupation (H1) and that of the cost of the scheme (H2). We capture the latter by the yearly real minimum insurable income (for non-wage workers, as shown in Table 3). We also estimate the model separately for employers, the self-employed, and unpaid family workers.

In addition to the key covariates discussed above, our models control for age; age squared; tenure; tenure squared; education level (categorically); region of residence (categorically) and the urban/rural nature of the region; firm size categorized into outside of establishment, i.e. micro with one to four workers, small with five to 24 workers, medium with 25 to 49 workers (the reference), large with more than 50 workers, and unstated size; industry (categorically); and hours of work (categorically).

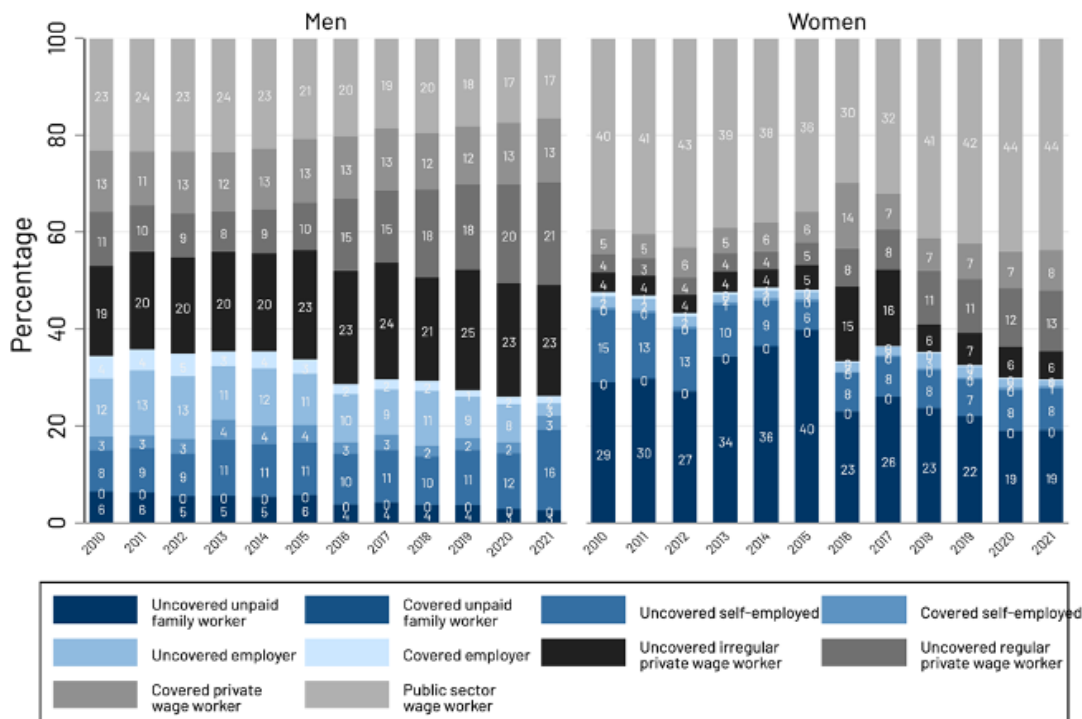
⁶ We use the term 'employees' to designate wage workers.

To check the robustness of our results for both wage workers and non-wage workers, we control for the year of the survey (specification 2) instead of the yearly real minimum insurable wage/income (specification 1). For regular wage workers, we also introduce interactions between monthly wage quintiles and the yearly minimum insurable wage to check how the impacts of the rise in cost are differentiated by wage quintiles. We also estimate separate models for regular wage workers inside and outside of establishments to ensure that our results are consistent. For irregular wage workers, we run two robustness checks: one while removing the firm size variable, and the other while only focusing on outside of establishment irregular workers. In all specifications, standard errors are clustered on the individual level, and weights are used throughout. We present odds ratios from the models in our result tables.

4. Stylized facts: Who is covered and who is not?

Figure 1 shows that the share of private sector regular wage work expanded from 24 percent of total employment in 2009 to 34 percent in Egypt in 2021, i.e., increasing by 10 percentage points. Yet, much of the increase happened in ‘uncovered’ regular wage work, making it the fastest-growing type of work in Egypt’s labor market. The share of regular but uncovered wage work in total employment doubled from 11 percent in 2009 to 21 percent in 2021 (Figure 1). Irregular wage work exhibited the second fastest growth after regular wage work, rising by only four percentage points from 19 percent in 2021 to 23 percent in 2023. The lack of SI coverage used to be concentrated among lower-end jobs, such as irregular wage work, or informal self-employed/employers. However, Figure 1 shows that the fast expansion of uncovered regular wage workers is alarming and means that even jobs that were presumably stable and of decent quality are becoming precarious with no SI coverage.

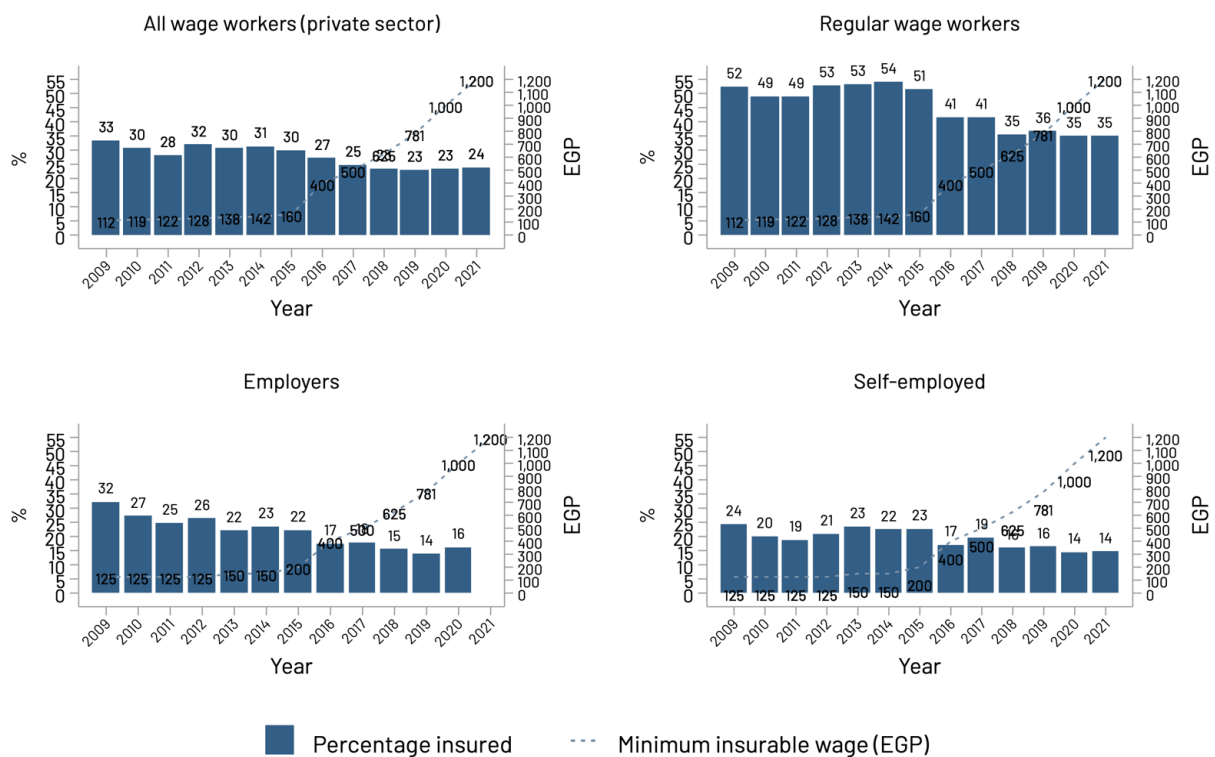
Figure 1. Evolution of types of employment in the private sector by gender, ages 15-64



Source: LFS 2009-21.

This evolution in the structure of jobs in Egypt’s labor market means that SI coverage rates have plummeted across the board in the private sector. The decline was especially sharp after 2016, a year that marked the first major currency devaluation that Egypt undertook since 2003, leading to inflation rates peaking at more than 30 percent.⁷ Another important event in 2016 has been the substantial rise in the minimum insurable wage, which increased to historically unprecedented levels as shown in Table 3 below. Figure 2 shows that employees experienced a drop in their SI from 28-30 percent between 2009 and 2015 to 23-25 percent between 2017 and 2021. The fastest decline in SI was for regular workers who saw their coverage falling from 49-54 percent during 2009-15 to 41 percent in 2016, until it reached as low as 35 percent in 2021. These workers were likely the most affected by the increase in the minimum insurable wages, although their coverage rates were high relative to non-wage workers. The pattern of rapid declines in SI coverage starting in 2016 was also observed among employers whose coverage rates dropped from 32 percent in 2009 to 17 percent in 2016, reaching 16 percent in 2021. The coverage rates for the self-employed also dropped from 24 percent in 2009 to 14 percent in 2021.

Figure 2. SI coverage rates by employment status, ages 15-64



Source: LFS 2010-21. Minimum insurable wage data from Table 3.

5. The legal framework for SI in Egypt

The Egyptian Constitution recognizes the importance of protecting workers’ rights and of building balanced work relationships between the two sides of the production process (Article

⁷ Data on inflation rates are found on the Central Bank of Egypt (CBE) website. <https://www.cbe.org.eg/en/economic-research/statistics/inflation-rates/historical-data>. Last accessed 26 June 2023.

13). The constitution also recognizes the universal right of all citizens to have access to the social security system (Article 17) as well as the importance of providing appropriate pensions to small farmers and agricultural wage workers, among other groups of informal labor, in accordance with the law.

The legal framework for SI,⁸ however, allows certain types of workers to opt out of participating in the SI system, thus legalizing and legitimating employment informality. Before the new law was adopted in 2019, there were four different social security regulations according to worker employment type/category. The new SI law (No. 148/2019) unified the schemes but maintained different treatments and sets of benefits for different groups of workers based on their employment status and/or occupation. Table 1 shows that there are different routes of enrollment based on a combination of employment status, regularity of the job, formal registration of business, and occupation as follows: regular wage workers, irregular wage workers, employers, self-employed, Egyptian workers abroad, and other types of workers. Informality is legal and allowed by the law, and Table 1 below details the cost and benefits for each of these groups.

Table 1. Employment status-based SI

Worker category/ employment status	Legal framework	Obligatory/ voluntary	Legally permissible lack of coverage?	Risks covered	Contribution rate
Wage workers/ Employees	Law 148/2019 (previously Law 79/1975 for wage workers).	Obligatory for regular workers.	Illegal lack of coverage (compliance gap).	Old age, disability, and survival; end-of-service bonus; injury/illness/ maternity; unemployment; health insurance.	Worker: 11% Employer: 18.75%.
		Voluntary for irregular workers (<i>*new law suggests not but onerous required documents</i>).	Legally permissible lack of coverage (no penalty).		Worker: 9% of insurable wage Government: 12%.
Non-wage workers (self- employed/own-account workers, employers, unpaid/ contributing family workers)	Registered own- account workers. Law 148/2019 (previously Law 108/1976).	Obligatory for 15 occupations, including syndicated professionals and employers of registered business units.	Illegal if firm is formal.	Old age, disability, and survival (no health insurance).	15% of chosen income (from income brackets).
		Voluntary.	Legally permissible lack of coverage.	Old age, disability, and survival (no health insurance).	
		Voluntary.	Legally permissible lack of coverage.	Old age, disability, and survival (no health insurance).	
	workers not included in any of the above SI schemes (contributing family workers and all unregistered workers).				

Source: Adapted from Lopez-Acevedo et al. (2023, p. 247).

⁸ Many studies have documented and analyzed the Egyptian SI scheme, which is a defined benefits scheme (DB) financed on a pay-as-you-go (PAYG) or partially-funded basis. For further details, see Barsoum and Selwaness, (2022), Helmy (2008), Loewe (2000, 2004), Roushdy and Selwaness (2019), Selwaness and Ehab (2022), Selwaness and Messkoub (2019), and Sieverding and Selwaness (2012).

5.1. Regular wage workers

5.1.1. Registration and contribution rates

Regular wage workers in a ‘continuous’ employment relationship for at least six months (which is the definition of regular work in the legal texts), have to be registered in the system by their employers, hence their SI is obligatory. Therefore, the coverage gap/informality for regular wage workers is illegal and reflects the discretion of their employers not to enroll their regular employees, whether based on a mutual agreement with the workers or not. There is a penalty that employers must pay in case of not registering workers in SI. It substantially increased with the new law to reach a minimum of EGP 30,000 and a maximum of EGP 100,000 and can potentially lead to jail (Article 165), from EGP 1 per worker with a maximum of EGP 500 in the old law (Article 181).

As shown in Table 2, under the old law, the cost of contributing to the scheme was 40 percent of the worker’s insurable wage, paid jointly by the employee (14 percent) and the employer (26 percent). The new law reduced the total contribution to 29.75 percent of the insurable wage, where employees contribute 11 percent and the employer 18.75 percent. However, the new law stipulates an increase of one percent every seven years in this total contribution.

Table 2. Cost of registering regular wage workers in the private sector (for both workers and employers)

Risks insured against	Old scheme (Law 79/1975)			New scheme (Law 148/2019)		Total (to be raised 1% every 7 years)
	Share of employer	Share of employee	Total	Share of employer	Share of employee	
Old age, disability, and survival	15%	10%	25%	12%	9%	21%
End-of-service bonus	2%	3%	5%	1%	1%	2%
Injury	3%	0%	3%	1.5%	0%	1.5%
Illness (health insurance)	4%	1%	5%	3.25%	1%	4.25%
Unemployment	2%	0%	2%	1%	0%	1%
Total	26%	14%	40%	18.75%	11%	29.75%
Paid leaves (labor code)	21 days in the first year and 30 days after 10 years of service – not including holidays that are paid (Article 47 of the labor code).					

Source: Barsoum and Selwaness (2022).

5.1.2. Minimum insurable wages and the change in the cost of formality

As with the old law, the new law continues to set a minimum and maximum level of the wage to calculate contributions, known as the “insurable wage.” The main difference between the new law and the old law is that the old law, when determining the maximum insurable wage, differentiated between the base salary and the variable salary so that each has a different maximum level. The new law, however, combined the base and variable salary in defining the maximum cap on insurable wage (Barsoum and Selwaness, 2022). A key issue, however, has been the increase in the minimum insurable wage. Table 3 shows the evolution over time in the minimum insurable wage and the maximum insurable wage. The minimum insurable wage increased substantially in 2016 to reach EGP 400 per month from EGP 160 per month. The old law also scheduled a 25 percent increase in the minimum insurable wage for five years. When the new law came into effect in 2020, the minimum insurable wage reached EGP 1,000 per

month. In parallel to these SI changes, the government also stipulated a national minimum wage for the private sector in 2022 amounting to EGP 2,400 (Official Gazette, 2021a). Official updates from the National Insurance Organization (NOSI) indicate that such national minimum wages will be used as the minimum insurable wage for regular wage workers,⁹ whereas the minimum insurable wage as shown in Table 3 will be used for all other types of workers, including irregular workers.¹⁰

Table 3. Evolution of the minimum and maximum insurable wages, and annual percentage increases

Year	Minimum insurable wage (EGP)		Maximum wage (EGP)			Annual percentage increase (%)			
	Wage workers (Law 79/1975)	Non-wage workers (Law 108/1976)	Basic	Variable	Total	Minimum wage	Maximum base wage	Maximum base wage	Maximum total wage
2009	112.00	125.00	800.00						
2010	119.00	125.00	850.00			6			
2011	122.50	125.00	875.00			3			
2012	127.75	125.00	912.50	1,200.00	2,112.50	4	4		
2013	138.25	150.00	987.50	1,380.00	2,367.50	8	8	15	12
2014	141.75	150.00	1,012.50	1,590.00	2,602.50	3	3	15	10
2015	160.00	200.00	1,120.00	1,830.00	2,950.00	13	11	15	13
2016	400.00	400.00	1,240.00	2,110.00	3,350.00	150	11	15	14
2017	500.00	500.00	1,370.00	2,430.00	3,800.00	25	10	15	13
2018	625.00	625.00	1,510.00	2,800.00	4,310.00	25	10	15	13
July 2018	625.00	625.00	1,510.00	3,336.00	4,846.00		0	19	12
2019	781.25	781.25	1,670.00	4,040.00	5,710.00	25	11	21	18
Law 2019									
2020	1,000.00	1,000.00			8,400.00	28			47
2021	1,200.00	1,200.00			9,720.00	20			16
2022	1,400.00	1,400.00			11,280.00	17			16
2023	1,700.00	1,700.00			13,080.00	21			16
2024	2,000.00	2,000.00			15,120.00	18			16
2025	2,300.00	2,300.00			17,400.00	15			15
2026	2,700.00	2,700.00			20,040.00	17			15
2027	3,200.00	3,200.00			23,160.00	19			16

Source: International Social Security Association (ISSA) (2009, 2011, 2013, 2015, 2017, 2019); Ministry of Social Solidarity (2013, 2017); and Official Gazette (2021b).

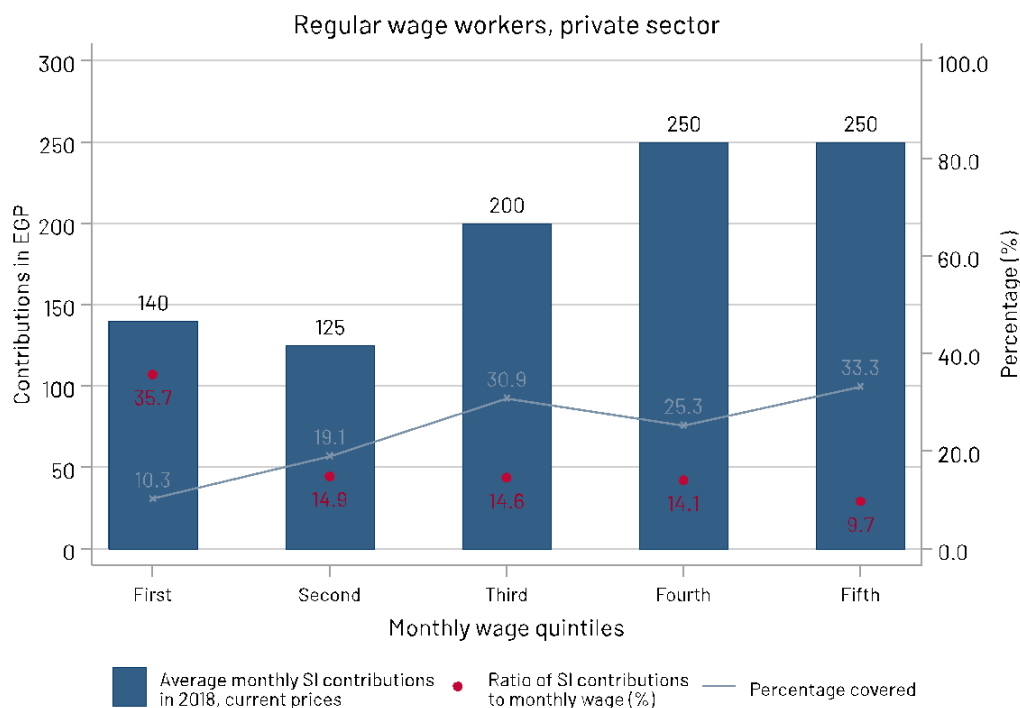
There are two important implications for the use of minimum and maximum insurable wages. First, as mentioned in the introduction, the minimum and maximum bounds of the insurable wage lead workers in lower wage quintiles to pay more SI contributions in relative terms than workers in higher quintiles, indicating that the scheme is regressive (Barsoum and Selwaness, 2022; Helmy, 2008; Selwaness, 2012). Data from the Egyptian Labor Market Panel Survey in

⁹ <https://nosi.gov.eg/ar/News/Pages/4-1-2022.aspx>. Last accessed 30 September 2023 (in Arabic)

¹⁰ Executive laws are not yet clear about this point, and much clarity is needed about the implementation of the national minimum wage and its interlinkages with the SI scheme's minimum and maximum bounds. If these NOSI statements are accurate, and minimum wage is to be used as minimum insurable wage for regular wage workers, it is expected that the coverage rate will further shrink, as the scheme will be more expensive. This is also given the lack of enforcement of minimum wage in the private sector (especially for informal business units).

2018 corroborates this implication. Figure 3 demonstrates that contributions of private sector regular workers in the first wage quintile were on average 36 percent of their monthly wage in 2018, more than double the average contributions of workers in the second (15 percent), third (15 percent), and fourth (14 percent) wage quintiles, and 3.6 times that of workers in the highest wage quintile who paid, on average, nine percent of their monthly wage. Also, the higher the wage quintile, the higher the coverage rate. In 2018, only 10 percent of workers in the first wage quintile were covered compared to 33 percent of workers in the highest wage quintile (Figure 3).

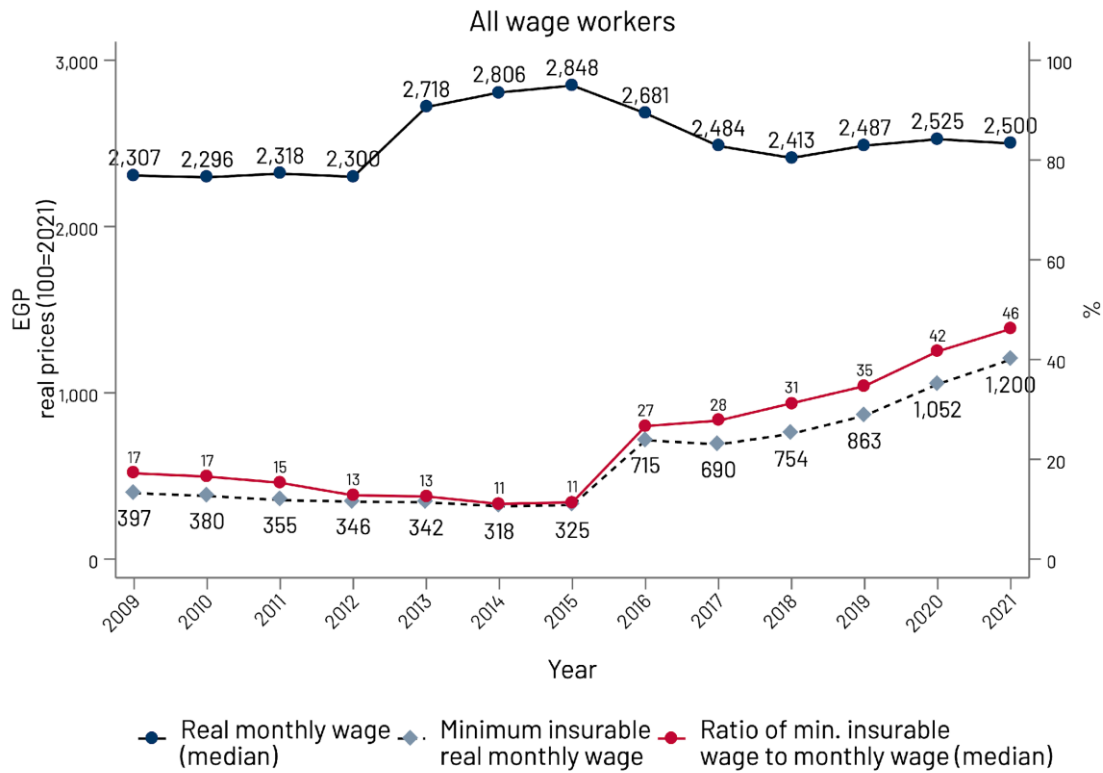
Figure 3. SI deductions in absolute terms and as a percentage of monthly wages, by wage quintiles, regular wage workers ages 15-64, 2018



Source: ELMPS 2018 (OAMDI, 2019).

Second, the series of increases to the minimum insurable wage imply that the scheme became less affordable (to workers and their employers) over time. Figure 4 shows that the median ratio of the minimum insurable wage to the monthly wage declined from 17 percent in 2009 to 11 percent in 2015 before sharply increasing to 27 percent in 2016. It continued to increase until it reached 48 percent in 2021. This means that almost half of wage workers in the private sector received a monthly wage below the minimum insurable wage in 2021.

Figure 4. The evolution of the minimum insurable wage, the median monthly wage, and the median ratio of insurable wage to monthly wage



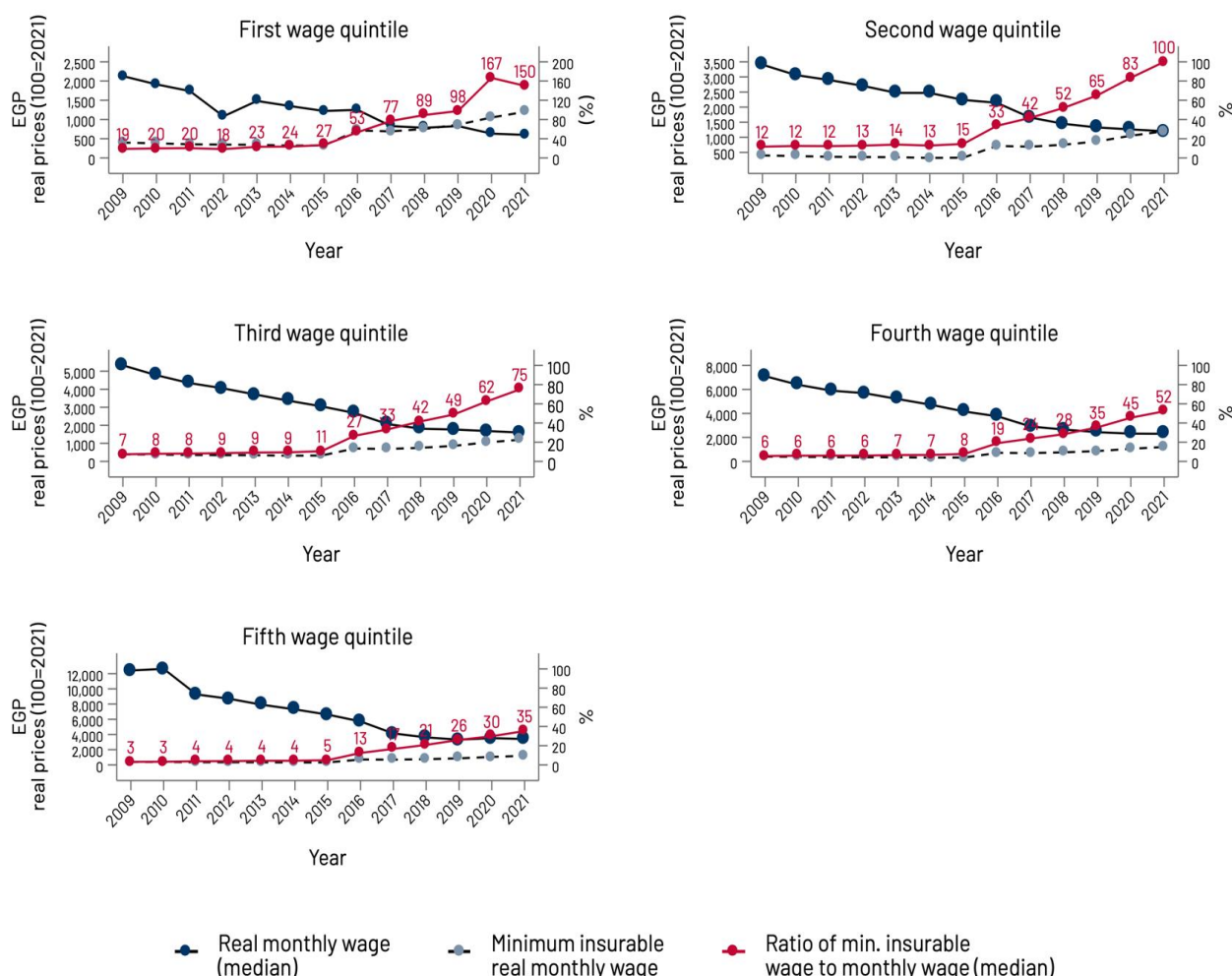
Source: LFS 2009-21 with data on insurable wage from Table 3. Note: Yearly Consumer Price Indices (CPI) retrieved from the CBE website were used to calculate real wages.

The underreporting of income to reduce the cost of system enrollment, which was previously documented in the Egyptian system (Barsoum and Selwaness, 2022; Roushdy and Selwaness, 2019; Selwaness, 2012; Selwaness and Messkoub, 2019; Sieverding and Selwaness, 2012) is becoming more difficult under the new regulations and recent minimum insurable wage increase. Interviews with administrators in companies show that insurance inspectors are required to compare taxation slips, Form 4 of taxation, and the actual payments transferred to workers. In this situation, the discrepancy will expose income underreporting. While employers can pay additional amounts in cash, this is counterproductive as the payment will not be shown on their expense records for taxation purposes. This applies to firms with payrolls that are automated and done through banking systems. However, the cash economy, or firms operating outside the realm of banks and digital business records, can evade the system. Yet, regardless of whether the payroll is automated or in cash, the SI authority and inspectors are applying the recent increase in the minimum insurable wage, where employers and workers have a limited ability to underreport or pay less than what SI inspectors specify as contributions.

The evolution of the minimum insurable wage relative to the monthly wage varies substantially by wage quintiles. As shown in Figure 5, the 2016 increase in the ratio of the minimum insurable wage to the monthly wage was particularly high for the first and second wage quintiles, where its median reached 57 percent and 33 percent, respectively. By 2021, the

insurable wage was double the monthly wage for half of the workers in the first wage quintile and equal to the monthly wage for workers in the second wage quintile. This highlights that SI has become relatively more costly since 2016, in an unprecedented manner compared to the legacy of a nearly stagnant minimum insurable wage in past years.

Figure 5. The evolution of the minimum insurable wage, the median monthly wage, and the median ratio of insurable wage to monthly wage by wage quintiles



Source: LFS 2009-21 with data on insurable wage from Table 3. Note: Yearly CPI retrieved from the CBE website were used to calculate real wages.

5.1.3. Eligibility and benefits

Against these costs, not every covered wage worker in the private sector is eligible for benefit entitlements. In case of reaching retirement age, or in cases of disability or survivorship, the worker is eligible for a retirement (or survivor) pension if they contributed through their employer for at least 10 years. In case of any other reason (such as exiting the labor market for marriage or migration), the worker has to double the vesting period to 20 years in order to receive this pension. In case of contributing less than the vesting period,¹¹ there is no retirement pension, but rather an end-of-service compensation, calculated at 15 percent of the annual

¹¹ That is 10 years for those reaching retirement age, or for reasons of death or disability; and 20 years for other reasons.

income for each year with contributions. In this situation, workers who are not likely to receive a pension end up subsidizing the system for those who complete the required minimum. The legal framework also stipulates that the lump sum payment for these workers (for those at the age of retirement) does not provide longevity protection.

These eligibility requirements have important implications for incentives to enroll, both for employees and their employers. The system favors those who contribute at a young age and manage to accumulate as many years as possible, which is no longer adapted to many of Egypt's labor market realities. For instance, women are one of the most penalized groups because they often drop out from the labor market at marriage – with 21 as the median age of marriage in Egypt (Assaad et al., 2022; Lopez-Acevedo et al., 2023), i.e., not completing the minimum vesting period. In anticipation of their drop from the labor market, employers are not willing to enroll their female workers in the scheme, since they perceive contributing for those workers who are potentially not eligible for SI pensions as too costly. In addition, workers (again, mostly women) with late entry to the labor market, above the age of 50, are disadvantaged.

Furthermore, given the rise of new entrants who start in jobs with no SI coverage, and given the low chances to transition to formal jobs once starting in informal ones (Krafft and Hannafi, Forthcoming; Roushdy and Selwaness, 2015; Selwaness and Ehab, 2022), the scheme is becoming exclusive to a select group in the labor market.

Employers might be willing to enroll some of their workers, but not *all* their workers, in fear of increased taxation. The tax authority, which is a different agency than the SI one, estimates specific productivity levels (and earned revenues), with each additional worker registered in SI. This is even though employers/business units may be reporting their revenues and taxes legally and accurately. This fear of potential increased taxation resulting from enrolling additional workers in the SI scheme is more pronounced among employers of workers with lower productivity and/or those who will potentially leave their jobs or the labor market shortly, those in micro and small firms, and those with workers outside of establishments or who alternate in night/morning shifts and thus can easily go undetected. In addition, with the real minimum insurable wage becoming closer to their real wages, the scheme is more expensive for workers with lower wages/productivity and their employers.

The last implication of this system design feature is that the portability of contributions for those who change their work status (from wage worker to own-account worker) is not possible and creates self-selection into employment status and barriers to entry into SI (Lopez-Acevedo et al., 2023; Roushdy and Selwaness, 2019). Even with the new unified system in 2019, because it maintained different treatments and contribution rates, it is expected that portability issues will still prevail.

5.2. Irregular wage workers: Registration, costs, and benefits

The law identifies nine categories of ‘irregular’ work documented in Article 7 of the executive bylaws, as highlighted by Barsoum and Selwaness (2022). These include groups such as landlords and owners of small lands, intermittent construction workers, domestic workers who work outside of private households, and the self-employed in non-registered and not fixed enterprises,¹² among others.

Conditions of enrollment for irregular wage workers

According to Law 148/2019 (Article 4), these nine categories *must* register themselves in the SI scheme, which may suggest that their informality is illegal. However, the required documentation makes the registration of some of them to the scheme almost impossible. Specifically, a national identity (ID) card that shows the worker’s occupation is required, which should serve as proof of occupation. This is, of course, difficult to obtain for this type of worker. Other documents, as highlighted by Barsoum and Selwaness (2022), include an employment history from the civil register, a medical certificate that the worker is physically fit to undertake the job, and a form showing earlier contributions (if any).

Finally, the law does not mention that there is a penalty in case these workers did not enroll, implying that their enrollment is *practically* on a voluntary basis, and hence their informality is legal. Some categories are completely excluded, such as domestic workers inside private households, or ‘gig’ and digital platform workers. The scheme protects them against three risks: old age, disability, and survivorship/death, and it costs nine percent of monthly wage earnings (or minimum wage stipulated by the government), whereas the government pays the rest of their contribution (12 percent).

5.3. Employers and the self-employed

SI for employers and the self-employed varies depending on access to syndicates and enterprise formality. For employers, the scheme is directed toward employers and owners of formal business units (with a valid business/professional registration ‘*Rakam el monsha*’), where enrollment in SI is mandatory. An employer with SI coverage is thus equivalent to a formal enterprise. Previous research shows that the informality of establishments is quite common among micro and small firms (Krafft et al., 2020). As for the self-employed, the scheme is directed toward 15 highly skilled occupations, which includes a listing of the select few from the educated, artists, owners of formal businesses, and owners of large lands.

The main benefits of the scheme for this group of workers are disability, old age, and survivorship pensions. There is no health insurance component in the scheme, which represents an important disadvantage for employers. Participants pay 21 percent (Law 2019, raised from 15 percent in the old law) of their reported income. Such reported income should not be less than that of employees. There are 16 brackets of income listed in the law, from which

¹² Examples of these self-employed include street vendors, mobile workers, shoe cleaners...etc. The law also stipulates all similar workers without explicitly identifying them.

employers and the self-employed choose as their insurable income. Employers/self-employed have the right to opt for the higher insurance income bracket every year (only in December), by submitting a request (in paper format)¹³ at NOSI. Employers who reach age 55 cannot change their insurable income and have to remain at their contribution level until they reach retirement age. This can potentially result in very low pensions at the age of retirement (65) since the real value of the income bracket at age 55 would erode over time. These features could render the scheme less attractive due to the high contribution rate and the income bracket constraints, in addition to the lack of health insurance. Choosing the lowest income bracket for the insurable income would be a sensible decision to avoid paying higher contributions in return for much lower pensions since there is a guarantee of a minimum pension of 50 percent (or EGP 900) in all cases.

The minimum insurable income for employers increased substantially in 2016. Although there is no information on the detailed change in the brackets of income (to the best of our knowledge), it is expected that all brackets of income have increased proportionally to the minimum insurable income (Table 3).

5.4. Other types: Egyptians working abroad, and construction, fishery, transportation workers

The fourth type is Egyptians who work abroad, and the fifth consists of any other type of worker who was not previously mentioned. These may include new forms of work that are emerging and were not previously included. In addition, the law detailed specific regulations for construction workers, fishermen, and transportation workers, including employees and the self-employed among them. The worker's national ID cards must include these occupations to be eligible. The main risks covered are retirement, disability, or death. Fishermen should have a permit from the local fishing authority. For those who work for an employer on a sail or motorboat, they have to pay monthly contributions of 10 percent. These should be calculated on their insurable wage, which the law stipulates to be greater than the minimum insurable wage bound. Additionally, their employers should pay a yearly contribution of 15 percent multiplied by the number of fishermen working on the boat and have a 12-month permit. As with other employers, they can enroll themselves in the system for a contribution rate of 21 percent of the income category they choose. Cumbersome enrollment procedures aside, this also means a high tax wedge for employers of formal workers (fishermen in this case). The law categorizes other types of fishermen who do not work for an employer, as irregular ones should have a permit to be able to enroll themselves. Their contributions are nine percent (periodical legal book no.1 for 2020). As for land transportation workers and car owners, their monthly contributions - similar to fishermen working for an employer – are 10 percent consisting of nine percent covering retirement, disability, or death, and one percent covering lump-sum.

¹³ Interviews with employers raised the issue that this request should be in paper format and is not yet digitized. Interviews highlighted that there were occasions when SI administrations did not process the request to increase the insurable income bracket, because of claims of loss of such paper requests or of claims of not receiving it in the first place.

Construction workers do have their specific stipulations, contributing 11 percent of their monthly insurable earnings, which is determined according to three skill levels.¹⁴ The law stipulates that the employers of these construction workers pay 18.75 percent of their insurable earnings based on the skill level. Other construction workers that the law considers ‘irregular’ should follow the rules for irregular workers explained in sub-section 5.2. Except for the condition that the employment relationship extends to more than six months, there are not enough details as to when a construction worker should contribute as an irregular worker or when working for an employer.

The analysis of these regulations shows that enrollment into the system for construction, fishery, and transportation requires documentation such as their national ID showing proof of occupation along with enterprise formality (business registration) of employers of construction, fishery, and transportation.

6. Multivariate analysis results

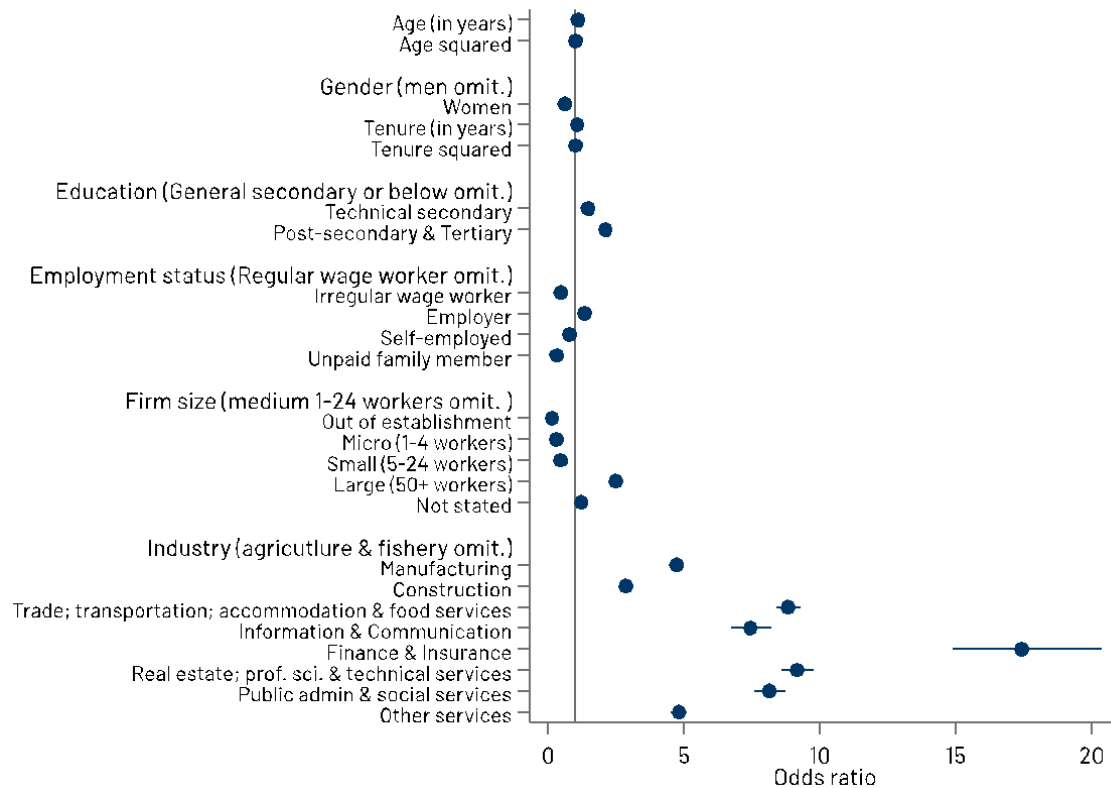
This section presents our results for the impact of this institutional framework on the probability of contributing to the SI system. We first discuss results for all workers in the private sector (results in Table 5), then shift to wage workers (regular workers results in Table 6 and irregular workers results in Table 7) and to non-wage workers (results in Table 8).

All workers

Figure 6 shows that irregular wage workers, the self-employed, and unpaid family workers have significantly lower odds of having SI coverage, in line with our institutional analysis. Their informality is permissibly legal within the system due to the difficulty in providing the required documentation, and potentially the lack of awareness of all required steps. Also, on average, women were significantly less likely to have SI in their jobs, controlling for individual-level characteristics, employment status, and job-level characteristics and the year of the survey. Yet the effect of tenure on SI coverage is insignificant. Overall, our results mostly support H1.

¹⁴ The minimum bound was EGP 1,000 in 2020 for the low-skilled, plus five percent (i.e., EGP 1,050 in 2020) for the medium-skilled, and plus 10 percent (i.e., EGP 1,100 in 2020) for high-skilled workers.

Figure 6. Odds ratio of SI coverage for all private sector workers, ages 15-64



Source: Authors' illustration based on the logit results in Table 5, controlling for the year of the survey and the rest of individual and job characteristics.

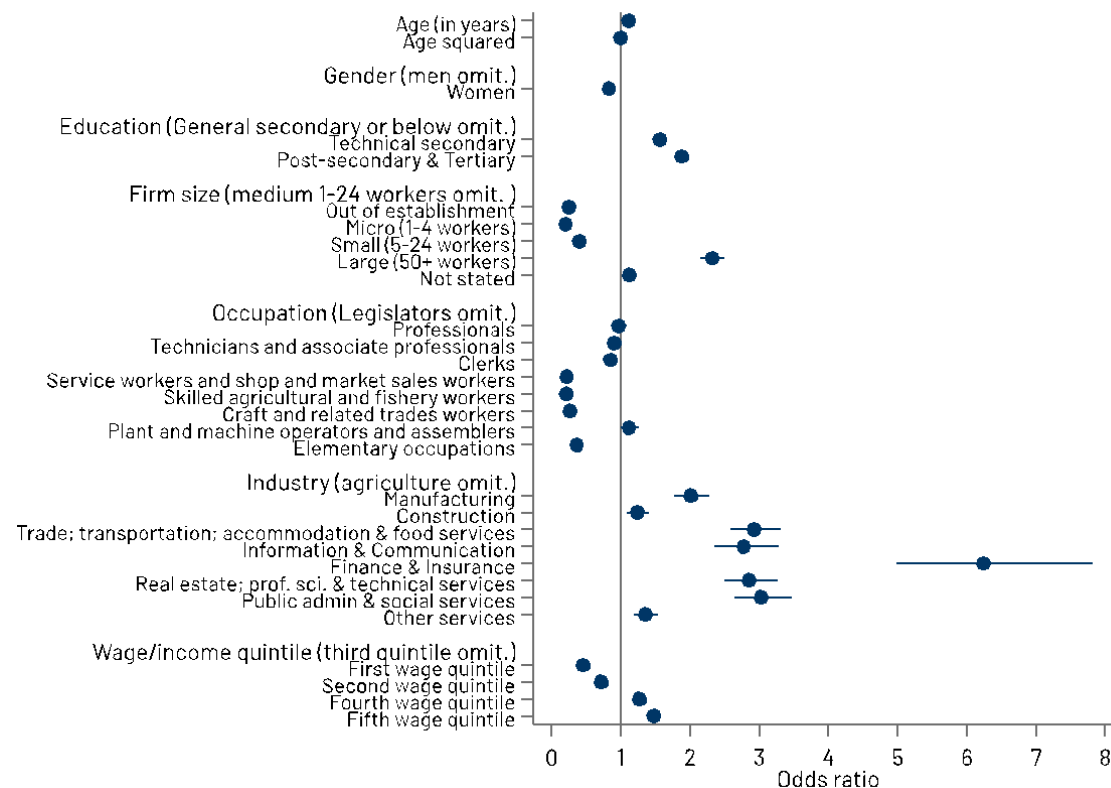
Regular wage workers

Figure 7 shows that even among regular wage workers who are de jure covered, there are some occupations with a significantly lower likelihood of access to SI, controlling for individual characteristics, job/firm characteristics, and yearly real minimum insurable wage (specification 1). For instance, regular wage workers who are service workers, shop and market sales workers, skilled agricultural and fishery workers, crafts and related trade workers as well as those in elementary occupations have significantly lower odds of having social security coverage. This is relative to the reference group (legislators, senior officials, and managers). The lack of coverage for these specific occupations might reflect the discretion of their employers to not enroll them, relative to other occupations. It could also reflect the weak aptitude among these workers to accumulate the minimum years of contribution. Therefore, this result validates our hypothesis that the scheme may disincentivize enrollment by employers of regular wage workers who are potentially less likely to contribute to the minimum required period of 120 months to receive a pension.

In addition, female wage workers are significantly less likely to have SI in their jobs (Figure 7). This result is different than previous studies that showed that in waged jobs, women had higher chances of coverage than men (Roushdy and Selwaness, 2019). This is likely due to these studies using one point in time, whereas our results present an average effect, controlling for multiple years.

Regular workers who are outside of establishment are significantly less likely than all other workers to have coverage (Figure 7). This result corroborates our earlier analysis that employers may avoid enrolling their workers who can go easily undetected, such as those who work in night shifts or outside of establishment. Also, the odds of coverage increase with firm size. Therefore, although workers in micro firms have higher odds of coverage than those outside of establishment, they have lower odds of coverage than those in small firms, and so forth. This is because informal business units are concentrated among the micro and small firms, therefore their owners are not covered, as well as those workers in these firms. For instance, two-thirds of firms with one to 24 workers (66 percent according to the economic census, and 61 percent according to the establishment census) are non-registered (i.e., informal) business units (Krafft et al., 2020). In addition, this result can also be explained by enforcement levels that may increase with firm size, as well as by the degree of adoption of automated payroll (versus cash), which also increases with firm size, leaving little room to escape enrollment or to underreport.

Figure 7. Odds ratio of SI coverage for regular employees in the private sector, ages 15-64



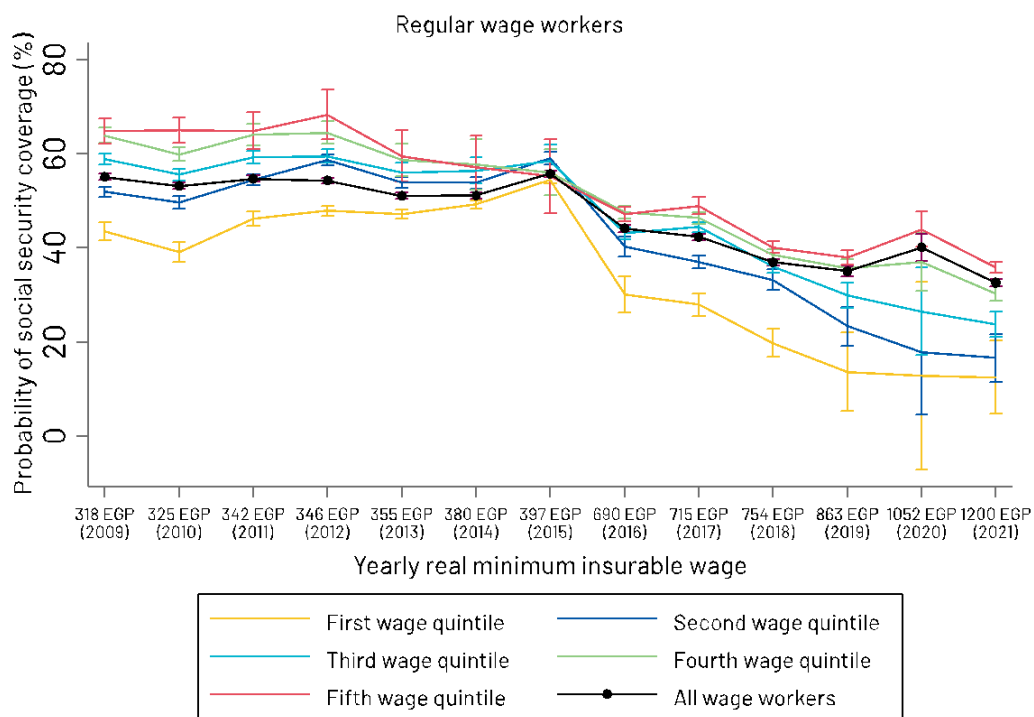
Source: Authors' illustration based on logit results in Table 6, controlling for yearly minimum insurable wage, individual, and job characteristics.

In line with the descriptive analysis, the likelihood of SI coverage decreases for workers in the first and second quintiles and rises steadily for workers in the fourth and the fifth wage quintiles, relative to those in the third wage quintile (Figure 7). Importantly, workers in the first and second wage quintiles were the most affected by the rise in the insurable wage in 2016, as illustrated in Figure 8, and had the least estimated probability in 2021, relative to

workers in other wage quintiles. Workers in the third wage quintile had a slightly higher probability of SI than average before 2016; however, their probability started diverging downward from average since 2018. The real minimum insurable wage increased every year since 2016 faster than some workers' wages (as shown in Figure 5), causing their coverage rates to drop quickly. Also, the margin of underreporting for wage earners whose full wage is below or equal to the maximum level became smaller, and hence their (and/or their employers') ability to underreport.

Therefore, our results support H2, that the scheme became more expensive for workers in the first and second quintiles, which explains the falling coverage rates. We also find that the effect of the increase in the real minimum insurable wage has been spreading to other quintiles in recent years. The appendix also shows further robustness analyses where we control for the ratio of the minimum insurable wage to the monthly wage (in percentage), instead of the yearly minimum insurable wage, and overall, our results are consistent (Appendix Table 1).

Figure 8. Average probability of SI coverage by wage quintile and yearly minimum insurable wage, controlling for job and individual characteristics



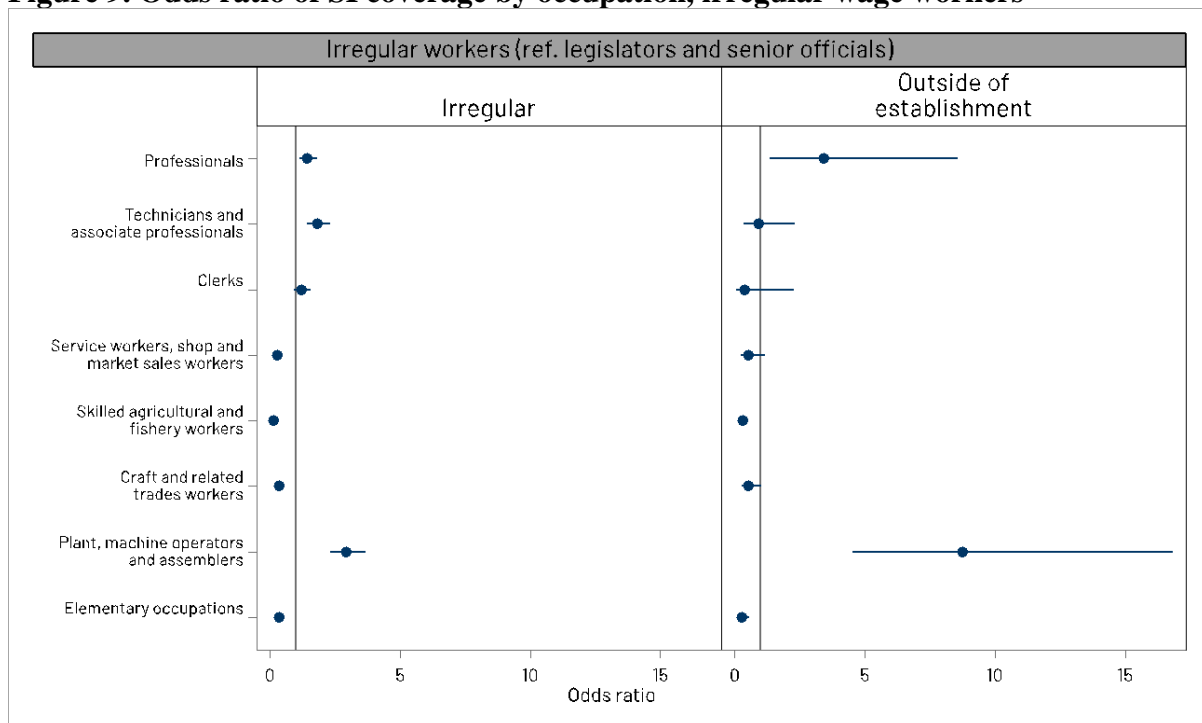
Source: Predicted probabilities based on logit estimations of the probability of SI coverage controlling for job and individual characteristics, with real minimum insurable wage and wage quintile interactions (Appendix Table 1, column 2).

The results for irregular workers¹⁵ show that, similar to regular wage workers, the lack of SI coverage is concentrated among specific low-skilled occupations, controlling for observable characteristics such as individual-level ones, industry, and time effects.

¹⁵ Further results for irregular workers can be found in Table 7.

Service workers, skilled agricultural and fishery workers, crafts workers, and those in elementary occupations were associated with the lowest odds of having SI coverage (Figure 9). Interestingly, the odds of coverage for professionals, technicians, and associate professionals among irregular wage workers are greater than one, indicating that their likelihood of coverage is higher than the reference group (Figure 9). This can be explained by either their higher awareness of the scheme and steps of registration, or because they are likely to have all required documents with their high-skilled occupations shown in the ID cards. These irregular workers include freelancers from these occupations, including gig workers, and give some indication that platform workers may be able to enroll in the scheme.

Figure 9. Odds ratio of SI coverage by occupation, irregular wage workers



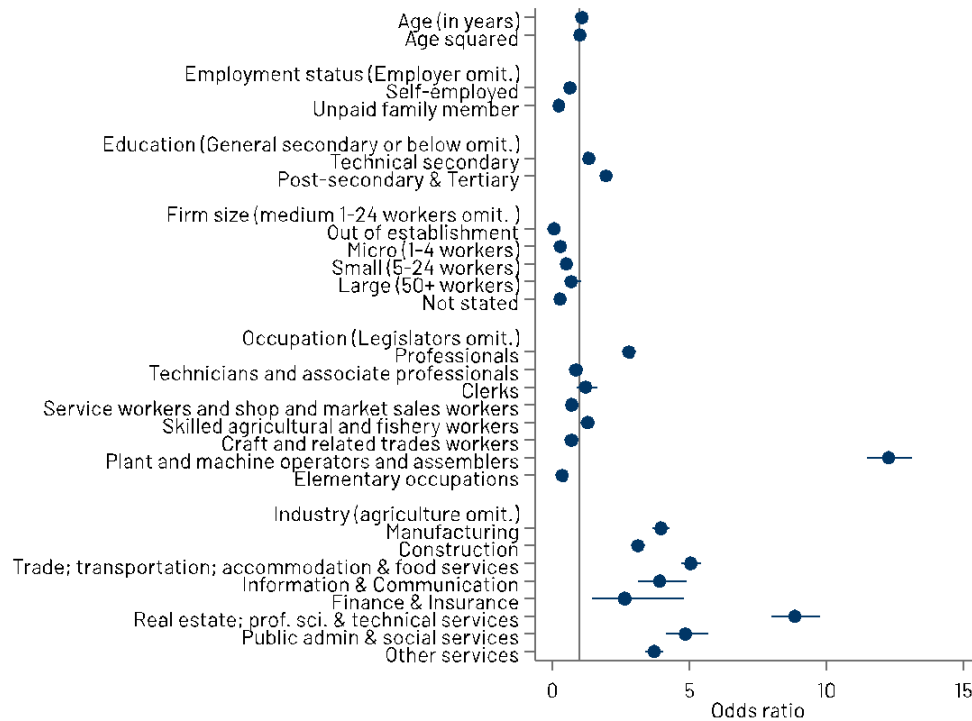
Source: Based on logit results in Table 7.

Employers and the self-employed

Results for non-wage workers show that professionals (i.e., doctors, engineers, journalists, lawyers...etc.) are the only group with higher odds of having SI coverage (Figure 10). This is explained by the fact they are among the 15 occupations which the law stipulates and are the most likely to be syndicated. This result provides further evidence for H1. In line with the result of irregular wage workers, professionals who are self-employed (freelancers...etc.) are also more likely to have SI coverage.

Similar to wage workers, non-wage workers who work as service workers, shop and market sales workers, and crafts and related trade workers, have significantly lower odds of having SI coverage. This result holds also when separating employers and the self-employed. For employers, this is primarily related to the informality of their business unit. Although data on the formality of their business units is not available in the LFS, we can conclude that corresponding business units for employers in these occupations are likely informal.

Figure 10. Odds ratio of SI coverage for non-wage workers in the private sector, ages 15-64



Source: Based on logit results in Table 8.

7. Conclusion

This paper examines to what extent institutional elements related to the design of the SI scheme contribute to the increasing SI coverage gap, particularly among private sector workers. We argue that there are main institutional obstacles that hinder the expansion of the current SI scheme and reinforce the decreasing trend in coverage.

Our findings are three-fold: First, the lack of SI coverage, or informality, is legal (or permissible) within the legal framework because it has differentiated regulations based on employment status. Cumbersome (and even commonly unattainable) requirements for several groups exclude them from the system. These are irregular wage workers, the self-employed, and unpaid family workers in unregistered enterprises or un-syndicated occupations.

Second, the cost of the scheme, through the minimum insurable wage upon which contributions are calculated, increased substantially over time. Such increases since 2016 represent a key issue explaining the rapid decline in SI coverage overall, and especially regular wage workers. Although regular wage workers in different wage levels were affected, lower wage earners became particularly less likely to have SI coverage over time, controlling for individuals and job characteristics, as the system became more expensive for these workers. Individual data on the amount of contributions that are paid by workers and employers is crucial to further investigate the impact of the scheme cost on affordability and coverage.

Third, for other workers who are de jure covered, the system creates disincentives for registering through a perceived and real high tax wedge by employers, thus exposing them to increased vulnerability. These are primarily in low-productivity sectors. Workers who are less likely to accumulate the minimum years of contributions to guarantee a retirement pension are particularly disincentivized to participate. These last two findings support our argument that formality is rendered quite costly given the current legal framework.

Other institutional barriers that are not directly related to SI schemes, such as the design of the taxation system (especially with the 2021 income tax reforms), can interact with the SI scheme and cause workers, particularly employers, to self-select out of the scheme. The roll-out of a universal health insurance scheme expected to cover all Egyptians by 2032 is another confounding reform that took/is taking place in Egypt. How the tax reform and the new health insurance program would interact with the SI scheme is an open question, since their impacts are yet to be seen, given the novelty of change at the time of writing this paper.

The key policy implications of this paper are, therefore, three-fold. First, the spirit of the law shows a commitment to include informal workers, however, cumbersome and unattainable requirements for system enrollment and eligibility need to be simplified for the self-employed and unpaid family workers in unregistered enterprises or un-syndicated occupations.

Second, the cost of the scheme, though important for the financial viability of the system, leads to the loss of contributions from a significant proportion of workers, particularly low-income earners. As a pay-as-you-go financed system, the exclusion of this group negatively affects the financial viability of the system and weakens its ability, as a defined benefit, to redistribute between earners of higher and lower incomes. It is obviously the case that the increases stipulated since 2016 have had a negative effect on system coverage, particularly given the pressures of the economic situation. Therefore, it is recommended to lower the minimum insurable wage in order to allow for wider outreach.

Third, optional additional payments, already stipulated in the law, need to be duly advertised to prospective contributors. These recommendations are in line with Holzmann and Hinz's (2005) argument for a multi-pillar system design. Specifically, there is a need for a mandated publicly managed defined benefit system that would include the poorest segments of the workforce, along with a voluntary retirement savings scheme that is flexible and responsive to the economic situation (Holzmann and Hinz, 2005).

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Table 4. Summary statistics

	Regular wage worker	Regular wage worker inside establishment	Regular wage worker outside establishment	Irregular wage workers	Irregular wage worker inside establishment	Irregular wage worker outside of establishment	Employer	Self-employed	Unpaid family worker	Total
Has social security coverage	0.430	0.470	0.288	0.100	0.236	0.056	0.225	0.189	0.014	0.236
Gender	0.107	0.127	0.035	0.074	0.193	0.036	0.043	0.150	0.580	0.131
Currently married	0.606	0.589	0.667	0.533	0.412	0.572	0.897	0.787	0.542	0.622
Education										
General secondary or below	0.403	0.343	0.620	0.553	0.367	0.614	0.645	0.590	0.690	0.521
Technical secondary	0.349	0.356	0.325	0.349	0.356	0.347	0.227	0.297	0.264	0.325
Post-secondary & Tertiary	0.248	0.301	0.055	0.098	0.276	0.040	0.128	0.112	0.046	0.153
Firm size										
Out of establishment	0.266	0.000	1.000	0.787	0.000	1.000	0.684	0.810	0.913	0.617
Micro (1-4 workers)	0.187	0.254	0.000	0.064	0.298	0.000	0.256	0.179	0.072	0.137
Small (5-24 workers)	0.126	0.172	0.000	0.038	0.178	0.000	0.046	0.004	0.011	0.062
Medium (25-49 workers)	0.036	0.050	0.000	0.008	0.038	0.000	0.003	0.000	0.000	0.015
Large (50+ workers)	0.150	0.205	0.000	0.026	0.123	0.000	0.002	0.000	0.000	0.060
Not stated	0.234	0.319	0.000	0.078	0.363	0.000	0.010	0.006	0.003	0.109
Occupation										
Legislators; senior officials & managers	0.022	0.027	0.003	0.006	0.008	0.005	0.647	0.046	0.003	0.075
Professionals	0.113	0.142	0.008	0.028	0.107	0.001	0.016	0.038	0.004	0.057
Technicians and associate professionals	0.059	0.073	0.009	0.017	0.060	0.003	0.009	0.024	0.002	0.031
Clerks	0.055	0.069	0.002	0.014	0.056	0.001	0.001	0.001	0.001	0.025

Table 4. Summary statistics (contd.)

Service workers and shop and market sales workers	0.171	0.214	0.021	0.072	0.273	0.006	0.026	0.144	0.075	0.112
Skilled agricultural and fishery workers	0.048	0.014	0.168	0.290	0.047	0.369	0.202	0.197	0.815	0.223
Craft and related trades workers	0.223	0.222	0.226	0.406	0.223	0.466	0.069	0.216	0.037	0.258
Plant and machine operators and assemblers	0.213	0.151	0.439	0.106	0.121	0.101	0.017	0.178	0.015	0.138
Elementary occupations	0.096	0.089	0.124	0.062	0.106	0.047	0.013	0.156	0.048	0.079
Industry										
Agriculture & fishing	0.055	0.020	0.180	0.299	0.054	0.379	0.571	0.215	0.825	0.266
Manufacturing	0.318	0.397	0.034	0.090	0.328	0.013	0.087	0.062	0.028	0.166
Construction	0.084	0.046	0.219	0.369	0.040	0.477	0.050	0.149	0.009	0.182
Trade; transportation; accommodation & food services	0.359	0.327	0.477	0.175	0.363	0.113	0.232	0.473	0.104	0.275
Information & Communication	0.015	0.020	0.001	0.004	0.016	0.000	0.002	0.002	0.000	0.008
Finance & Insurance	0.009	0.012	0.000	0.001	0.006	0.000	0.000	0.000	0.000	0.004
Real estate; prof. sci. & technical services	0.049	0.059	0.012	0.016	0.055	0.003	0.030	0.038	0.002	0.031
Public admin & social services	0.058	0.073	0.006	0.022	0.087	0.001	0.007	0.006	0.003	0.031
Other services	0.052	0.047	0.071	0.024	0.053	0.015	0.021	0.054	0.029	0.038
Hours per week										
1-36 hours per week	0.115	0.101	0.165	0.282	0.203	0.308	0.155	0.268	0.522	0.226
37-47 hours per week	0.200	0.195	0.219	0.264	0.202	0.285	0.255	0.222	0.226	0.232
48+ hours per week	0.685	0.704	0.617	0.454	0.595	0.408	0.590	0.511	0.251	0.542

Table 4. Summary statistics (contd.)

Region										
Greater Cairo	0.412	0.438	0.319	0.178	0.356	0.120	0.125	0.263	0.070	0.260
Alexandria	0.143	0.141	0.150	0.113	0.133	0.107	0.164	0.148	0.200	0.139
Lower Egypt (Delta)	0.228	0.212	0.285	0.175	0.154	0.181	0.301	0.222	0.260	0.218
Canal cities	0.102	0.103	0.096	0.101	0.101	0.102	0.112	0.086	0.086	0.100
North Upper Egypt	0.057	0.054	0.067	0.174	0.120	0.192	0.182	0.133	0.270	0.135
Central Upper Egypt	0.016	0.014	0.023	0.082	0.041	0.096	0.035	0.037	0.033	0.045
South Upper Egypt	0.042	0.037	0.060	0.176	0.095	0.203	0.080	0.111	0.082	0.103
Urban/rural										
Urban	0.603	0.635	0.490	0.315	0.552	0.238	0.301	0.420	0.138	0.417
Year										
2009	0.063	0.061	0.068	0.052	0.050	0.053	0.091	0.060	0.102	0.064
2010	0.064	0.061	0.072	0.063	0.069	0.061	0.093	0.068	0.087	0.068
2011	0.054	0.051	0.063	0.065	0.067	0.065	0.097	0.067	0.086	0.066
2012	0.057	0.058	0.054	0.067	0.070	0.066	0.097	0.067	0.077	0.067
2013	0.054	0.057	0.042	0.069	0.070	0.069	0.078	0.084	0.091	0.068
2014	0.059	0.063	0.042	0.067	0.068	0.067	0.087	0.079	0.096	0.069
2015	0.063	0.068	0.046	0.079	0.085	0.077	0.078	0.075	0.106	0.075
2016	0.082	0.085	0.073	0.094	0.113	0.088	0.070	0.072	0.066	0.083
2017	0.085	0.087	0.080	0.094	0.113	0.088	0.070	0.079	0.076	0.086
2018	0.097	0.096	0.099	0.077	0.058	0.083	0.085	0.071	0.064	0.083
2019	0.097	0.096	0.100	0.093	0.086	0.095	0.065	0.080	0.056	0.087
2020	0.109	0.106	0.117	0.089	0.076	0.094	0.062	0.081	0.046	0.090
2021	0.117	0.110	0.146	0.090	0.075	0.095	0.028	0.116	0.047	0.094
Age (in years)	34.364	34.103	35.302	31.599	29.250	32.367	44.673	39.360	30.831	34.620
	(10.80)	(10.63)	(11.34)	(10.92)	(9.316)	(11.29)	(11.24)	(11.51)	(12.07)	(11.77)

Table 4. Summary statistics (contd.)

Age square	1297.494 (815.4)	1275.932 (798.6)	1374.848 (868.6)	1117.677 (796.9)	942.327 (651.1)	1175.039 (831.2)	2122.066 (993.5)	1681.636 (942.9)	1096.276 (874.1)	1337.175 (899.4)
Tenure (in years)	10.153 (9.167)	9.577 (8.843)	12.249 (9.986)	10.468 (9.980)	5.607 (6.711)	12.085 (10.36)	17.563 (11.08)	14.138 (10.51)	11.007 (9.462)	11.476 (10.09)
Tenure square	187.120 (311.8)	169.912 (290.3)	249.756 (373.5)	209.191 (369.3)	76.473 (194.7)	253.335 (401.6)	431.187 (487.4)	310.270 (415.4)	210.686 (331.5)	233.547 (372.9)

Source: LFS 2009-21.

Table 5. Logit estimates (odds ratio) of SI coverage among all workers in the private sector, ages 15-64

	(1) All workers spec.1	(2) All workers spec.2
Has social security coverage		
Age (in years)	1.094*** (0.003)	1.094*** (0.003)
Age squared	0.999*** (0.000)	0.999*** (0.000)
Tenure (in years)	1.065*** (0.002)	1.065*** (0.002)
Tenure squared	0.999*** (0.000)	0.999*** (0.000)
Gender (Men omitted)		
Women	0.620*** (0.011)	0.620*** (0.011)
Marital status (currently unmarried omitted)		
Currently married	1.326*** (0.018)	1.326*** (0.018)
Education level (General secondary or below omitted)		
Technical secondary	1.463*** (0.014)	1.463*** (0.014)
Post-secondary & Tertiary	2.105*** (0.030)	2.105*** (0.030)
Employment (regular employee omitted)		
Irregular wage worker	0.464*** (0.006)	0.464*** (0.006)
Employer	1.335*** (0.023)	1.335*** (0.023)
Self-employed	0.774*** (0.010)	0.774*** (0.010)
Unpaid family member	0.321*** (0.011)	0.321*** (0.011)
Firm size (medium (25-49 workers) omitted)		
Out of establishment	0.141*** (0.005)	0.141*** (0.005)
Micro (1-4 workers)	0.295*** (0.009)	0.295*** (0.009)
Small (5-24 workers)	0.453*** (0.015)	0.453*** (0.015)
Large (50+ workers)	2.480*** (0.084)	2.480*** (0.084)
Not stated	1.218*** (0.038)	1.218*** (0.038)
Occupation (legislators & senior officials omitted)		
Professionals	2.257*** (0.057)	2.257*** (0.057)
Technicians and associate professionals	1.837*** (0.048)	1.837*** (0.048)
Clerks	1.855*** (0.058)	1.855*** (0.058)
Service workers and shop and market sales workers	0.449*** (0.009)	0.449*** (0.009)
Skilled agricultural and fishery workers	1.083** (0.028)	1.083** (0.028)
Craft and related trades workers	0.621*** (0.013)	0.621*** (0.013)
Plant and machine operators and assemblers	5.014*** (0.110)	5.014*** (0.110)

Table 5. Logit estimates (odds ratio) of SI coverage among all workers in the private sector, ages 15-64 (contd.)

Elementary occupations	0.501*** (0.011)	0.501*** (0.011)
Industry (agriculture omitted)		
Manufacturing	4.718*** (0.134)	4.718*** (0.134)
Construction	2.858*** (0.078)	2.858*** (0.078)
Trade; transportation; accommodation & food services	8.830*** (0.225)	8.830*** (0.225)
Information & communication	7.441*** (0.372)	7.441*** (0.372)
Finance & insurance	17.420*** (1.397)	17.420*** (1.397)
Real estate; prof. sci. & technical services	9.153*** (0.302)	9.153*** (0.302)
Public admin & social services	8.139*** (0.298)	8.139*** (0.298)
Other services	4.811*** (0.150)	4.811*** (0.150)
Hours per week (1-14 hrs/week omitted)		
37-	0.944*** (0.014)	0.944*** (0.014)
48-	1.081*** (0.014)	1.081*** (0.014)
Region (Cairo omitted)		
Alexandria	1.178*** (0.027)	1.178*** (0.027)
Lower Egypt (Delta)	0.866*** (0.016)	0.866*** (0.016)
Canal cities	0.824*** (0.019)	0.824*** (0.019)
North Upper Egypt	0.801*** (0.017)	0.801*** (0.017)
Central Upper Egypt	1.080* (0.033)	1.080* (0.033)
South Upper Egypt	1.033 (0.024)	1.033 (0.024)
Urban/rural (rural omitted)		
Urban	0.880*** (0.016)	0.880*** (0.016)
Region & urban/rural int.		
Alexandria X Urban	1.272*** (0.036)	1.272*** (0.036)
Lower Egypt (Delta) X Urban	1.209*** (0.031)	1.209*** (0.031)
Canal cities X Urban	1.831*** (0.057)	1.831*** (0.057)
North Upper Egypt X Urban	1.581*** (0.052)	1.581*** (0.052)
Central Upper Egypt X Urban	1.473*** (0.072)	1.473*** (0.072)
South Upper Egypt X Urban	1.646*** (0.056)	1.646*** (0.056)

Table 5. Logit estimates (odds ratio) of SI coverage among all workers in the private sector, ages 15-64 (contd.)

Yearly real min insurable wage (318 EGP in 2009 for wage workers omitted)		
325 EGP (2010)	0.920*** (0.017)	
342 EGP (2011)	1.077*** (0.019)	
346 EGP (2012)	1.132*** (0.020)	
355 EGP (2013)	0.949** (0.017)	
380 EGP (2014)	1.210*** (0.023)	
397 EGP (2015)	1.547*** (0.030)	
690 EGP (2016)	0.698*** (0.014)	
715 EGP (2017)	0.771*** (0.014)	
754 EGP (2018)	0.531*** (0.011)	
863 EGP (2019)	0.591*** (0.015)	
1052 EGP (2020)	0.718*** (0.034)	
1200 EGP (2021)	0.625*** (0.015)	
Year of the survey (2009 omitted)		
2010		0.782*** (0.015)
2011		0.613*** (0.012)
2012		0.731*** (0.014)
2013		0.696*** (0.014)
2014		0.646*** (0.013)
2015		0.595*** (0.012)
2016		0.498*** (0.010)
2017		0.451*** (0.010)
2018		0.343*** (0.007)
2019		0.382*** (0.010)
2020		0.464*** (0.022)
2021		0.404*** (0.010)
P-value	0.000	0.000
N	792544	792544
N(clustered)	304636	304636
Pseudo R-squared	0.422	0.422

Source: LFS 2009-2021. Notes: Exponentiated coefficients. Standards errors are clustered at the individual level.

Table 6. Logit estimates (odds ratio) of SI coverage among wage workers in the private sector, ages 15-64

	(1) Regular workers spec.1	(2) Regular workers spec.2	(3) Regular wage workers inside establishments	(4) Regular wage workers outside establishments
Has social security coverage				
Age (in years)	1.112*** (0.006)	1.112*** (0.006)	1.102*** (0.007)	1.110*** (0.013)
Age squared	0.999*** (0.000)	0.999*** (0.000)	0.999*** (0.000)	0.999*** (0.000)
Tenure (in years)	1.084*** (0.003)	1.084*** (0.003)	1.092*** (0.003)	1.067*** (0.006)
Tenure squared	0.998*** (0.000)	0.998*** (0.000)	0.998*** (0.000)	0.999*** (0.000)
Gender (Men omitted)				
Women	0.828*** (0.022)	0.828*** (0.022)	0.915*** (0.024)	0.401*** (0.065)
Marital status (currently unmarried omitted)				
Currently married	1.263*** (0.024)	1.263*** (0.024)	1.272*** (0.028)	1.183*** (0.052)
Education level (General secondary or below omitted)				
Technical secondary	1.563*** (0.025)	1.563*** (0.025)	1.623*** (0.030)	1.375*** (0.044)
Post-secondary & tertiary	1.875*** (0.045)	1.875*** (0.045)	1.959*** (0.051)	1.561*** (0.113)
Firm size (medium (25-49 workers)				
Out of establishment	0.246*** (0.010)	0.246*** (0.010)		
Micro (1-4 workers)	0.200*** (0.008)	0.200*** (0.008)	0.206*** (0.008)	
Small (5-24 workers)	0.401*** (0.015)	0.401*** (0.015)	0.409*** (0.015)	
Large (50+ workers)	2.316*** (0.089)	2.316*** (0.089)	2.239*** (0.083)	
Not stated	1.119** (0.040)	1.119** (0.040)	1.088* (0.037)	
Occupation (legislators & senior officials omitted)				
Professionals	0.969 (0.058)	0.969 (0.058)	0.875* (0.054)	1.327 (0.391)
Technicians and associate professionals	0.902 (0.056)	0.902 (0.056)	0.822** (0.053)	0.647 (0.189)
Clerks	0.849** (0.053)	0.849** (0.053)	0.788*** (0.051)	1.351 (0.512)
Service workers and shop and market sales workers	0.215*** (0.013)	0.215*** (0.013)	0.283*** (0.017)	0.170*** (0.045)
Skilled agricultural and fishery workers	0.208*** (0.018)	0.208*** (0.018)	0.429*** (0.044)	0.095*** (0.022)
Craft and related trades workers	0.263*** (0.015)	0.263*** (0.015)	0.265*** (0.016)	0.136*** (0.037)

Table 6. Logit estimates (odds ratio) of SI coverage among wage workers in the private sector, ages 15-64 (contd.)

Plant and machine operators and assemblers	1.117 (0.066)	1.117 (0.066)	0.602*** (0.038)	1.625* (0.402)
Elementary occupations	0.360*** (0.022)	0.360*** (0.022)	0.486*** (0.031)	0.105*** (0.026)
Industry (agriculture omitted)				
Manufacturing	2.010*** (0.127)	2.010*** (0.127)	1.936*** (0.138)	2.147*** (0.374)
Construction	1.237** (0.082)	1.237** (0.082)	2.203*** (0.175)	0.688* (0.122)
Trade; transportation; accommodation & food services	2.923*** (0.183)	2.923*** (0.183)	1.604*** (0.116)	3.415*** (0.474)
Information & communication	2.775*** (0.235)	2.775*** (0.235)	2.245*** (0.203)	1.543 (1.095)
Finance & insurance	6.236*** (0.718)	6.236*** (0.718)	4.916*** (0.588)	5.850* (4.038)
Real estate; prof. sci. & technical services	2.852*** (0.197)	2.852*** (0.197)	2.233*** (0.172)	3.792*** (0.762)
Public admin & social services	3.027*** (0.210)	3.027*** (0.210)	2.138*** (0.163)	15.870*** (3.617)
Other services	1.352*** (0.091)	1.352*** (0.091)	1.271** (0.098)	2.038*** (0.328)
Hours per week (1-14 hrs/week omitted)				
37-	0.859*** (0.023)	0.859*** (0.023)	0.759*** (0.024)	1.172** (0.065)
48-	0.924*** (0.022)	0.924*** (0.022)	0.798*** (0.023)	1.341*** (0.067)
Region (Cairo omitted)				
Alexandria	1.324*** (0.058)	1.324*** (0.058)	1.040 (0.055)	2.347*** (0.216)
Lower Egypt (Delta)	0.805*** (0.022)	0.805*** (0.022)	0.692*** (0.021)	1.294*** (0.079)
Canal cities	1.028 (0.036)	1.028 (0.036)	1.076 (0.042)	0.949 (0.077)
North Upper Egypt	0.966 (0.038)	0.966 (0.038)	0.844*** (0.039)	1.329*** (0.113)
Central Upper Egypt	1.631*** (0.099)	1.631*** (0.099)	1.225* (0.100)	2.156*** (0.226)
South Upper Egypt	1.247*** (0.061)	1.247*** (0.061)	1.104 (0.069)	1.645*** (0.156)
Urban/rural (rural omitted)				
Urban	0.968 (0.025)	0.968 (0.025)	1.009 (0.028)	0.783*** (0.049)
Region & urban/rural int.				
Alexandria X Urban	1.114* (0.055)	1.114* (0.055)	1.487*** (0.088)	0.622*** (0.067)
Lower Egypt (Delta) X Urban	0.939 (0.037)	0.939 (0.037)	0.910* (0.040)	1.281** (0.112)

Table 6. Logit estimates (odds ratio) of SI coverage among wage workers in the private sector, ages 15-64 (contd.)

Canal cities X Urban	1.479*** (0.069)	1.479*** (0.069)	1.265*** (0.066)	3.074*** (0.327)
North Upper Egypt X Urban	1.214** (0.077)	1.214** (0.077)	1.304*** (0.095)	0.986 (0.147)
Central Upper Egypt X Urban	0.827* (0.080)	0.827* (0.080)	0.983 (0.118)	0.873 (0.158)
South Upper Egypt X Urban	1.577*** (0.105)	1.577*** (0.105)	1.703*** (0.141)	1.754*** (0.238)
Monthly wage quintiles (third quintile omitted)				
First wage quintile	0.453*** (0.011)	0.453*** (0.011)	0.431*** (0.011)	0.654*** (0.036)
Second wage quintile	0.715*** (0.015)	0.715*** (0.015)	0.717*** (0.017)	0.856** (0.042)
Fourth wage quintile	1.268*** (0.028)	1.268*** (0.028)	1.249*** (0.031)	1.266*** (0.065)
Fifth wage quintile	1.477*** (0.039)	1.477*** (0.039)	1.437*** (0.046)	1.559*** (0.083)
Yearly real min insurable wage (318 EGP in 2009 omitted)				
325 EGP (2010)	0.846*** (0.026)		0.871*** (0.029)	0.739*** (0.059)
342 EGP (2011)	1.139*** (0.035)		1.144*** (0.038)	1.123 (0.089)
346 EGP (2012)	1.330*** (0.040)		1.389*** (0.047)	1.117 (0.084)
355 EGP (2013)	1.173*** (0.037)		1.245*** (0.044)	0.854* (0.066)
380 EGP (2014)	1.641*** (0.053)		1.786*** (0.065)	1.227** (0.095)
397 EGP (2015)	1.960*** (0.066)		2.166*** (0.083)	1.351*** (0.111)
690 EGP (2016)	0.535*** (0.018)		0.570*** (0.020)	0.430*** (0.034)
715 EGP (2017)	0.570*** (0.017)		0.587*** (0.019)	0.452*** (0.034)
754 EGP (2018)	0.376*** (0.012)		0.406*** (0.015)	0.347*** (0.028)
863 EGP (2019)	0.393*** (0.016)		0.390*** (0.021)	0.460*** (0.038)
1052 EGP (2020)	0.618*** (0.052)			0.582*** (0.067)
1200 EGP (2021)	0.313*** (0.012)		0.325*** (0.016)	0.340*** (0.027)

Table 6. Logit estimates (odds ratio) of SI coverage among wage workers in the private sector, ages 15-64 (contd.)

Year of the survey (2009 omitted)				
2010		0.837***		
		(0.027)		
2011		0.598***		
		(0.019)		
2012		0.678***		
		(0.021)		
2013		0.581***		
		(0.020)		
2014		0.510***		
		(0.017)		
2015		0.432***		
		(0.015)		
2016		0.291***		
		(0.010)		
2017		0.273***		
		(0.010)		
2018		0.192***		
		(0.007)		
2019		0.201***		
		(0.009)		
2020		0.315***		
		(0.027)		
2021		0.160***		
		(0.007)		
P-value	0.000	0.000	0.000	0.000
N	189124	189124	141968	47156
N(clustered)	126967	126967	99205	40537
Pseudo R-squared	0.336	0.336	0.327	0.400

Source: LFS 2009-21.

Notes: Exponentiated coefficients. Standards errors are clustered at the individual level.

Table 7. Logit estimates (odds ratio) of SI coverage among irregular wage workers in the private sector, ages 15-64

	(1)	(2)	(3)	(4)
Has social security coverage	Irregular workers spec.1	Irregular workers spec.2	Irregular workers (excl. firm size)	Irregular workers outside establishments
Age (in years)	1.095*** (0.008)	1.095*** (0.008)	1.105*** (0.008)	1.143*** (0.014)
Age squared	0.999*** (0.000)	0.999*** (0.000)	0.999*** (0.000)	0.999*** (0.000)
Tenure (in years)	1.069*** (0.004)	1.069*** (0.004)	1.051*** (0.004)	1.043*** (0.006)
Tenure squared	0.999*** (0.000)	0.999*** (0.000)	0.999*** (0.000)	0.999*** (0.000)
Gender (Men omitted)				
Women	1.076 (0.046)	1.076 (0.046)	1.138** (0.045)	0.612** (0.106)
Marital status (currently unmarried omitted)				
Currently married	1.358*** (0.040)	1.358*** (0.040)	1.338*** (0.037)	1.218*** (0.059)
Education level (general secondary or below omitted)				
Technical secondary	1.308*** (0.031)	1.308*** (0.031)	1.433*** (0.032)	1.318*** (0.044)
Post-secondary & tertiary	1.864*** (0.069)	1.864*** (0.069)	2.381*** (0.080)	1.308*** (0.098)
	(0.024)	(0.024)		
Firm size (medium (25-49 workers)				
Out of establishment	0.308***	0.308***		
Micro (1-4 workers)	0.315*** (0.025)	0.315*** (0.025)		
Small (5-24 workers)	0.608*** (0.048)	0.608*** (0.048)		
Large (50+ workers)	2.688*** (0.210)	2.688*** (0.210)		
Not stated	1.744*** (0.128)	1.744*** (0.128)		
Occupation (legislators & senior officials omitted)				
Professionals	1.440** (0.176)	1.440** (0.176)	1.570*** (0.173)	3.414** (1.602)
Technicians and associate professionals	1.808*** (0.224)	1.808*** (0.224)	1.798*** (0.200)	0.913 (0.435)
Clerks	1.203 (0.158)	1.203 (0.158)	1.372** (0.159)	0.369 (0.344)
Service workers and shop and market sales workers	0.264*** (0.032)	0.264*** (0.032)	0.267*** (0.029)	0.541 (0.211)
Skilled agricultural and fishery workers	0.141*** (0.016)	0.141*** (0.016)	0.096*** (0.010)	0.297*** (0.082)
Crafts and related trade workers	0.353*** (0.043)	0.353*** (0.043)	0.205*** (0.023)	0.513 (0.181)

Table 7. Logit estimates (odds ratio) of SI coverage among irregular wage workers in the private sector, ages 15-64 (contd.)

Plant and machine operators and assemblers	2.921*** (0.339)	2.921*** (0.339)	1.803*** (0.189)	8.743*** (2.919)
Elementary occupations	0.335*** (0.040)	0.335*** (0.040)	0.379*** (0.041)	0.279*** (0.100)
Industry (agriculture omitted)				
Manufacturing	1.858*** (0.213)	1.858*** (0.213)	5.366*** (0.605)	0.955 (0.222)
Construction	0.639*** (0.075)	0.639*** (0.075)	0.731** (0.087)	0.759 (0.149)
Trade; transportation; accommodation & food services	4.937*** (0.535)	4.937*** (0.535)	4.956*** (0.549)	4.756*** (0.786)
Information & communication	2.785*** (0.407)	2.785*** (0.407)	4.405*** (0.623)	3.322 (2.570)
Finance & insurance	5.997*** (1.158)	5.997*** (1.158)	9.178*** (1.670)	3.866 (4.507)
Real estate; prof. sci. & technical services	3.685*** (0.446)	3.685*** (0.446)	4.530*** (0.554)	3.050*** (0.953)
Public admin & social services	2.155*** (0.267)	2.155*** (0.267)	3.293*** (0.407)	4.730* (3.021)
Other services	2.035*** (0.241)	2.035*** (0.241)	2.186*** (0.261)	1.929** (0.457)
Hours per week (1-14 hrs/week omitted)				
37-	0.791*** (0.026)	0.791*** (0.026)	0.832*** (0.025)	1.060 (0.052)
48-	0.921** (0.026)	0.921** (0.026)	0.978 (0.025)	1.414*** (0.061)
Region (Cairo omitted)				
Alexandria	1.346*** (0.074)	1.346*** (0.074)	1.238*** (0.064)	0.865 (0.065)
Lower Egypt (Delta)	0.897* (0.042)	0.897* (0.042)	0.816*** (0.036)	0.652*** (0.040)
Canal cities	0.897 (0.051)	0.897 (0.051)	0.943 (0.049)	0.372*** (0.029)
North Upper Egypt	0.876** (0.042)	0.876** (0.042)	0.814*** (0.036)	0.581*** (0.038)
Central Upper Egypt	0.940 (0.062)	0.940 (0.062)	0.843** (0.052)	0.493*** (0.040)
South Upper Egypt	1.013 (0.051)	1.013 (0.051)	0.957 (0.046)	0.594*** (0.041)
Urban/rural (rural omitted)				
Urban	0.983 (0.042)	0.983 (0.042)	1.003 (0.040)	0.560*** (0.036)
Region & urban/rural int.				
Alexandria X Urban	0.772*** (0.055)	0.772*** (0.055)	0.763*** (0.051)	1.297* (0.138)
Lower Egypt (Delta) X Urban	0.991 (0.068)	0.991 (0.068)	0.909 (0.059)	1.903*** (0.190)
Canal cities X Urban	1.749*** (0.133)	1.749*** (0.133)	1.533*** (0.106)	3.978*** (0.460)

Table 7. Logit estimates (odds ratio) of SI coverage among irregular wage workers in the private sector, ages 15-64 (contd.)

North Upper Egypt X Urban	1.353*** (0.100)	1.353*** (0.100)	1.240** (0.085)	2.656*** (0.305)
Central Upper Egypt X Urban	1.274* (0.132)	1.274* (0.132)	1.262* (0.121)	2.092*** (0.312)
South Upper Egypt X Urban	1.271** (0.096)	1.271** (0.096)	1.324*** (0.093)	2.168*** (0.251)
Yearly real min insurable wage (318 EGP in 2009 omitted)				
325 EGP (2010)	1.052 (0.048)		1.019 (0.044)	1.104 (0.074)
342 EGP (2011)	1.188*** (0.054)		1.094* (0.047)	1.039 (0.070)
346 EGP (2012)	1.393*** (0.063)		1.319*** (0.057)	1.209** (0.085)
355 EGP (2013)	0.872** (0.041)		0.895* (0.041)	0.799** (0.060)
380 EGP (2014)	1.229*** (0.060)		1.199*** (0.056)	1.496*** (0.114)
397 EGP (2015)	1.185** (0.066)		1.082 (0.057)	1.730*** (0.148)
690 EGP (2016)	0.758*** (0.040)		0.764*** (0.038)	0.776*** (0.059)
715 EGP (2017)	1.362*** (0.060)		1.515*** (0.064)	0.659*** (0.048)
754 EGP (2018)	0.744*** (0.040)		0.673*** (0.034)	0.907 (0.067)
863 EGP (2019)	0.645*** (0.037)		0.550*** (0.027)	0.671*** (0.051)
1052 EGP (2020)	0.854 (0.089)		0.826* (0.065)	0.847 (0.103)
1200 EGP (2021)	0.834*** (0.044)		0.736*** (0.035)	0.923 (0.066)

Table 7. Logit estimates (odds ratio) of SI coverage among irregular wage workers in the private sector, ages 15-64 (contd.)

Year of the survey (2009 omitted)				
2010		1.038		
		(0.059)		
2011		0.736***		
		(0.041)		
2012		1.175**		
		(0.063)		
2013		1.002		
		(0.054)		
2014		0.844**		
		(0.047)		
2015		0.888*		
		(0.048)		
2016		1.149**		
		(0.060)		
2017		0.639***		
		(0.038)		
2018		0.628***		
		(0.038)		
2019		0.544***		
		(0.035)		
2020		0.720**		
		(0.078)		
2021		0.704***		
		(0.043)		
P-value	0.000	0.000	0.000	0.000
N	220393	220393	226635	172996
N(clustered)	141778	141778	146983	118910
Pseudo R-squared	0.414	0.414	0.371	0.505

Source: LFS 2009-21.

Notes: Exponentiated coefficients. Standards errors are clustered at the individual level.

Table 8. Logit estimates (odds ratio) of SI coverage among non-wage wage workers in the private sector, ages 15-64

	(1) Non-wage workers spec.1	(2) Non-wage workers spec.2	(3) Employer s	(4) Self- employed	(5) Unpaid family workers
Has social security coverage					
Age (in years)	1.073*** (0.005)	1.073*** (0.005)	1.067*** (0.008)	1.066*** (0.008)	1.067*** (0.008)
Age squared	1.000*** (0.000)	1.000*** (0.000)	1.000*** (0.000)	1.000** (0.000)	1.000*** (0.000)
Tenure (in years)	1.041*** (0.002)	1.041*** (0.002)	1.076*** (0.004)	1.001 (0.003)	1.076*** (0.004)
Tenure squared	0.999*** (0.000)	0.999*** (0.000)	0.999*** (0.000)	1.000* (0.000)	0.999*** (0.000)
Gender (men omitted)					
Women	0.459*** (0.013)	0.459*** (0.013)	0.336*** (0.014)	0.698*** (0.034)	0.336*** (0.014)
Marital status (currently unmarried omitted)					
Currently married	1.145*** (0.026)	1.145*** (0.026)	1.165*** (0.036)	1.141*** (0.041)	1.165*** (0.036)
Employment (employer omitted)					
Self-employed	0.633*** (0.012)	0.633*** (0.012)			
Unpaid family member	0.233*** (0.009)	0.233*** (0.009)			
Education level (general secondary or below omitted)					
Technical secondary	1.324*** (0.020)	1.324*** (0.020)	1.310*** (0.027)	1.324*** (0.032)	1.310*** (0.027)
Post-secondary & tertiary	1.950*** (0.042)	1.950*** (0.042)	1.697*** (0.057)	2.074*** (0.063)	1.697*** (0.057)
Firm size (medium (25-49 workers)					
Out of establishment	0.064*** (0.010)	0.064*** (0.010)	0.112** (0.084)	0.076*** (0.012)	0.112** (0.084)
Micro (1-4 workers)	0.284*** (0.043)	0.284*** (0.043)	0.472 (0.356)	0.300*** (0.048)	0.472 (0.356)
Small (5-24 workers)	0.501*** (0.077)	0.501*** (0.077)	0.414 (0.315)	0.555*** (0.089)	0.414 (0.315)
Large (50+ workers)	0.686 (0.145)	0.686 (0.145)	0.406 (0.339)	0.769 (0.186)	0.406 (0.339)
Not stated	0.278*** (0.045)	0.278*** (0.045)	0.364 (0.277)	0.319*** (0.055)	0.364 (0.277)
Occupation (legislators & senior officials omitted)					
Professionals	2.793*** (0.134)	2.793*** (0.134)	4.520*** (0.368)	1.567*** (0.133)	4.520*** (0.368)
Technicians and associate professionals	0.859** (0.044)	0.859** (0.044)	0.822* (0.069)	1.111 (0.093)	0.822* (0.069)
Clerks	1.206 (0.197)	1.206 (0.197)	1.192 (0.254)	1.280 (0.613)	1.192 (0.254)
Service workers and shop and market sales workers	0.699*** (0.018)	0.699*** (0.018)	0.738*** (0.030)	0.631*** (0.031)	0.738*** (0.030)

Table 8. Logit estimates (odds ratio) of SI coverage among non-wage wage workers in the private sector, ages 15-64 (contd.)

Skilled agricultural and fishery workers	1.286*** (0.039)	1.286*** (0.039)	0.596*** (0.055)	1.049 (0.042)	0.596*** (0.055)
Craft and related trades workers	0.693*** (0.019)	0.693*** (0.019)	0.783*** (0.042)	0.677*** (0.026)	0.783*** (0.042)
Plant and machine operators and assemblers	12.253*** (0.418)	12.253*** (0.418)	11.408*** (0.559)	8.107*** (0.605)	11.408*** (0.559)
Elementary occupations	0.356*** (0.016)	0.356*** (0.016)	0.307*** (0.018)	0.444*** (0.044)	0.307*** (0.018)
Industry (agriculture omitted)					
Manufacturing	3.954*** (0.158)	3.954*** (0.158)	0.844 (0.078)	5.512*** (0.315)	0.844 (0.078)
Construction	3.117*** (0.126)	3.117*** (0.126)	0.611*** (0.058)	4.593*** (0.239)	0.611*** (0.058)
Trade; transportation; accommodation & food services	5.042*** (0.186)	5.042*** (0.186)	1.546*** (0.123)	5.891*** (0.325)	1.546*** (0.123)
Information & communication	3.907*** (0.447)	3.907*** (0.447)	0.996 (0.182)	5.010*** (0.852)	0.996 (0.182)
Finance & insurance	2.631** (0.809)	2.631** (0.809)	0.733 (0.345)	3.882** (1.757)	0.733 (0.345)
Real estate; prof. sci. & technical services	8.838*** (0.450)	8.838*** (0.450)	2.118*** (0.218)	11.608** (0.863)	2.118*** (0.218)
Public admin & social services	4.852*** (0.389)	4.852*** (0.389)	0.609** (0.098)	8.491*** (0.961)	0.609** (0.098)
Other services	3.705*** (0.169)	3.705*** (0.169)	1.061 (0.095)	4.527*** (0.335)	1.061 (0.095)
Hours per week (1-14 hrs/week omitted)					
37-	1.057* (0.023)	1.057* (0.023)	1.145*** (0.036)	0.854*** (0.029)	1.145*** (0.036)
48-	1.240*** (0.025)	1.240*** (0.025)	1.456*** (0.041)	0.914** (0.029)	1.456*** (0.041)
Region (Cairo omitted)					
Alexandria	1.129*** (0.038)	1.129*** (0.038)	1.231*** (0.057)	1.212*** (0.067)	1.231*** (0.057)
Lower Egypt (Delta)	0.940* (0.027)	0.940* (0.027)	0.898** (0.033)	1.065 (0.053)	0.898** (0.033)
Canal cities	0.659*** (0.024)	0.659*** (0.024)	0.813*** (0.040)	0.587*** (0.035)	0.813*** (0.040)
North Upper Egypt	0.768*** (0.025)	0.768*** (0.025)	1.026 (0.043)	0.633*** (0.035)	1.026 (0.043)
Central Upper Egypt	1.150** (0.055)	1.150** (0.055)	1.095 (0.071)	1.341*** (0.099)	1.095 (0.071)
South Upper Egypt	1.097* (0.040)	1.097* (0.040)	0.952 (0.043)	1.348*** (0.082)	0.952 (0.043)
Urban/rural (rural omitted)					
Urban	0.770*** (0.023)	0.770*** (0.023)	0.737*** (0.028)	0.878* (0.045)	0.737*** (0.028)
Region & urban/rural int.					
Alexandria X Urban	1.767*** (0.077)	1.767*** (0.077)	1.464*** (0.088)	1.849*** (0.127)	1.464*** (0.088)
Lower Egypt (Delta) X Urban	1.628*** (0.064)	1.628*** (0.064)	1.576*** (0.085)	1.526*** (0.094)	1.576*** (0.085)

Table 8. Logit estimates (odds ratio) of SI coverage among non-wage wage workers in the private sector, ages 15-64 (contd.)

Canal cities X Urban	2.256*** (0.111)	2.256*** (0.111)	2.180*** (0.148)	2.082*** (0.156)	2.180*** (0.148)
North Upper Egypt X Urban	1.964*** (0.095)	1.964*** (0.095)	1.455*** (0.100)	2.389*** (0.174)	1.455*** (0.100)
Central Upper Egypt X Urban	2.134*** (0.157)	2.134*** (0.157)	2.097*** (0.213)	2.063*** (0.230)	2.097*** (0.213)
South Upper Egypt X Urban	1.823*** (0.097)	1.823*** (0.097)	2.168*** (0.150)	1.426*** (0.124)	2.168*** (0.150)
Yearly real min insurable wage (337 EGP in 2009 omitted)					
325 EGP (2010)	0.861*** (0.024)		0.901** (0.034)	0.806*** (0.033)	0.901** (0.034)
342 EGP (2011)	1.110*** (0.030)		1.132*** (0.042)	1.104* (0.046)	1.132*** (0.042)
346 EGP (2012)	1.245*** (0.033)		1.135** (0.047)	1.391*** (0.053)	1.135** (0.047)
355 EGP (2013)	1.124*** (0.031)		1.042 (0.043)	1.294*** (0.054)	1.042 (0.043)
380 EGP (2014)	1.439*** (0.041)		1.399*** (0.059)	1.632*** (0.070)	1.399*** (0.059)
397 EGP (2015)	2.131*** (0.061)		1.892*** (0.083)	2.582*** (0.112)	1.892*** (0.083)
690 EGP (2016)	0.673*** (0.020)		0.761*** (0.032)	0.576*** (0.027)	0.761*** (0.032)
715 EGP (2017)	0.578*** (0.017)		0.647*** (0.026)	0.515*** (0.023)	0.647*** (0.026)
754 EGP (2018)	0.469*** (0.015)		0.536*** (0.024)	0.399*** (0.019)	0.536*** (0.024)
863 EGP (2019)	0.502*** (0.020)		0.713*** (0.035)	0.230*** (0.018)	0.713*** (0.035)
1052 EGP (2020)	0.494*** (0.039)		0.590*** (0.053)	0.262*** (0.052)	0.590*** (0.053)
1200 EGP (2021)	0.624*** (0.024)		0.642*** (0.028)	0.537*** (0.053)	0.642*** (0.028)

Table 8. Logit estimates (odds ratio) of SI coverage among non-wage wage workers in the private sector, ages 15-64 (contd.)

Year of the survey (2009 omitted)						
2010			0.675***			
			(0.019)			
2011			0.527***			
			(0.015)			
2012			0.584***			
			(0.016)			
2013			0.521***			
			(0.015)			
2014			0.469***			
			(0.013)			
2015			0.404***			
			(0.012)			
2016			0.271***			
			(0.008)			
2017			0.316***			
			(0.010)			
2018			0.220***			
			(0.007)			
2019			0.235***			
			(0.010)			
2020			0.232***			
			(0.018)			
2021			0.293***			
			(0.011)			
P-value			0.000	0.000	0.000	0.000
N	382861	382861	139449	131776	139449	
N(clustered)	174829	174829	105514	96071	105514	
Pseudo R-squared						

Source: LFS 2009-21.

Notes: Exponentiated coefficients. Standards errors are clustered at the individual level.

Appendix

Appendix Table 1. Robustness checks with interactions with time effects

	(1)	(2)	(3)
	All workers	Regular wage workers	Regular wage workers
Has social security coverage			
Age (in years)	1.090*** (0.003)	1.110*** (0.006)	1.111*** (0.006)
Age squared	0.999*** (0.000)	0.999*** (0.000)	0.999*** (0.000)
Tenure (in years)	1.067*** (0.002)	1.084*** (0.003)	1.084*** (0.003)
Tenure squared	0.999*** (0.000)	0.998*** (0.000)	0.998*** (0.000)
Gender (men omitted)			
Women	0.623*** (0.011)	0.845*** (0.023)	0.870*** (0.024)
Marital status (currently unmarried omitted)			
Currently married	1.324*** (0.018)	1.267*** (0.025)	1.266*** (0.025)
Education level (general secondary or below omitted)			
Technical secondary	1.475*** (0.015)	1.558*** (0.025)	1.561*** (0.025)
Post-secondary & tertiary	2.096*** (0.030)	1.873*** (0.045)	1.846*** (0.045)
Firm size (outside of establishment omitted)			
Out of establishment	0.141*** (0.005)	0.248*** (0.010)	0.245*** (0.010)
Micro (1-4 workers)	0.292*** (0.009)	0.201*** (0.008)	0.201*** (0.008)
Small (5-24 workers)	0.451*** (0.015)	0.402*** (0.015)	0.404*** (0.015)
Large (50+ workers)	2.464*** (0.083)	2.314*** (0.089)	2.309*** (0.089)
Not stated	1.183*** (0.037)	1.121** (0.040)	1.129*** (0.041)
Occupation (legislators & senior officials omitted)			
Professionals	1.884*** (0.050)	0.957 (0.057)	0.955 (0.057)
Technicians and associate professionals	1.499*** (0.041)	0.883* (0.055)	0.878* (0.055)
Clerks	1.569*** (0.051)	0.828** (0.051)	0.827** (0.052)
Service workers and shop and market sales workers	0.376*** (0.008)	0.210*** (0.012)	0.212*** (0.013)
Skilled agricultural and fishery workers	0.733*** (0.022)	0.201*** (0.018)	0.202*** (0.018)
Craft and related trades workers	0.512*** (0.011)	0.257*** (0.015)	0.257*** (0.015)
Plant and machine operators and assemblers	4.127*** (0.098)	1.091 (0.064)	1.091 (0.065)
Elementary occupations	0.418*** (0.010)	0.353*** (0.021)	0.355*** (0.021)

Appendix Table 1. Robustness checks with interactions with time effects (contd.)

Industry (agriculture omitted)			
Manufacturing	4.309*** (0.126)	2.024*** (0.128)	2.006*** (0.127)
Construction	2.582*** (0.073)	1.253*** (0.083)	1.230** (0.082)
Trade; transportation; accommodation & food services	7.968*** (0.210)	2.935*** (0.184)	2.885*** (0.182)
Information & communication	6.683*** (0.338)	2.782*** (0.236)	2.759*** (0.236)
Finance & insurance	15.729*** (1.269)	6.369*** (0.737)	6.112*** (0.704)
Real estate; prof. sci. & technical services	8.396*** (0.282)	2.864*** (0.198)	2.840*** (0.197)
Public admin & social services	7.297*** (0.270)	3.085*** (0.215)	3.142*** (0.221)
Other services	4.370*** (0.141)	1.372*** (0.093)	1.365*** (0.093)
Hours per week (1-14 hrs/week omitted)			
37-	0.958** (0.014)	0.858*** (0.023)	0.854*** (0.023)
48-	1.095*** (0.014)	0.921*** (0.022)	0.917*** (0.022)
Region (Cairo omitted)			
Alexandria	1.171*** (0.027)	1.317*** (0.057)	1.321*** (0.058)
Lower Egypt (Delta)	0.862*** (0.016)	0.806*** (0.022)	0.810*** (0.022)
Canal cities	0.821*** (0.019)	1.024 (0.036)	1.022 (0.036)
North Upper Egypt	0.802*** (0.017)	0.971 (0.038)	0.983 (0.039)
Central Upper Egypt	1.078* (0.034)	1.636*** (0.100)	1.684*** (0.104)
South Upper Egypt	1.032 (0.024)	1.248*** (0.061)	1.238*** (0.062)
Urban/rural (rural omitted)			
Urban	0.880*** (0.016)	0.964 (0.024)	0.963 (0.025)
Region & urban/rural int.			
Alexandria X Urban	1.281*** (0.036)	1.122* (0.055)	1.131* (0.057)
Lower Egypt (Delta) X Urban	1.202*** (0.031)	0.944 (0.037)	0.935 (0.037)
Canal cities X Urban	1.829*** (0.057)	1.489*** (0.069)	1.498*** (0.071)
North Upper Egypt X Urban	1.593*** (0.052)	1.223** (0.078)	1.220** (0.079)
Central Upper Egypt X Urban	1.476*** (0.072)	0.833 (0.080)	0.827 (0.081)
South Upper Egypt X Urban	1.648*** (0.057)	1.597*** (0.106)	1.620*** (0.110)

Appendix Table 1. Robustness checks with interactions with time effects (contd.)

Employment (regular employee omitted)			
Irregular wage worker	0.323***		
	(0.016)		
Employer	2.226***		
	(0.081)		
Self-employed	0.871***		
	(0.035)		
Unpaid family member	0.560***		
	(0.039)		
Monthly wage quintiles (third quintile omitted)			
First wage quintile	0.376***		0.596***
	(0.026)		(0.019)
Second wage quintile	0.634***		0.785***
	(0.032)		(0.018)
Fourth wage quintile	1.394***		1.188***
	(0.092)		(0.028)
Fifth wage quintile	1.508***		1.228***
	(0.150)		(0.040)
Ratio of insurable wage to monthly wage (%)			0.986***
			(0.003)
Year	Yes	No	Yes
Year & employment status int.	Yes	No	No
Year and ratio of insurable wage to monthly wage int.	No	No	Yes
Yearly min. insurable wage	No	Yes	No
Wage quintile & yearly min. insurable wage int.	No	Yes	No
P-value	0.000	0.000	0.000
N	792544	189124	184250
N(clustered)	304636	126967	125380
Pseudo R-squared	0.425	0.337	0.337

Source: LFS 2009-21.

Notes: Exponentiated coefficients. Standards errors are clustered at the individual level.