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Do Egyptian Trade Unions Have Any Bargaining Power?

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Abstract

I contribute to the study of wage determination in the MENA region by studying the union wage gap in Egypt, a country where union activity has been highly controlled and centralized since independence. Despite reports of a dysfunctional union landscape, our findings point to a positive and significant union wage gap, comprised between 0.05 and 0.2 log-wages and robust to several alternative specifications. The data does not allow us to reject the null hypothesis of an identical gap between the public and private sectors, and shows positive wage gaps across educational levels, firm sizes and economic activities. Given the centralized and regime-controlled character of labor's organization in Egypt as documented by the broader social sciences, this finding comes as a surprise. Investigating other frequent outcomes of union activity in the second part of the paper, I find no links neither between unionization and compressed wage distributions at the sectoral level, nor between unionization levels and decreasing profits at the firm level. The positive union wage gap is thus unlikely to stem from traditional union activity per se, and suggests careful interpretation of union wage gaps in settings where labor organization is restricted.

Keywords: trade unions, wage setting, bargaining power, Egypt.
JEL: J31,J51,J52

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1 Introduction

In the Arab world, unions have been driving forces behind a desire for a new social contract. As such, unions were tightly linked to the Arab spring movements in Tunisia and Egypt, and are a supporting actor in Algeria's *hirak* movement. At the same time, the absence of political pluralism in many of the region's countries has also implied state repression of labor movements, varying over time and modes of governance (Cammett and Posusney 2010). Historically, and across the globe, trade unions have been paramount in establishing worker rights, decent working conditions, pay and benefits, and the economics literature relying on data from Europe and North America has established that unions give voice to workers and improve pay, yet may also constitute a monopoly reducing overall market efficiency.

In a landmark book, Freeman and Medoff (1984) draw several important conclusions on the role of unions: the union wage premium exists; its magnitude varies across markets, people and time periods; those variations are related to union monopoly power and market product power; and finally, the social cost of union monopoly power is modest. Blanchflower and Bryson (2004), revisiting these questions with new data twenty years later, find no reason to cast doubt on Freeman and Medoff's conclusions, and also find evidence of important union wage gaps for the public sector. In a chapter of the handbook of development economics, Freeman (2010) summarizes what is known about the impact of labor market regulations in developing countries, showing that unions and collective bargaining are less important in developing countries than in developed countries, but that they do affect both wage and nonwage outcomes. Most of the evidence gathered by Freeman comes from Latin American and African labor markets, and although the Latin American studies all find a positive union wage gap, three out of six African studies found that unions were associated with lower pay, casting doubt on the nature of unions in these economies. In Freeman's review, no evidence from MENA countries is presented, however. In general, few papers have attempted to understand wage setting mechanisms in the region, and this paper is an attempt to bridge this gap. Furthermore, a spark in the interest in inequalities at the global level has prompted research into the links between unionization and inequality, asking whether falling union membership rates can explain increasing wage inequality (Card, Lemieux,

and Riddell 2004; Kollmeyer 2018; Farber et al. 2021). It is in this regard important to distinguish the effect of unions on the overall wage distribution, which may not hold up in segmented labor markets, from the effect on the intra-sectoral or firm-level wage distribution (Ahlquist 2017)

In the following pages, I carefully examine the role of unions in improving workers' outcomes in Egypt, focusing on wages. A country with a fairly long history of unionism, it has nevertheless seen frequent attempts to clamp down on union membership, and has seen union membership decrease in recent years. Most recently, in 2018, independent unions were dismantled and required to re-register, leading to a sharp decrease in the number of recognized unions. The Egyptian case thus also enables a reflection on the role of unions in authoritarian regimes: the International Trade Union Confederation's 2020 report quotes Egypt as one of the ten worst countries for workers (ITUC, 2020), and the MENA region in general as the worst region for workers. Except for countries in conflict, Algeria, Egypt and the Gulf countries are singled out as particularly lacking worker rights. Furthermore, in Egypt, union activity has since independence been characterized by centralization. All collective bargaining agreements occurred at the national level, and were controlled by the State. This is not always the case in the region: Cammett and Posusney (2010) distinguish non-oil monarchies from non-oil one-party states: in Morocco and Jordan, for example, greater tolerance for pluralism was ensured through monarchies positioning themselves above political decisions (while maintaining ultimate authority over key decisions), and this implied a more dynamic union landscape than in non-oil one-party states. In oil-rich monarchies, unions were and remain virtually non-existant.[1]

The rationale of unions relies on firm rent capturing, without which union presence would be irrational, and a sizable literature has well documented a positive wage effect of union membership in (mostly) developed countries (Jarrell and Stanley 1990), but evidence is also suggestive of positive wage premia in developing countries (Free-

[1]The issue of trade unionism in these countries is tightly linked to foreign labour, which constitutes a large proportion of working population. As such, in Qatar and Saudi Arabia, for example, nationals are able to join unions. Bahrain is one of the few countries in the group to extend the right to join unions to foreign workers (Depierrefeu 2016).

man 2010), despite structurally different labor markets and institutions. The capacity of unions to further the interests of workers depends on their bargaining power, itself related both to the political space within which they operate, but also to the nature of markets. On the one hand, there are grounds to believe that developing countries are more prone to market imperfections than developed economies, with on average worse business environments and more frictions and barriers to entry into markets. This would favor the establishment and aggressiveness of unions. On the other hand, large informal sectors, largely void of frictions, segment markets in a way that is largely unknown to developed countries and which may impede the ability to organize workers efficiently. In the end, of course, the political environment within which workers exert their rights may completely determine the possibilities for union activity. In Egypt, much as in other countries of the region, post-independence has been characterized by authoritarian regimes clinging to power for decades, without free elections. The capacity for unions to effectively advance the cause of workers under such regimes remains an open question.

Despite a presence of unions in Egypt dating back to WWI, and their important role as a sociopolitical actor in recent times, few (if any) studies have attempted to investigate quantitatively their role in shaping worker outcomes in the country, or even in the wider region. The findings in this paper point to a positive and significant union wage gap in Egypt, comprised between 0.05 and 0.2 log-wages and robust to several alternative specifications. Furthermore, the data does not allow us to reject the null hypothesis of an identical gap between the public and private sectors, and positive and significant union wage gaps are found across educational levels, industries and firm sizes. Given the centralized and regime-controlled character of labor's organization in Egypt, as documented by the broader social sciences, a wage gap resulting from effective union operations extracting rents from employers is surprising. In a second part of the paper, I therefore analyze the links between unionization and compressed wage distributions at the sectoral level on the one hand, and unionization levels and decreasing profits at the firm level on the other hand. There is no evidence of either. I therefore conjecture that unions are associated with better jobs, but that this is a mere correlation. This result may call into question the interpretation of union wage gaps in other, similar, contexts.

The following section describes the data used, and draws a portrait of union activity in recent times in Egypt using microdata and secondary sources. Section 3 discusses methodological issues in measuring the union wage gap, and implements an analysis of union wage gaps in Egypt. Section 4 analyzes the links between income distributions and unionization rates at the sectoral and occupational levels. Section 5 discusses the overall findings and the plausibility of union bargaining power, relying on evidence from firm-level data. The last section concludes.

2 Unionism in modern Egypt

2.1 State of the Union: from post-independence to post-revolution

In the decades running up to Independence, as anticolonialist movements gained momentum in the MENA region workers were simultaneously creating the premise for representation in order to achieve decent working condition and wages. Trade union membership grew rapidly, to the extent that by 1960, Egypt had some 500 000 members of trade unions and had ratified 30 international labor conventions (World Bank 2004). Gamal Abd al-Nasser in 1957 created the Egyptian Trade Union Federation (ETUF), which functioned as the sole legal representative of Egyptian workers (Schmidinger 2013). According to Beinin (2009b), the Egyptian Trade Union Federation was since its foundation merely an extension of the regime, and the absence of direct elections to its committees and its hierarchical organization implied that local union chapters were constrained in their ability to carry out actions. For example, according to the 1976 Trade Union Law, strikes must be approved by 2/3 of the executive committee of the national-level sector union, and all local union committees need to belong to the national-level sector union (Beinin 2009b).

Although the ETUF may have been a means of ensuring State control over worker rights, this does not mean that all members were positive to ETUF's structure, nor that no other organization occurred. Following liberalization policies in the 1980s, which deteriorated workers' conditions, workers slowly started to reorganize (Schmidinger 2013). In 1990, the Center for Trade Union and Workers' Service (CTUWS) was founded, intended as an NGO supporting workers without formally being a union. As

the new millennium began, strikes and worker actions became more and more commonplace. Beinin (2009a) states that while from 1998 to 2003 an average 118 collective actions took place in the country a year, they numbered 614 in 2007 and 608 in 2008. This escalation continued up until 2012, when 2 239 collective actions were counted, but faded after the 2013 military coup.[2] Originating in the textile industry, collective actions spread to involve nearly all industrial sectors, and even public services, extending to doctors, pharmacists and university professors (Beinin 2009b). Response to collective actions by the Mobarak regime was sometimes violent, and prompted the creation of associations (often through social networks) that would ultimately become protagonists of the revolution, such as "The 6th of April", a Facebook group prominent in the events leading up to and during the January 2011 revolution.

Against the backdrop of grassroots unionism, whether performed within or outside of local ETUF committees, a few independent trade unions established themselves in the last years of the Mobarak regime. In 2009, the government recognized the Independent General Union of Real Estate Tax Authority Workers, the first union not affiliated with ETUF (Beinin 2009b). This was a second success for municipal tax collectors, who in December 2007 had gone on a 10-day strike to achieve wage parity with tax collectors employed directly by the Ministry of Finance (Beinin 2009b). An independent teachers' union was established in 2010, and on January 30, 2011, together with a retired workers' union and a health professionals union, they formed the Egyptian Federation of Independent Trade Unions (EFITU). By September, 2011, 130 independent unions had been formed, although only 24 of which adhered to EFITU (Schmidinger 2013), and in January 2013, their number surpassed 1000, mostly affiliated either with the EFITU, or the Egyptian Democratic Labor Congress (EDLC) formed as an alternative to the EFITU. Labor protests also continued growing since the revolution, and anecdotal evidence suggests that some of the post-revolution collective organizations actually succeeded in overturning governmental policy, such as when in January, 2016 civil servants obtained the rejection by the parliament of a new civil service law (Abdalla and Wolff 2016). Although the formation of new strong unions cannot be discarded as insignificant, most blue-collar workers remain organized under the ETUF umbrella. This

[2]https://www.jacobinmag.com/2020/05/arab-spring-workers-struggle-democracy-unions

is since ETUF holds a monopoly on the social security funds providing pensions and other benefits to union members, the contributions to which are included in membership fees which are often automatically deducted from pay (Abdalla and Wolff 2016).

Although the union landscape has changed dramatically since the revolution, ETUF remains a major actor. According to Abdalla and Wolff (2016), ETUF in 2016 claimed to represent some 3.8 million workers, while EDLC claims 886000 members. EFITU claims to represent 2.4 million workers, although this number is contested by the authors.[3] Furthermore, the extent to which simultaneous membership interferes with the capacity of independent unions to operate is unknown. What is known, however, is that many workers joining new unions stayed on as members of the ETUF unions, given its monopoly on social transfers. A last piece of evidence suggesting that new unionism in Egypt did indeed have the potential for societal change is the law on Trade Unions passed in December, 2017, effectively reestablishing the ETUF as the sole workers' organization allowed to operate.[4] The law, intended to decentralize union activity, led to the dissolution of independent unions in March 2018, with a requirement to re-register within 60 days. By May, only 122 of an approximate 1000 independent unions had been recognized by the government. The law was amended in 2019, lowering the numbers of required members for a union to achieve recognition from 150 to 50, but workers' right groups claim that little has actually changed on the ground and that spurious refusals and interference in union elections were commonplace.

2.2 Collective bargaining by law and in practice

Up until the revolution, Law No. 213 from 1976 governed matters of trade union activity. This was the law which formally recognized the European Trade Union Federation as the sole legal representative of Egyptian workers. The law formally established 21 general unions, with an additional three added between the promulgation of the law and 2011. Independent unions were disallowed and worker-employer conflict were dealt

[3]Much more conservative figures are given by the Danish Trade Union Development Agency, mentioning 300,000 EFITU members and 120,000 EDLC members.

[4]NATLEX, ILO.

with within ETUF's federative structure. Over the period, and since the 1950s, there was thus no place in law for collective bargaining at the enterprise level and all labor agreements were centralized and supervised by the ETUF (Beinin 2012). The National Wages Concil, set up to monitor wages, would intervene when the situation became too critical in a sector. Furthermore, although the law officially did not allow for collective bargaining in the public sector, evidence suggest it has been a common practice (DTUDA 2020). Under this regime, a collective bargaining agreement required three actors: the union (affiliated with the ETUF), the business owners, and the Ministry of Manpower and Migration (MoMM). It furthermore required the signature of the representatives of the general labour union. The absence of a bottom-up process meant that in most cases, organized workers resorted to strikes rather than attempting to install centralized wage bargaining.

Since the revolution, things have changed a bit. Initially allowing independent unions through a loophole in the law, the labor law of 2017, in effect since 2018, required independent unions to re-register, but also opened up for the possibility of signing collective bargaining agreements at the trade committee level (workplace). A supreme council for community dialogue was also set up in 2018, composed of 24 members from the ministry, business owners and trade union directors. The body is aimed at overseeing national labor relations and promoting social dialogue. Alike the National Wages Council, which was effectively inactive between 2013 and 2019, the supreme council for community dialogue does not seem very active, apart from setting the minimum wage in the private sector and validating the 2019 labour law amendment (DTUDA 2020). The extent to which the new dispositions of the law have translated into more wage increases, let alone collective bargaining agreements, and their geographical scope, remains an unanswered question at the moment. The Danish Trade Union Development Agency has however identified local collective bargaining agreements from four regions, covering some 73 300 workers.

2.3 Data

The main data used are drawn from the Egyptian Labor Market Panel Survey, a longitudinal dataset featuring data collected in 1998, 2006, 2012 and 2018. A distinctly cross-sectional round—separated from the panel—was carried out in 1988, but is not part of the panel sample. The data was collected by the Economic Research Forum (ERF) in collaboration with the Central Agency for Public Mobilization and Statistics (CAPMAS).[5] The survey collects data on a wide range of topics, such as education, housing, job history, migration, fertility, etc. Being a panel survey, the survey tracks households (and split-offs therefrom) at every survey. Each round also adds a refresher sample to maintain the representativeness of the sample, and to focus on particular phenomena of interest. With regards to union membership, the individual questionnaire contains a question of whether or not individuals are members of a trade union (*rabita*). While this question remains the same across waves, related questions have changed slightly across waves. In the most recent wave, for individuals declaring not being members of a union, the question of whether or not other individuals at their workplace are members is asked, proxying for union presence in the workplace. In the 2012 wave, a question on the precise nature of the union is included. In the first two waves, neither of the two questions are available.

The annual labor force survey (also run as a collaboration between ERF and CAPMAS) is also a good asset to study the impact of unions in Egypt. While the surveys, based on larger samples than ELMPS and spanning 2005 - 2019, do contain a question on union membership which would allow for union coverage rates with higher precision at the sectoral level, this question is censored in all rounds of the publicly available data except 2010 and 2011. I thus use those two years as an alternative data source for estimating the union wage gap. Another source of information on trade union activity in Egypt is available from the ILO, and in particular the NORMLEX database, which keeps tabs of negotiations between the government, worker representatives and ILO surrounding the compliance of Egyptian law with international labor conventions, and the practical enforcement (or lack thereof) of labor laws. In the last part of the paper, I also draw on evidence from the World Bank enterprise surveys from 2004 and 2007 to

[5] See (Krafft, Assaad, and Rahman 2019) for a description of the last round of the survey.

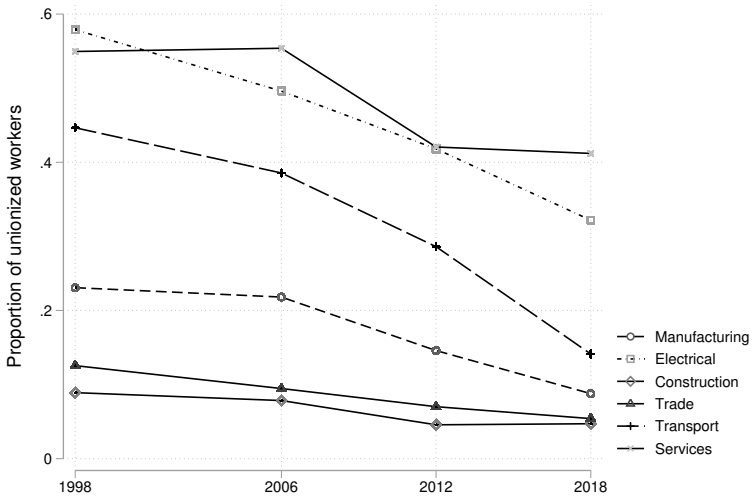


Figure 1: Sectoral unionization rate (selected industries, ELMPS 98-18)

ask whether or not unionization is correlated with the profit share.

Figure 1 shows the proportion of wage earners (15 years or older) who are union members, by sector. It suggests that unions have become less pervasive in Egypt since 1998, although decline varies significantly from sector to sector. The transport sector has seen continuous decline over all panel rounds, while manufacturing saw a sharp drop between 2006 and 2012, but small changes over the other periods. Figure 2 shows the evolution of the coverage rate by institutional status. It shows that government and public enterprises have significantly higher coverage rates than the formal private sector, although rates have been falling for each. Unsurprisingly, irregular wage employment and informal private employment see negligible but positive union coverage rates. The fact that these are non-nil is probably reflecting employment categorization errors, errors in the union variable, or a combination of both.

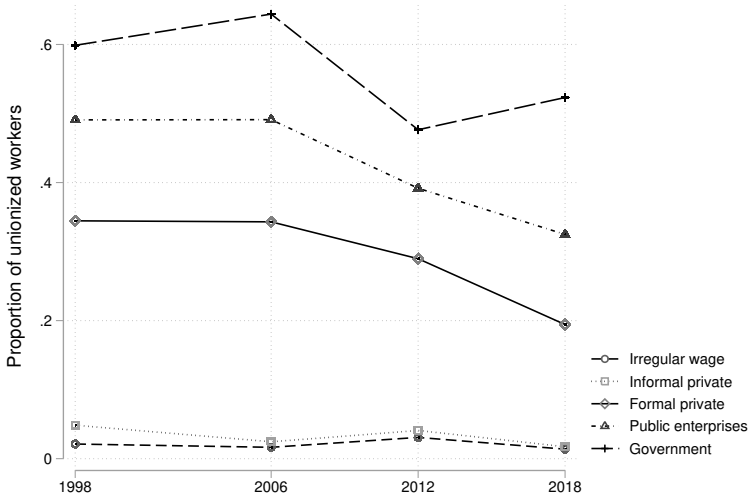


Figure 2: Unionization rate by employment status (ELMPS 98-18)

3 The union wage gap: a reality in Egypt?

3.1 Identification issues

Although a sizable literature on the union wage gap exists, in particular using data from the U.S. and Europe, evaluating the effect of union membership on wages and other job benefits has been—and still is—an intricate matter. At least four difficulties can be thought of. The first one concerns the endogeneity of union existence at the industry level. It is well known that unions historically arose to protect workers in contexts of unfair and hard working conditions. In other words, the existence of bad working conditions precedes that of unions, and it is likely that within an economy and at a given time period, unions develop to a larger extent in those sectors where workers have the worst working conditions. An OLS regression of union presence in a sector on wages or working conditions is thus likely to exhibit downward bias on the coefficient of union presence. A real-world example of this threat is the fact that union activity in Egypt in the 1980s and 1990s had its center of gravity in the textile industry (Schmidinger 2013), an industry known for its poor working conditions (Hammam 1979). Similarly, endogeneity can occur at the individual level. Not all members of a workplace choose to join unions, and those who do may not constitute a random sample of workers in

the workplace. Workers indeed have different incentives to increase union power in workplaces. Freeman and Medoff (1984) found that unions tend to decrease inequality in the workplace, and Johnson and Youmans (1971) had already found that unions raised the wages of less skilled workers more than those of more skilled workers. This suggests that relatively low-skilled, untalented or discriminated-against workers would be more likely to join unions. This would again result in downward bias on the coefficient of union membership. Selection however also occurs on the employer's side. If union jobs are rationed, queues build up for such jobs, and employers have a say in the employees they choose to hire. Interested in productivity, they are likely to hire high-productivity individuals (who are also those least likely to be interested in joining unions in the first place). This creates a positive bias on the union coefficient, and the total bias associated with union coverage thus depends on the relative size of the two effects (Blanchflower and Bryson 2010). Solutions to these selection problems have included estimating unions and wages simultaneously, adding a source of plausibly exogenous variation for union membership (Booth, Francesconi, and Zoega 2003), or exploiting within-individual variation in union membership in a panel setting (Card 1996). The difficulty of solving the endogeneity problem prompted Freeman and Medoff (1981) to consider OLS, showing less instability in its results, as a more stable and higher value measure than panel estimates which may be more prone to measurement error. Robinson (1989) however showed consistency among the evidence from alternative estimators, arguing that Freeman and Medoff's conclusion may be unjustified.

Another source of bias in estimating the impact of unions is the "threat effect". This effect refers to the idea that employers, viewing union formation in their workplaces as a potential threat to their profits, provide minimally acceptable wages and working conditions to avoid being targeted by unions. To assess the extent of such spillover effects, several methods have been employed. Freeman and Medoff (1981) regress nonunion wages on the sectoral union coverage rate, finding no evidence of a threat effect. Bronars and Deere (1994) analyze the equity value of firms in narrowly defined (4-digit) industries and examine what happens to the value of share prices in the industry when one firm submits a petition to the National Labor Relations Board. They find that while the petitioning firm experiences a loss of -1.04 percent during the petition month, rival firms in the same narrow industry experience losses of -0.74 percent

during the same month, suggesting substantial spillover effects. Using panel data, Neumark and Wachter (1995) distinguish the threat effect from a "crowding effect", where the non-union segment acts competitively. In this model, higher unionization implies layoffs in the unionized segment of the market, leading to increased supply and falling wages in the non-unionized segment. The two effects have contradictory outcomes, the first one reducing the union wage gap, and the second one reinforcing it. Assuming that unobservable characteristics of industries remain fixed over time, and using data from the Current Population Survey (1983-1989) they identify a negative and significant net effect of coverage rates on non-union wages, suggesting that the crowding mechanisms outweighs the threat mechanism.

Although not directly related to identification, the Egyptian case presents a supplemental difficulty in interpreting the union wage gap. As described in section 2, the idea that unions acted in the pure interest of workers during Egypt's autocratic regimes is highly doubtful. The monopoly on union activity held by the Egyptian Trade Union Federation, the presence of regime candidates in most higher instances of decision (Abdalla and Wolff 2016), as well as the refusal to support the 2011 revolution (Schmidinger 2013) casts doubts on the possibility and desire of officially recognized trade unions to act in the interest of workers prior to the revolution. The emergence of a handful of independent unions in the 1990s, and their multiplication and recognition during and after the revolution would provide an interesting point of comparison, had the type of union individuals are associated with been identifiable. Unfortunately, this is not the case in the ELMPS data. For 2012, it is possible to know the type of union individuals are affiliated with (specifically, whether its inside or outside the workplace), but not whether it is affiliated with the EUTF or not. However, if we assume that free unions do a better job at improving working conditions than EUTF unions, then the increase in free unions could in principle lead to a stronger wage effect on average. In other words, an individual joining a union or finding a unionized job after the revolution should see a larger wage gain than before the revolution.

3.2 Empirical specifications and results for the union wage gap

As an initial specification, and to achieve comparability with a strain of the literature, I run an OLS regression on each round of the panel, with union membership as the variable of interest. The dependent variable is the logarithm of the monthly wage, and a vector of both time-invariant and time-variant supplementary variables, including industry and employment type dummmies, are included as independent variables. The samples correspond to men and women in formal jobs (i.e. with a written contract), aged 18 to 55.

$$w_i = \alpha + \beta U_i + \gamma X_i + \epsilon_i \tag{1}$$

Following a broad earlier literature attempting to mitigate bias in the union gap as measured by OLS, I then rely on a panel regression with individual fixed effects to identify the union wage gap.

$$w_{i,t} = \alpha + \beta U_{i,t} + \gamma X_{i,t} + \delta_i + \phi_t + \epsilon_{i,t} \tag{2}$$

Apart from analyzing the effect of union membership on wages in itself, I also aim to test the hypothesis that unions emerged as more potent actors after the 2011 revolution. If verified, applying the above specification to time pairs 1998-2006, 2006-2012 and 2012-2018 should see β increase in value (or decrease if negative). I focus on the population of wage earners in formal jobs aged 18 - 55 in the first round of the two rounds, in order to capture a working-age population.

Table 1 shows the results from OLS regressions on each round of the panel (equation 1), controlling for sector of activity, governorate, occupation category, employment status and a set of socio-demographic variables. I also control for firm size, although in rounds 1998 and 2006 the question on firm size was only asked a subset of the sample.[6]

[6] In 1998 and 2006, only Private sector workers were asked about firm size.

Table 1: Union wage gap, ELMPS (four rounds) and LFS (two rounds)

	ELMPS				LFS	
	1998	2006	2012	2018	2010	2011
	(1)	(2)	(3)	(4)	(5)	(6)
Union member	0.12257***	0.17413***	0.14075***	0.11603***	0.09978***	0.11490***
	(0.023)	(0.019)	(0.020)	(0.022)	(0.006)	(0.006)
Age	0.02007*	0.00916	0.01047	-0.02246*	0.01964***	0.00224
	(0.009)	(0.008)	(0.009)	(0.009)	(0.002)	(0.003)
Age-squared	0.000076	0.00016	0.000079	0.00042***	-0.000057*	0.000054
	(0.00012)	(0.00010)	(0.00012)	(0.00011)	(0.000031)	(0.000036)
Female	-0.10142***	-0.15944***	-0.18148***	-0.18701***	-0.15240***	-0.08176***
	(0.021)	(0.020)	(0.022)	(0.024)	(0.006)	(0.007)
Education level: *Ref: illiterate*						
—Read & Write	0.06449	0.17777***	0.07578	0.05724	0.04084**	-0.00061
	(0.057)	(0.053)	(0.067)	(0.075)	(0.015)	(0.018)
—Less than intermediate	0.16424**	0.18825***	0.17548***	0.14429*	0.09033***	0.04405**
	(0.052)	(0.045)	(0.047)	(0.062)	(0.014)	(0.017)
—Intermediate	0.29468***	0.36457***	0.27478***	0.22027***	0.19172***	0.07362***
	(0.057)	(0.039)	(0.042)	(0.055)	(0.013)	(0.015)
—Above intermediate	0.38181***	0.45007***	0.32151***	0.24522***	0.29973***	0.12557***
	(0.062)	(0.045)	(0.057)	(0.067)	(0.015)	(0.017)
—University and above	0.53224***	0.56829***	0.42602***	0.37846***	0.35813***	0.20853***
	(0.063)	(0.045)	(0.049)	(0.060)	(0.015)	(0.017)
Rural	-0.05608*	-0.06437***	-0.05332**	0.05520**	-0.05627***	-0.01554*
	(0.024)	(0.019)	(0.020)	(0.021)	(0.006)	(0.007)
Not student	-0.09049	-0.16520	0.01664	-0.15426*	-0.05663	0.08328
	(0.147)	(0.121)	(0.070)	(0.076)	(0.063)	(0.075)
R^2	0.43267	0.38759	0.25392	0.18169	0.38645	0.21924
N	2443	3687	4392	3380	31,918	33,130

Robust standard errors in parentheses. Population: formal workers with reported wages aged 18 to 55. Additional control variables: economic activity (1-digit ISIC), occupation (1-digit), governorate, marital status, firm size and employment status (private, government, public enterprise, investment firm, international organization).

The dependent variable is log-wages, winsorized at 0.5%. The population is that of formal workers aged 18 to 55. The estimated coefficients show that being a union member is associated with a positive wage premium in Egypt, for all periods (columns 1-4). I run the same regression, with the same explanatory variables, for two rounds of the Labor Force Survey featuring much larger samples. The union coefficient again shows up positive and significant, although lower than in the 2006 and 2012 panel rounds. Summarizing, at given levels of education, sector of activity and employment status, individuals who are members of unions earn more than those who do not. The specification is a semi-log one, such that β can be interpreted as the percentage wage increase that being a union member entitles. I also run the above regressions separately, for the private and government sectors. For all six samples, coefficients for both the private and governmental sectors are positive, and the 95% confidence intervals significantly overlap. For a more adequate test of coefficient equality, I compute $Z = \frac{\beta_1 - \beta_2}{\sqrt{SE^2_{\beta_1} + SE^2_{\beta_2}}}$ (Clogg, Petkova, and Haritou 1995) for the private and public coefficient difference. In no round is the private - public differential significant at conventional thresholds.

Several interpretations for these positive coefficients are possible and may coexist. First, the selection issue. Recall that the rationing of union jobs creates queues for such jobs, and employers may hire the most high-productive elements in such queues. Wage discrepancies between union members and non members would thus be due to underlying productivity differences and not to union membership. Second, upward bias may also result from a crowding effect (Neumark and Wachter 1995), where unionization leads to higher layoffs in unionized sectors, increased supply of workers and falling wages in non-unionized sectors. Furthermore, the presence of upward bias does not imply that downward bias related to selection both at the industry and individual level does not operate. Finally, the ability of unions in Egypt to actually exert pressure on employers is doubtful, at least until the 2011 revolution. I shall get back to this issue.

Given its claim of being nationally representative for all rounds (using refresher samples), comparing the beta coefficients across rounds can tell us about the evolution of the union wage gap over time. Positive across rounds, there is nevertheless a spike in 2006, followed by a decrease, suggesting the benefits of being in a union (job) have de-

creased since 2006. Testing for the equality of these coefficients (Clogg, Petkova, and Haritou 1995) shows that 2006 is significantly higher than both 1998 and 2018, and that the other years do not appear statistically different from one another. This may suggest that unions saw an increase followed by a decrease in bargaining power over the last two decades. It may however equally well suggest that the the factors associated with bias on the union coefficient have shifted. This could happen if ability-based selection into union jobs diminished over time, or if economic policy or market forces worked in favor of an increasingly equal wage distribution.

As a complement to cross-sectional data, I thus draw on the panel feature of the data to investigate wage variations in individuals who join or leave unions between rounds of the panel. Using a fixed effects specification, any time-invariant immeasurable correlates of the wage level, such as permanent components of ability or motivation, will be absorbed. I use three sub-samples of the data: the 1998 wave and the 2006 wave, the 2006 and the 2012 waves, and the 2012 and the 2018 waves. This is done to keep attrition low, and to be able to assess the evolution of the coefficient over time. For the same reason, I restrict each subsample to individuals who were between 18 and 55 in the first of the two waves. Aside from the shown coefficients, occupational and economic activity dummies are present. Due to the full availability of firm size in the 2012 and 2018 datasets only, I drop it from the estimates.[7] Table 2 shows the results of the regressions.

The coefficient of interest from the panel regression is also positive, albeit of a lower magnitude than in the OLS case. Interpreting the coefficient, one sees that the gain (loss) of union membership between two rounds is associated with a 7.4% wage increase (decrease) for the period 1998 to 2006, a 5.7% increase (decrease) for 2006 to 2012, and a 6.7% increase (decrease) for 2012 to 2018. Unsurprisingly (given the closeness of coefficients) the results from an equality test prevent us from concluding on a variation in the absolute union wage gap over time. Unlike in table 1, the samples in the panel regression include individuals in the informal sector. When restricting the

[7]Including it greatly reduces samples sizes in columns 1 and 2, but increases the size of the union wage gap, which remains significant. Including the variable in column 3 barely modifies the size and significance of the coefficient.

Table 2: Union wage gap, fixed-effets regression (ELMPS data)

	1998/2006 (1)	2006/2012 (2)	2012/2018 (3)
Union member	0.07174***	0.05322**	0.07026**
	(0.020)	(0.020)	(0.023)
2006	0.71510***		
	(0.014)		
2012		0.84188***	
		(0.013)	
2018			0.78785***
			(0.013)
Marital status			
Ref: Under 18			
Never married		-0.13378	
		(0.086)	
Married	0.16656***	0.07242	0.11196**
	(0.033)	(0.079)	(0.037)
Divorced	0.03545	-0.02338	0.12481
	(0.112)	(0.116)	(0.099)
Widow	0.16513	0.00000	0.27341**
	(0.085)	(.)	(0.093)
Rural	0.02627	-0.14657	-0.11180
	(0.088)	(0.081)	(0.107)
Institutional sector			
Ref: government			
Public enterprise	0.05346	0.02990	0.15247**
	(0.053)	(0.048)	(0.054)
Private	0.23156***	0.09615*	0.08219
	(0.063)	(0.046)	(0.048)
Investment	0.28307*	0.23186***	0.23898**
	(0.113)	(0.067)	(0.083)
International	0.85827***	0.91724*	-0.19756
	(0.243)	(0.423)	(0.221)
Other	0.13826	0.16498	-0.26390
	(0.194)	(0.119)	(0.163)
R^2	0.65072	0.61766	0.52750
N	7522	12891	15706

Coefficients are from a fixed effects-regression with (robust standard errors in parentheses), run on wave pairs from four rounds of ELMPS. Additional controls: economic sector, occupation, firm size, out-of-school dummy.

sample to individuals who held a formal job in both periods, the samples drop by more than half. However, for consistency, I have also run the regressions on these reduced samples. They show coefficients of 0.05 , 0.03 and 0.06 respectively. The coefficient for column 2 (the 2006/2012 pair) is now barely insignificant.[8] Although the fixed effects specification deals with time-invariant heterogeneity, it does not absolve us from other problems. In particular, it is unknown whether the positive wage impact arises from individuals who joined a union, staying at their previous jobs/sectors, from individuals changing jobs/sectors and becoming union members during the change, or a combination of both. In essence, we are interested in knowing if union membership *per se* carries a wage benefit, or if being in a unionized sector or workplace is what is triggering the wage impact.

3.3 Is the union effect personal?

To investigate this issue, I rely on a question that was inserted in the 2018 round of ELMPS: in case of a negative answer to the question on union membership, individuals were asked whether or not their coworkers were union members. This allows us to effectively distinguish the impact of union membership from that of being at a workplace with at least some union presence. This is close in spirit to Lewis (1983), who discusses the introduction of an extent-of-unionism variable in empirical studies of the wage gap. From the cross-sectional regression on formal workers in Table 3, we see that being in a workplace where other workers are union members, without being one oneself, is not significantly associated with higher wages. The coefficients are indeed positive, but never significant. It therefore does seem to matter *who* is a union member, and not (only) whether unions exist in the workplace or not. This again begs the question of to what extent unions truly exert bargaining power in the Egyptian labor market. Provisionally accepting the hypothesis that unions indeed improve wages in Egypt, how to best interpret Table 3? If personally being a member of a union is what matters, unions would negotiate wages only on behalf of their members, and employers would be able to discriminate and offer different wages to union and non-union members. If that were the case, however, all workers would be strongly incentivized to join unions, and the general pattern of a fall in union membership would be diffi-

[8] Results available on request.

cult to explain. A more plausible, in my view, explanation is that unions do not exert pressure on wages through collective bargaining, and that union membership is merely correlated with good jobs. If different individuals in the same workplace have short-term versus long-term contracts, these arrangements would likely correlate both with union membership and wages. Although we control for contractual arrangements in the regressions, union membership could in the data act as a signal for contractual arrangements and job amenities which are imperfectly captured by other variables in the data.

ELMPS contains information on contractual arrangements and other job benefits, which can be controlled for in a regression. In column 4, I switch from 1-digit economic activity and occupation dummies to two-digit dummies. I also add dummies for contract type, firm size, and duration of experience at current job. As can be seen, alternative vectors of independent variables do not strongly increase or decrease the levels nor significance of the two union variables.

3.4 A look at the union wage gap using propensity scores

Exogenous variations in union membership are difficult to come by. Union membership is linked to the nature of the job, itself endogenous with respect to wage, and distinguishing between firm-level union coverage and individual coverage is tricky. Individual-level instruments for union membership are thus rarely credible, and are a rare feature of the literature. As an alternative, propensity score matching (PSM) has been used (Bryson 2002; Eren 2007; Meara, Pastore, and Webster 2020) to establish credible counterfactuals. By construction, PSM does not correct for bias due to unobservables, and the set of covariates used to match non union members with union members should thus be as large as possible. At the same time, if the first-stage regression does too well in estimating the propensity score, the area of common support is likely to be small and the number of observations used for the matching too few for statistical inference. In Table 4, I use a matching estimator to assess the union wage gap in each round of ELMPS. The matching algorithm is a radius-based one with a caliper

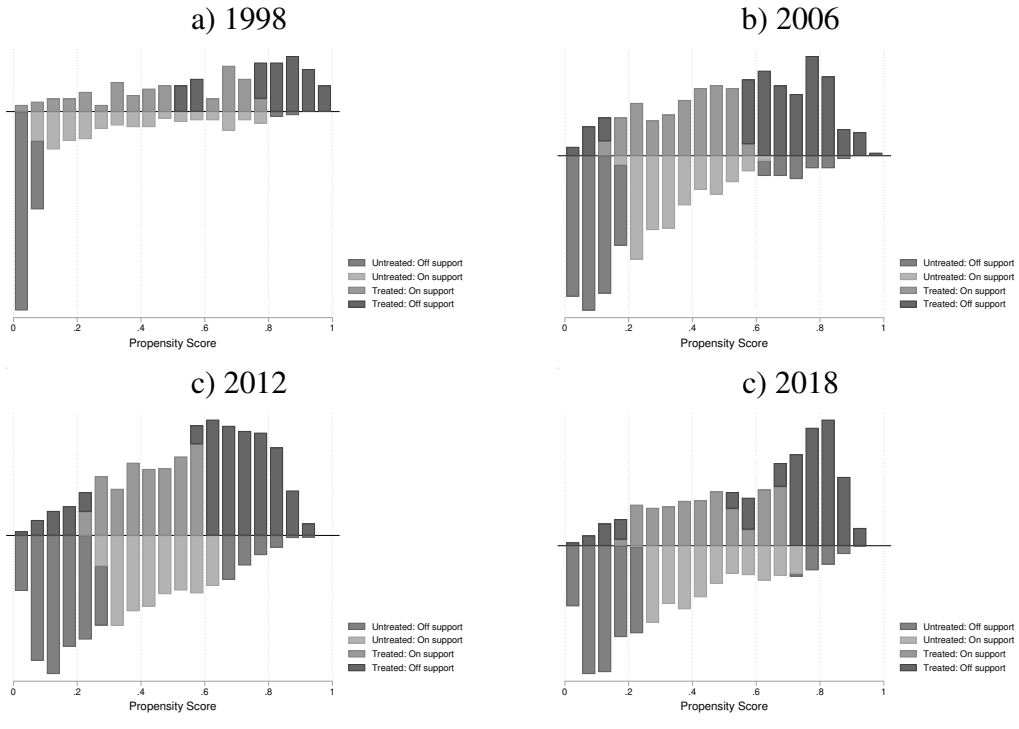
Table 3: Union wage gap 2018, distinguishing union presence and membership

	(1)	(2)	(3)	(4)
Union category:				
Ref: no union presence at workplace				
Union member	0.09067**	0.12578***	0.14249***	0.10747***
	(0.029)	(0.029)	(0.030)	(0.030)
Other union presence (only)	0.04242	0.05592	0.05068	0.04276
	(0.036)	(0.035)	(0.036)	(0.037)
Age	-0.02015	-0.01274	-0.01622	-0.01808
	(0.011)	(0.011)	(0.010)	(0.011)
Female	-0.32645***	-0.24684***	-0.22684***	-0.22502***
	(0.028)	(0.030)	(0.030)	(0.030)
Education level:				
Ref: illiterate				
Read & Write	0.11628	0.12752	0.13010	0.14564
	(0.089)	(0.088)	(0.085)	(0.090)
Less than intermediary	0.08779	0.09803	0.11952	0.10852
	(0.075)	(0.074)	(0.072)	(0.077)
Intermediary	0.25148***	0.24784***	0.23428***	0.20700**
	(0.064)	(0.063)	(0.061)	(0.067)
Above intermediary	0.34118***	0.34033***	0.29913***	0.26754**
	(0.081)	(0.080)	(0.079)	(0.083)
University and above	0.42510***	0.41070***	0.39125***	0.39625***
	(0.071)	(0.070)	(0.069)	(0.074)
Rural	-0.03511	0.00010	0.05416*	0.06758**
	(0.023)	(0.023)	(0.025)	(0.026)
Not student	-0.15851	-0.16106	-0.16961	-0.16821
	(0.134)	(0.133)	(0.114)	(0.111)
Employment status dummies	Yes	Yes	Yes	Yes
Occupation dummies	Yes(1-dig)	Yes(1-dig)	Yes(1-dig)	Yes(2-dig)
Economic activity dummies	No	Yes (1-dig)	Yes (1-dig)	Yes (2-dig)
Institutional sector dummies	No	No	Yes	Yes
Governorate dummies	No	No	Yes	Yes
R^2	0.09300	0.12779	0.17424	0.23415
N	3378	3373	3366	3315

Coefficients are from an OLS regression (robust standard errors in parentheses), run on individuals with formal jobs declaring wages in 2018. Additional controls in column 4: contract type, firm size, experience at current job.

of 0.1.[9] The propensity score estimation is based on a logit model which very well predicts union membership (McFadden's Pseudo-R^2 lies between 0.2 and 0.32 in the four rounds). The independent variables of the logit model are the same as in Table 1, plus a dummy for formal employment and a dummy for work experience. Given the good level of fit, it comes as no surprise that a large proportion of the untreated observations are clustered around propensity scores close to 0. To ensure that comparable propensity scores are used, we drop 50% of the treated observations at which the propensity scores of the untreated observations are the lowest. Figure 3 shows the distribution of the propensity scores for treated and untreated, used and unused observations. Clearly, the observations used come from a broad range of propensity scores, avoiding concerns for a localized effect.

Figure 3: Areas of common support in matching procedure (kernel-based classification)



[9]Other matching algorithms were tried, and did not significantly alter results. Results are available upon request.

Aside from providing estimates of the union wage gap, the estimation of the propensity score used to match union members with non-members provides an opportunity to explore who unionized individuals are (Table 10, Appendix). It turns out that union membership is quite strongly related to occupational groups, education level and institutional sectors, but less so to marital status, economic activity and firm size. In particular, the highly educated and employees of the public sector are more likely to be union members.

Table 4 shows the results of the matching procedure. The effect on wages from union membership is positive and significant, in all specifications and samples except for the Mahalanobis distance matching for 2018. The effects are lower than those estimated in the OLS regressions, suggesting that compositional effects did indeed drive part of the previous results. Similar to OLS, again, we find that the wage gap peaked in 2006, decreasing in magnitude in the subsequent rounds. The above exercise was also carried out for the LFS data from 2010 and 2011 (Table 14, Appendix), confirming a positive and strongly significant wage gap ranging from 0.0814 to 0.1059.

3.5 Heterogeneity in the wage gap

The preceding results, although controlling for structural variables such as sector, industry or occupation capture aggregate wage gaps. Relying on the larger samples drawn from the 2010 and 2011 Labour Force Surveys, I will here briefly analyze variations in the wage gap across sub-samples. I have already established that the two institutional sectors—the public and the private sectors—both carry positive and similar wage gaps. Regressing the log-wage on union membership at the economic activity level[10] allows for a comparison of the wage gap between industries. In doing this, I keep the same covariates as in Table 1 (except for the economic activity dummy). As seen in panel A of

[10]The 15 economic activities are: Agriculture, Forestry and Fishing; Mining and Quarrying; Manufacturing; Electricity, gas and water supply; Construction; Wholesale and retail trade; Transportation and storage; Accommodation and food services; Information and communication; Financial and insurance activities; Real estate, professional and support services; Public administration and defense, Education; Human health and social work act ivies; Other activities. Mining and quarrying is dropped from the list of industries since it contains less than 100 observations.

Table 4: Effects of union membership on wages, 1998 - 2018

	Treated	Controls	Difference	S.E.	T-stat	Obs.
Sample: ELMPS, 1998						
Radius (caliper 0.1)						
Unmatched	5.67071009	5.42836932	0.242340773	0.021207526	11.43	2937
Matched	5.60278491	5.53006418	0.072720731	0.030599952	2.38	2147
Kernel						
Unmatched	5.67071009	5.42836932	0.242340773	0.021207526	11.43	2937
Matched	5.60278491	5.53826365	0.064521257	0.031707594	2.03	2147
Sample: ELMPS, 2006						
Radius (caliper 0.1)						
Unmatched	6.28078882	5.97281722	0.3079716	0.018264027	16.86	4314
Matched	6.17692999	5.99526827	0.181661727	0.024439398	7.43	3117
Kernel						
Unmatched	6.28078882	5.97281722	0.3079716	0.018264027	16.86	4314
Matched	6.17692999	6.00972071	0.176009286	0.025145635	7.00	3117
Sample: ELMPS, 2012						
Radius (caliper 0.1)						
Unmatched	6.99398605	6.77227249	0.221713567	0.018352961	12.08	4971
Matched	6.94855342	6.84790928	0.100644148	0.029182996	3.45	2204
Kernel						
Unmatched	6.99398605	6.77227249	0.221713567	0.018352961	12.08	4971
Matched	6.95990887	6.83426516	0.125643709	.030411518	4.13	2068
Sample: ELMPS, 2018						
Radius (caliper 0.1)						
Unmatched	7.70324477	7.42655713	0.276687636	0.017813284	15.53	4311
Matched	7.69495644	7.57183567	0.123120775	.02742561	4.49	4284
Kernel						
Unmatched	7.70324477	7.42655713	0.276687636	0.017813284	15.53	4307
Matched	7.69495644	7.63468468	0.06027176	.036886733	1.63	4309

Results from matching algorithms run on ELMPS rounds 1 - 4. Population: 18 - 55 year-olds in formal wage employment. First stage covariates: age, age-squared, sex, education level, marital status, student, economic activity (1-digit), occupation (1-digit), institutional sector, duration at current job, governorate, social security dummy.

Table 5, for 2010, out of 14 economic activities, the wage gap is significant and positive in 9 of them. The interval ranges from 0.063 to 0.126 for significant coefficients. For 2011, only the Transportation and Accommodation sectors are non significant, and the only sector with a non-significant union wage premium across both years is Accommodation and food. The coefficients for 2012 range from 0.072 to 0.23 (0.156 when excluding Agriculture). These results suggest relatively little heterogeneity at the economic activity level. In other words, the union wage gap is pervasive in Egypt, present in virtually all industries and in both the public and the private sector.

What about heterogeneity along firm size and educational qualifications? Firms may need a minimum size to attract a union, and if firm size is correlated with wages, the previous results may reflect a firm size effect. Controlling for firm size is not enough to absolve the wage gap of bias. Similarly, the literature has found that high-qualified workers benefit less from union membership than low-skilled workers (Johnson and Youmans 1971; Card 1996). I therefore interact dummies of educational qualifications and firm size with the union membership variable to investigate heterogeneity in these dimensions. Panels B and C of Table 5 synthesize the results. For firm size, the interaction terms are jointly significant in both the 2010 (5% level) and 2011 (10% level) data, although most interactions are non significant. The data from both years suggest a non-linear relationship between the marginal effect of union membership along firm size. For both years, the marginal effect starts out negative for small companies (but not enough to offset the general positive effect of union membership), becomes large and positive for medium-sized companies (10 to 24 employees), only to then decrease again, finally increasing for very large firms with more than 100 employees. In only one case (2010, companies with 5 to 9 employees) is the joint effect of the union variable and the interaction term not significantly positive, suggesting that a union wage gap operates at all firm size levels. Concerning the education level, the interactions between it and union membership are only jointly significant in the 2010 data. They then point to increasing returns to union membership in education, suggesting that well educated benefit more from union membership than less educated. Although the lower educated benefit less from union membership, the interaction term and the union membership dummy are jointly significantly positive for all education levels. It is noteworthy, however, that a union wage gap increasing in education is somewhat counterintuitive to

what one would expect from normal union behavior and fits poorly with empirical results from the literature.

Although these are not experimental estimates, the consistency and generality of the estimated union wage gap does suggest that unions are favorably associated with wages in Egypt. This does not, obviously, warrant a causal interpretation. It could very well be that union jobs are simply *better* jobs, independently of union activity (an omitted variable bias). The assumption that wage gaps are due to union activity is implicit in most of the literature, and is probably a warranted assumption in the European or North American contexts. In Egypt, however, given the constraints to free unionization that the literature suggests, and the link between unionization rates and the public sector, the assumption is more difficult to accept. The result from section 3.3, that mere union presence in the workplace is not significantly correlated with wages, further casts doubt on the assumption. Thus, rather than taking the union wage gap as indicative of a union effect, I therefore in the next section investigate whether other frequent outcomes indicative of workers' bargaining power are present in Egypt.

4 Does union presence in a sector concentrate income?

A prevalent result from studies into union impacts on wage distributions is that unionized sectors tend to concentrate income (Freeman and Medoff 1981; Card, Lemieux, and Riddell 2004; Farber et al. 2021). On the one hand, collective bargaining may raise wages, ensuring that some workers are paid above their marginal productivity, effectively decreasing income inequalities at the workplace. On the other hand, highly productive individuals may opt out of such industries or workplaces, fearing that they be paid below their marginal productivity. If union activity indeed sets a wage standard at the industry level through collective bargaining, we should expect to see more concentrated income distributions in those sectors where union presence is the strongest.

Delving into collective bargaining requires a discussion of how wages are set in Egypt. According to Book IV of the Labour Code[11], collective bargaining refers to discussions about labour terms and conditions, social development for workers and settling of dis-

[11] Accessible at: https://www.ilo.org/dyn/natlex/natlex4.detail?p_lang=en&p_isn=64693.

Table 5: Heterogeneity analysis, LFS 2010 and 2011

	2010			2011		
	Panel A: Industry-level estimates of the union wage gap					
	Coeff.	S.E.	Obs	Coeff.	S.E.	Obs
Agriculture, forestry, fishing	0.07768	(0.061)	398	0.22860***	(0.065)	448
Manufacturing	0.10089***	(0.015)	4986	0.15573***	(0.018)	4291
Electricity, gas and water	0.06253*	(0.026)	1533	0.12409***	(0.026)	1697
Construction	0.12572**	(0.038)	811	0.08655*	(0.038)	862
Wholesail and retail trade	0.11958***	(0.028)	1362	0.11393***	(0.03)	1455
Transportation and storage	0.07263*	(0.031)	1124	0.04418	(0.038)	1205
Accommodation and food	0.11245	(0.064)	603	-0.08553	(-0.068)	541
Information and communication	0.08222	(0.049)	453	0.11564*	(0.049)	448
Finance and insurance	0.08159	(0.045)	715	0.12402***	(0.037)	765
Real estate & professional	-0.00683	(-0.036)	904	0.08264*	(0.038)	933
Public administration	0.10160***	(0.012)	6852	0.13519***	(0.013)	7337
Education	0.07257***	(0.011)	8208	0.08984***	(0.013)	8827
Human health and social work	0.08298***	(0.02)	2200	0.07175*	(0.029)	2399
Other	0.10887***	(0.031)	1256	0.13787***	(0.037)	1361
	Panel B: Firm size interacted with union membership					
Firm size (ref: "Not stated")	Coeff.	S.E.	Obs.	Coeff.	S.E.	Obs.
1 to 4 workers x Union member	-0.02773	(-0.028)		-0.03827	(-0.036)	
5 to 9 workers x Union member	-0.06728	(-0.041)		-0.02644	(-0.041)	
10 to 24 workers x Union member	0.03007	(0.022)		0.04415	(0.025)	
25 to 49 workers x Union member	0.01012	(0.016)		0.01475	(0.018)	
50 to 99 workers x Union member	0.00966	(0.017)		0.00701	(0.02)	
100+ workers x Union member	0.03015*	(0.013)		0.03386*	(0.014)	
Union coefficient	0.08870***	(0.009)	31918	0.10212***	(0.009)	33130
	Panel C: Educational level interacted with union membership					
Educational level (ref: "University")	Coeff.	S.E.	Obs.	Coeff.	S.E.	Obs.
Illiterate x Union member	-0.06730*	(-0.032)		0.05323	(0.033)	
Read & write x Union member	-0.05872*	(-0.029)		0.07045*	(0.033)	
Less than intermediate x Union member	-0.07686**	(-0.026)		0.01188	(0.029)	
Intermediate x Union member	-0.03521**	(-0.012)		0.00614	(0.013)	
Above intermediate x Union member	-0.03004	(-0.018)		-0.01875	(-0.021)	
Union coefficient	0.12232***	(0.008)	31918	0.10939***	0.010	33130

Panel A: Union wage gap estimates from OLS regressions run sector by sector. Panel B: coefficients for interaction terms between union membership and a firm size variable, from an OLS regression on the full sample. Panel C: coefficients for interaction terms between union membership and educational attainment, from an OLS regression o nthe full sample. Additional controls in all three panels: age, age-squared, sex, educational attainment, firm size, rural dummy, schooling dummy, marital status, economic activity (1-digit), institutional sector, occupation (1-digit), governorate, contract type.

putes between workers and employers. The law contains provisions for negotiations at the establishment, branch, occupation or industry-levels, and when establishments are small or lacking union presence, workers selected by the union branch office may represent the establishment's workers. The law also specifies that all branch data used in such negotiations shall be provided by the General Egyptian Federation of Trade Unions (ETUF). In practice, however, scholars have highlighted that all labor agreements have been "centralized and supervised by the State in collaboration with ETUF" (Beinin 2013). According to a report by the Danish Trade Union Development Agency, collective bargaining is technically not allowed in the public sector, although it exists in practice. The Ministry of Manpower and Migration oversees any collective bargaining, even at the establishment level. Since 2018 and the new labor law, however, independent unions are allowed to sign collective bargaining agreements, and a number of such agreements were signed in 2019-2020 (Danish Trade Union Development Agency, 2018). The general picture that emerges for the period 1998 to 2018, however, is one of scarce collective bargaining, and where the National Council of Wages only intervenes - primarily in the public sector -when things become acute. In the private sector, employers often do not respect the law and the bargaining framework has completely broken down (Danish Trade Union Development Agency, 2018).

To investigate the extent to which union activity over the period 1998 - 2018 contributed to a contraction in wage disparities at the sectoral level, we exploit the panel nature of the data and regress measures of income inequality at the occupation and industry levels on the share of unionized workers in each occupation/industry. To correct for time invariant selection on both wages and unionization rates, we run a fixed effects specification at the occupation and industry levels. A central methodological consideration here is the industry and occupation aggregation that is used. On the one hand, using few industries or occupations ensures that a large number of observations exists to estimate wage inequality in each group, but may not be relevant for wage setting mechanisms[12] and reduces the number of observation and thus power in the fixed-effects regression. On the other hand, a too narrow definition of sectors or occupations implies that each group inequality measure is calculated from few observations. To try to navigate in

[12]For example, treating 'Manufacturing' as a uniform sector with respect to unionization and wage inequality is probably not a good idea.

between extremes, we use 2-digit and 3-digit sectoral (occupation) classifications, removing those sectors (occupations) which did not contain enough observations in a given year. The results are shown in Table 6 which shows the outcomes of a series of regressions with group-level Gini coefficients as the outcome variables. Groups are—respectively—industries, occupations, and a mix of industries and occupations (the 1-digit level of industries interacted with occupations at the 1-digit level).

Table 6: Effects of union coverage on sectoral Gini, 1998 - 2018

	Industry		Occupation		Industry & occupation
	2-digit level	3-digit level	2-digit level	3-digit level	1-digit & 1-digit
Removing sectors with less than 25 wage observations					
Union (avg)	0.0302	-0.00445	-0.0681	-0.01453	0.06382
	(0.03)	(-0.036)	(-0.056)	(-0.057)	(0.064)
2006	0.01235	0.01125			
	(0.009)	(0.009)			
2012	0.00936	0.00791	0.00387	0.00626	0.00551
	(0.009)	(0.017)	(0.01)	(0.009)	(0.009)
2018	-0.0099	-0.00693	-0.00214	0.0124	-0.00654
	(-0.012)	(-0.017)	(-0.012)	(0.012)	(-0.008)
Constant	0.30263***	0.30963***	0.32160***	0.29372***	0.27939***
	(0.011)	(0.017)	(0.022)	(0.021)	(0.023)
R^2	0.10052	0.07148	0.07867	0.03857	0.06681
Obs	147	189	84	164	156
Removing sectors with less than 50 wage observations					
Union (avg)	0.03002	0.07099	0.00695	0.00614	0.06897
	(0.04)	(0.046)	(0.052)	(0.069)	(0.1)
2006	0.01422	0.01482			
	(0.01)	(0.01)			
2012	-0.00015	0.00705	0.00572	-0.01356	0.00741
	(-0.011)	(0.018)	(0.011)	(-0.007)	(0.012)
2018	-0.00845	-0.0065	0.00097	-0.00433	-0.01259
	(-0.012)	(-0.018)	(0.014)	(-0.013)	(-0.012)
Constant	0.30558***	0.29003***	0.30037***	0.30526***	0.27429***
	(0.014)	(0.019)	(0.023)	(0.023)	(0.039)
R^2	0.09009	0.17514	0.01173	0.0591	0.152
Obs	99	111	75	112	85

Results from a fixed effects model. Robust standard errors in parentheses.

If unions raise the wage floor through bargaining power or threat of strikes or other

forms of worker mobilization, we would expect to see that inequality falls as unionization rates increase, *i.e.* a negative and significant coefficient of the Union variable. The coefficient of the Union variable is indeed negative in 3 of the regressions in Table 6, but it is never close to significant. Rather, in 7 regressions out of 10 the coefficient is positive, including a barely insignificant one at the 3-digit industry level when sectors with less than 50 observations were removed. If anything, the union effect seems more likely to be increasing inequality than decreasing it. Turning to magnitude; the union variable is expressed as a proportion, so if precision is an issue and one of the coefficients shown actually represent the impact of union activity on wages inequalities, the impact would nonetheless be weak. In column 2 (upper panel), for example, going from no unionization to a 100% unionization would entail a 0.004 increase in the Gini coefficient, a negligible effect. At most, going from zero to full unionization in a sector would bring about a modification of (+) 0.07 of the Gini (column 2, lower panel).

Concerns for accuracy of the estimated Gini to some extent be mitigated when using the LFS 2010-2011 data. The impact on the unconditional distribution of income from union membership can be computed using recentered influence functions, as shown by Firpo, Fortin, and Lemieux (2009). Table 7 shows the results from a recentered influence function regression using Gini as the affected distributional statistic. The results are run at the industry level, to account for possibly heterogeneous behavior across industries. The results however echo those of Table 6 using the panel data. In no case is a marginal replacement of the income distribution with one containing more unionized workers significantly associated with decreasing income inequality. On the contrary, in some cases union membership is significantly associated with increasing income inequality in a sector. These results hold at the 1-digit industry level, but also in the aggregate case, and when looking at 1-digit occupations.[13] It therefore seems unlikely that unions contribute to reducing wage inequality at the industry level in Egypt.

[13] Results available upon request.

Table 7: Results from a RIF regression on Gini, LFS 2010 and 2011

	2010			2011		
Industry	Union	Obs	Gini	Union	Obs	Gini
Agriculture, forestry, fishing	0.20281	401	0.361	0.05352	450	0.31944
Mining and quarrying	0.06376	82	0.33591	-0.05181	67	0.3403
Manufacturing	0.08118	5021	0.36913	0.03320**	4312	0.29688
Electricity, gas and water	0.03799	1539	0.33098	0.01559	1704	0.31062
Construction	0.08516	817	0.35212	0.00006	869	0.2862
Wholesail and retail trade	-0.05222	1378	0.33046	0.05916*	1463	0.29656
Transportation and storage	0.03868	1131	0.36347	0.02624	1241	0.32477
Accommodation and food	-0.03517	606	0.37886	0.02162	544	0.3279
Information and communication	0.17392	456	0.32407	0.02001	449	0.28356
Finance and insurance	0.04431	719	0.39537	0.05001*	774	0.33105
Real estate & professional	-0.02337	911	0.34859	0.05579	941	0.32908
Public administration	0.08156*	6900	0.35825	0.02777*	7369	0.3116
Education	-0.01787	8305	0.43636	0.00278	8908	0.31049
Human health and social work	0.15126*	2218	0.39409	0.01952	2433	0.38947
Other	-0.04417	1260	0.34868	0.03108	1367	0.35555

Results from a recentered influence function on the Gini at the industry level. Additional controls: age, age-squared, sex, education level, firm size, rural dumy, dummy for school attendance, marital status, economic activity (1-digit), occupation (1-digit), institutional sector, governorate, contract type.

5 Discussion

The positive associations between union membership and wages, found both in the fixed effects and matching results of the previous sections, suggested wage gains of 5% up to 20% from union membership. These figures are in the same ball park as previously reported results for OECD countries Jarrell and Stanley (1990). They are also reconcilable with the figures reported by Freeman (2010) from a set of Latin American, Asian and African countries.[14] In these studies, the union wage gap ranges from 5% to 20%. However, in three cases, a negative wage gap is reported. In the words of Freedman, "Since it makes little sense for independent unions to negotiate lower wages for members, in all these cases, the unions are presumably not "normal unions" doing collective bargaining." Although the above estimates rhyme well with figures found in both developed in developing countries, they do not seem to fit with anecdotal evidence of union behavior on the ground. As previously discussed, both international worker organizations as well as scholars consider the Egyptian collective bargaining process to be defunct, and only recently have independent unions started to earn formal recognition. In the previous section, we indeed show that there is no evidence that the extent of union coverage in a sector or occupation relates negatively to the extent of wage inequalities, suggesting that what we are capturing at the individual level from the ELMPS survey is not "normal union" operations.

As a last piece of evidence, we draw on data from the World Bank Enterprise Survey in Egypt. The survey is a panel survey with six waves; 2004, 2007, 2008, 2013, 2016 and 2020. In the post-revolutionary waves, however, questions concerning unions were dropped from the dataset. The period 2004 to 2008 however corresponds to intermediate years between waves 1, 2 and 3 of the ELMPS survey and may serve as good indicators of firms' labor relations during the period 1998 to 2012. It is important to emphasize that the Enterprise survey targets private companies in the manufacturing and services sectors, and are thus not representative of employment in Egypt on the whole. This may be especially worthwhile mentioning since unionization rates are higher in the public sector. Furthermore, the enterprise survey does not allow us to directly identify wages. Dividing the total labor cost by the number of employees indeed

[14] No Arab evidence from countries is included in the review.

gives us an average wage, but this does not say much about the distribution of labor value added between top management and production workers.

Table 8 shows average unionization rates among private firms in the years 2004, 2007 and 2008. Clearly, the unionization rates reported by firms are lower than those from formal private firms reported by workers in the ELMPS. Two reasons may explain the discrepancy: first of all, the firms included in the enterprise survey may not be an accurate representation of the formal private sector. Second, and more plausibly, firms are not necessarily aware of the fact that workers are union members. If the numbers in ELMPS are to be believed, this implies that firms underestimate unionization rates by around 20 percentage points. Equivalently, they fail to identify (roughly) two out of three unionized workers. This is already a first piece of evidence suggesting that unions in Egypt are not primarily concerned with workforce-management relations. A second piece of evidence from table 8 is the low share of strikes and labor disputes experiences by firms, ranging from 0.18% (in 2007, when only panel firms were considered) to a maximum of 2.89% in 2008 (also for the panel sample). This indeed suggests that labor disputes are a rare phenomenon in private Egyptian firms.

Evidence from North America and Europe (N. A. Menezes-Filho 1997; Doucouliagos and Laroche 2009) as well as Latin America (Murillo et al. 2005; N. Menezes-Filho et al. 2005) shows relatively consistent evidence that union presence decreases profits. This is fairly intuitive, since the mere existence of unions relies on firms extracting rents of which unions seek a bite. If unions have no effect on total sales, but do increase wages, there should be a negative correlation between unionization and profit margins. Pooling data from the 2004-2008 panel sample, the correlation between profit shares and unionization rates in the enterprise surveys stands at $\rho = 0.024$. To more properly assess the relationship, we also regress the profit share on declared unionization rates, bearing in mind that the unionization rates declared by firms may sharply understate the true rates.

The coefficients from table 9 do not suggest falling profit shares with union presence in Egypt. Column 2 shows the impact of having at least some union presence (defined as

Table 8: Descriptive statistics from Enterprise surveys (2004,2007,2008)

	2004	2007	2008
Sample: full			
Average % of workforce unionized	6.87	11.47	10.62
% of firms with no union presence	81.96	68.97	79.41
% of firms affected by strikes or labor disputes during the past year	0.74	0.38	1.82
Profits as percentage of total sales (after tax)	14.44	11.12	16.59
Sample: firms present in all three waves (556 firms)			
Average % of workforce unionized	7.41	8.56	7.18
% of firms with no union presence	81.32	74.31	85.3
% of firms affected by strikes or labor disputes during the past year	0.93	0.18	2.89
Profits as percentage of total sales (after tax)	14.29	10.00	14.66

Source: Author's computations using WB Enterprise surveys.

Table 9: Effects of unionization rate on net profits [as % of revenue], 2004 - 2008

	(1)	(2)
2007	-0.03318***	-0.03231***
	(0.006)	(0.006)
2008	0.00102	0.00156
	(0.007)	(0.007)
Union rate	0.03005*	
	(0.016)	
Some union		-0.00078
		(0.009)
Constant	0.14400***	0.14632***
	(0.005)	(0.005)
R^2	0.03803	0.03485
N	2450	2450

Results from a fixed effects model. Robust standard errors in parentheses.

a unionization rate > 0 in the data) on the share of net profits over total sales. The firm fixed effects ensure that sector-specific profit levels spuriously correlated with unionization rates do not bias the estimates, as long as those rates remain fixed in time or do not evolve in a systematic way with respect to unionization. The coefficient in column 2 is close to zero and far from significant. In column 1, we report the coefficient from the unionization rate. If unions indeed captured rent from firms, we expect the coefficient to be negative and significant. Instead, the coefficient is positive and significant at the 10% level, suggesting that unionization rates increased net profits as a share of revenue.

6 Concluding remarks

Union membership among Egyptian workers has fallen from 24.7% 1998 to 18.8% 2018, echoing trends in Europe and North America, although the reasons may have more to do with governmental clampdown than lack of interest among workers. The relationship between unions, wages and inequalities in the Egyptian context warrants study since the country is in a period of transition regarding its labor laws and collective bargaining framework. The central question of this paper is whether unionization in Egypt during the period 1998 - 2018 promoted increased bargaining power as reflected in higher wages.

Wage regressions run using household survey data suggest a positive union wage gap; unionized individuals do receive higher wages, controlling for sectoral, occupational and institutional categories as well as individual attributes. This result stands in a difference-in-difference framework, and using a propensity score matching algorithm. A heterogeneity analysis furthermore suggests that the union wage gap is positive across educational qualifications, in both the private and public sector, and for small and large firms. The mere presence of a union in the workplace is however not significantly associated with a higher wage. Putting these results into perspective, political scientists and NGOs have consistently depicted Egyptian unions as little more than instruments of the regime, and with no power to assert workers' rights. The law governing labor relations up until 2018 stipulated centralized discussions with few margins at the local or

workplace level. Investigating union ties to wage compression at the industry level and profit shares at the enterprise level in the data, there is indeed no obvious support for the claim that what Freeman (Freeman 2010) called "normal unions", *i.e.* unions capturing parts of firms' rents and distributing them to workers, operate in Egypt. Unionization rates are neither associated with income distributions at the sectoral or occupational levels, nor do they act negatively on firms' shares of net profits.

The necessity to reconcile the two above and seemingly contradictory findings leads us to believe that unionization is a job attribute in the Egyptian labor market. Unionized jobs are on average good jobs, but that has little to do with union activity in itself. These results thus warrant caution when studying the union wage gap in contexts where unions do not operate freely. There is thus scope for reform in the field of labor relations in Egypt, and future independent unions may contribute to a normalization of relations. On the whole, understanding the real efficiency of unions at extracting rents is crucial to understand whether current resistances by regimes in the Arab world are solely based on political power struggles or may be linked to vested business interests. Further research should seek to examine the political as well as economic conditions that allow for the emergence of efficient unions.

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7 Appendix

Table 11: Summary statistics, ELMPS, 4 rounds

	1998	2006	2012	2018
	Mean	Mean	Mean	Mean
Log-wage	5.50	6.02	6.75	7.46
Union membership	.38	.36	.24	.18
Age	35.36	34.51	34.34	35.08
Female	.22	.21	.18	.15
Education level				
Illiterate	.14	.12	.13	.13
Reads & Writes	.08	.05	.04	.06
Less than Intermediate	.16	.14	.15	.13
Intermediate	.30	.38	.39	.42
Above Intermediate	.09	.06	.05	.04
University & Above	.22	.24	.25	.22
Firm size				
1-4	.20	.23	.30	.29
5-9	.08	.09	.12	.17
10-24	.05	.06	.09	.12
25-49	.02	.03	.09	.08
50-99	.02	.02	.09	.06
100+	.04	.05	.27	.24
Don't Know	.60	.52	.05	.04
Urban	.29	.39	.51	.61
Marital status				
Never married	.31	.28	.23	.21
Married	.67	.70	.75	.76
Divorced	.01	.01	.01	.01
Widowed	.01	.01	.01	.01
Out-of-school	.99	.99	.98	.98

Sector of activity				
A: Agriculture; forestry and fishing	.07	.08	.10	.14
B: Mining and quarrying	.00	.00	.00	.00
C: Manufacturing	.18	.16	.14	.13
D: Electricity; gas, etc.	.01	.01	.01	.01
E: Water supply; sewage; etc.	.01	.01	.01	.01
F: Construction	.08	.10	.14	.18
G: Wholesale and retail trade; auto repairs.	.07	.10	.10	.11
H: Transportation and storage	.06	.07	.08	.09
I: Accommodation and food service activities	.02	.03	.03	.03
J: Information and communication	.01	.02	.01	.01
K: Financial and insurance activities	.02	.02	.01	.01
L: Real estate activities	.00	.00	.00	.00
M: Professional, scientific and technical activities	.01	.01	.01	.01
N: Administrative and support service activities		.00	.01	.01
O: Public administration and defense	.18	.14	.11	.08
P: Education	.18	.17	.16	.12
Q: Human health and social work activities	.04	.05	.04	.04
R: Arts, entertainment and recreation	.01	.01	.01	.00
S: Other service activities	.04	.02	.02	.02
T: Activities of households as employers	.00	.01	.00	.01
U: Activities of extraterritorial organizations and bodies	.00	.00	.00	
Occupation				
Managers	.05	.04	.03	.02
Professionals	.25	.21	.21	.16
Technicians and associate professionals	.08	.14	.12	.06
Clerical support workers	.12	.07	.04	.08
Service and sales workers	.14	.16	.12	.17
Skilled agricultural workers	.06	.07	.10	.14
Craft and related trades workers	.20	.19	.20	.23
Plant and machine operators	.07	.09	.11	.11
Elementary occupations	.03	.03	.08	.04
Institutional sector				
Government	.48	.41	.35	.28
Public	.10	.08	.05	.03
Private	.39	.50	.58	.68

Investment	.01	.02	.02	.01
International	.00	.00	.00	.00
Other	.00	.00	.00	.00

Table 12: Summary statistics for panel regression (Table 2)

	1998/2006 Mean	2006/2012 Mean	2012/2018 Mean
Log-wage	5.55	6.07	7.06
Union membership	.39	.36	.23
Age	36.51	35.79	36.10
Female	.22	.21	.18
Education level			
Illiterate	.14	.13	.13
Reads & Writes	.09	.06	.05
Less than Intermediate	.16	.14	.13
Intermediate	.30	.37	.40
Above Intermediate	.09	.06	.04
University & Above	.23	.24	.25
Rural	.29	.40	.54
Marital status			
Never married	.29	.27	.19
Married	.68	.71	.78
Divorced	.01	.01	.01
Widowed	.02	.02	.01
Out of school	.99	.99	.99
Sector of activity			
A: Agriculture; forestry and fishing	.07	.08	.11
B: Mining and quarrying	.00	.00	.00
C: Manufacturing	.18	.16	.13
D: Electricity; gas, etc.	.01	.01	.01
E: Water supply; sewage, etc.	.01	.01	.01

F: Construction	.08	.10	.14
G: Wholesale and retail trade; auto repair	.07	.09	.10
H: Transportation and storage	.06	.07	.08
I: Accommodation and food service activities	.02	.03	.03
J: Information and communication	.01	.02	.01
K: Financial and insurance activities	.02	.02	.01
L: Real estate activities	.00	.00	.00
M: Professional, scientific and technical activities	.01	.01	.01
N: Administrative and support service activities		.00	.01
O: Public administration and defense	.19	.14	.11
P: Education	.18	.17	.15
Q: Human health and social work activities	.04	.05	.05
R: Arts, entertainment and recreation	.01	.01	.01
S: Other service activities	.03	.02	.02
T: Act. of households as employers	.00	.01	.01
U: Act. of extraterritorial organizations and bodies	.00	.00	.00
Occupation			
Managers	.06	.05	.03
Professionals	.25	.21	.20
Technicians and associate professionals	.08	.15	.10
Clerical support workers	.12	.07	.06
Service and sales workers	.14	.15	.14
Skilled agricultural, forestry and fishery workers	.06	.07	.11
Craft and related trades workers	.19	.19	.20
Plant and machine operators, and assemblers	.07	.09	.11
Elementary occupations	.03	.03	.06
Institutional sector			
Government	.49	.42	.35
Public	.11	.08	.04
Private	.38	.48	.59
Investment	.01	.02	.02
International	.00	.00	.00
Other	.00	.00	.00

Table 10: Results from a logistic regression on union membership, ELMPS 1998-2018

	(1) Coeff./S.E.	(2) Coeff./S.E.	(3) Coeff./S.E.	(4) Coeff./S.E.
	1998	2006	2012	2018
Age	0.0409	0.14378***	0.05649	-0.02403
	(0.047)	(0.035)	(0.034)	(-0.04)
Age²	-0.00036	-0.00136**	-0.00036	0.00033
	(-0.001)	(0.000)	(0.000)	(0.000)
Female	-0.29842*	-0.33790***	-0.24786**	-0.08681
	(-0.119)	(-0.091)	(-0.085)	(-0.095)
Education (ref: Illiterate)				
Read & write	0.55237*	0.47031*	0.09912	0.15351
	-0.257	-0.219	-0.295	-0.335
Less than intermediary	0.61498**	0.70317***	0.35442	0.05731
	-0.238	-0.183	-0.212	-0.289
Intermediary	1.42307***	1.06727***	0.57067**	0.53017*
	-0.241	-0.176	-0.199	-0.253
Above intermediary	2.01472***	1.02604***	0.60274*	0.78139**
	-0.271	-0.209	-0.235	-0.289
Universty and above	2.88462***	1.86406***	1.38043***	1.44288***
	-0.266	-0.202	-0.218	-0.267
Rural	-0.18251	-0.16609	-0.16185*	-0.0729
	-0.122	-0.087	-0.077	-0.084
Marital status (ref: not married)				
Married	0.36055*	0.07698	0.22942*	-0.12668
	-0.156	-0.114	-0.112	-0.138
Divorced/separated	0.43097	-0.14958	0.43788	-0.47186
	-0.456	-0.335	-0.296	-0.306
Widow	0.62168	-0.15411	-0.1449	-0.32846
	-0.412	-0.284	-0.29	-0.288
Not student	0.58255	-0.13047	-0.26442	-0.4809
	-0.622	-0.567	-0.266	-0.318
Experience at current job	-0.01142	-0.00924	-0.01244*	-0.02979***
	-0.007	-0.006	-0.006	-0.006
Occupation (ref: managers)				
Professionnals	0.37235	0.63450***	0.64353***	0.26918
	-0.201	-0.16	-0.145	-0.174
Technicians and ass. Professionnals	-0.41389*	-0.05947	-0.26625	-0.45058*
	-0.209	-0.16	-0.152	-0.196
Clerical support workers	-0.88707***	-0.36557*	-0.51345**	-0.76351***
	-0.201	-0.177	-0.189	-0.181
Services and sales workers	-0.99681***	-0.44669*	-0.73152***	-0.98540***
	-0.229	-0.18	-0.198	-0.201
Skilled agricultural workers	-1.49667*	-0.55011	-2.83220**	-1.08575
	-0.715	-0.429	-1.085	-0.59
Craft and related trades workers	-0.65801**	-0.38878	-0.80071***	-0.83718***
	-0.241	-0.204	-0.239	-0.251
Plant and machine operators	0.63839*	0.53543**	0.46181*	-0.33767
	-0.254	-0.206	-0.19	-0.231
Elementary occupations	-0.62382	-0.86420*	-1.00349***	-0.32524
	-0.59	-0.423	-0.215	-0.385
Firm size (ref: 1 to 4 workers)				
5 to 9 workers			-0.56116*	-0.45194
			-0.232	-0.236
10 to 24 workers			-0.47430*	0.0705
			-0.189	-0.196
25 to 49 workers			-0.31521	0.36215
			-0.183	-0.191
50 to 99 workers			-0.25405	0.37884
			-0.18	-0.195
100+ workers			-0.26803	0.24823
			-0.166	-0.174
Not stated			-0.59795**	0.50670*
			-0.209	-0.223
Constant	19.71219	14.86351	23.42673*	59.08651***
	-14.28	-11.443	-11.603	-12.365
Economic activities	Yes	Yes	Yes	Yes
Institutional sector	Yes	Yes	Yes	Yes
Governorate	Yes	Yes	Yes	Yes
McFadden's R²	0.3120	0.2329	0.1966	0.2210
N	3330	4866	5341	4344

Table 13: Descriptive statistics by union status, 2010 and 2011 LFS

	2010		2011	
	(1)	(2)	(3)	(4)
Union member	No	Yes	No	Yes
Age	37.156	40.250	37.751	40.444
Male	0.772	0.684	0.762	0.678
Marital status:				
Never married	0.211	0.122	0.200	0.134
Married monogamous	0.761	0.850	0.772	0.833
Married polygamous	0.002	0.001	0.002	0.001
Divorced/separated	0.009	0.008	0.010	0.011
Widowed	0.018	0.018	0.016	0.022
Education status:				
Illiterate	0.072	0.018	0.071	0.022
Read & write	0.067	0.024	0.064	0.023
Less than intermediate	0.091	0.030	0.079	0.033
Intermediate	0.440	0.271	0.448	0.274
Above intermediate	0.081	0.108	0.080	0.105
University & above	0.250	0.549	0.258	0.543
Firm size:				
1 through 4	0.047	0.029	0.044	0.021
5 through 9	0.026	0.012	0.025	0.017
10 through 24	0.062	0.057	0.055	0.059
25 through 49	0.108	0.151	0.100	0.143
50 through 99	0.103	0.131	0.084	0.123
100+	0.289	0.282	0.265	0.275
Not stated	0.366	0.336	0.427	0.364
Urban	0.506	0.587	0.516	0.566
Health insurance	0.797	0.955	0.789	0.953
Social security	0.872	0.981	0.872	0.980
Job status:				
Full time	0.854	0.960	0.848	0.953
Part time/temporary	0.145	0.040	0.151	0.047
Seasonal/irregular	0.001	0.000	0.001	0.000
Contract status:				
Officially hired	0.583	0.789	0.583	0.805
Written contract for unlimited duration	0.189	0.132	0.201	0.122
Written contract for a limited duration	0.228	0.079	0.216	0.073

Table 14: Effects of union membership on wages, LFS 2010 - 2011

	Treated	Controls	Difference	S.E.	T-stat	Obs.
Sample: LFS, 2010						
Radius (caliper 0.1)						
Unmatched	6.76294375	6.48361131	0.279332449	0.005700385	49.0	40373
Matched	6.64928422	6.56788719	0.081397028	0.008401591	9.69	18648
Kernel						
Unmatched	6.76294375	6.48361131	0.279332449	0.005700385	49.0	40373
Matched	6.65542046	6.57051093	0.084909529	0.008673919	9.79	18085
Sample: LFS, 2011						
Radius (caliper 0.1)						
Unmatched	7.11537666	6.75574695	0.359629709	0.005806401	61.94	40377
Matched	6.9993233	6.89806029	0.101263011	0.008502393	11.91	18587
Kernel						
Unmatched	7.11537666	6.75574695	0.359629709	0.005806401	61.94	40377
Matched	7.00589994	6.90080568	0.105094269	0.00876568	11.99	18009

Results from matching algorithms run on LFS for years 2010 and 2011. Population: 18 - 55 year-olds in formal wage employment. First stage covariates: age, age-squared, sex, education level, marital status, student, economic activity (1-digit), occupation (1-digit), institutional sector, governorate.