

ECONOMIC
RESEARCH
FORUM



منتدى
البحوث
الاقتصادية

2017

working paper series

**REVISITING THE IMPACT OF TRADE OPENNESS
ON INFORMAL AND IRREGULAR
EMPLOYMENT IN EGYPT**

Mélika Ben Salem and Chahir Zaki

Working Paper No. 1107

**REVISITING THE IMPACT OF TRADE OPENNESS
ON INFORMAL AND IRREGULAR
EMPLOYMENT IN EGYPT**

Mélika Ben Salem and Chahir Zaki

Working Paper 1107

June 2017

Send correspondence to:
Chahir Zaki
Cairo University and ERF
chahir.zaki@feps.edu.eg

First published in 2017 by
The Economic Research Forum (ERF)
21 Al-Sad Al-Aaly Street
Dokki, Giza
Egypt
www.erf.org.eg

Copyright © The Economic Research Forum, 2017

All rights reserved. No part of this publication may be reproduced in any form or by any electronic or mechanical means, including information storage and retrieval systems, without permission in writing from the publisher.

The findings, interpretations and conclusions expressed in this publication are entirely those of the author(s) and should not be attributed to the Economic Research Forum, members of its Board of Trustees, or its donors.

Abstract

This paper examines the impact of trade openness on job quality through the evolution of the shares of informal and irregular employment in total employment. In fact, Egypt has undertaken several liberalization waves and reforms of the labor market (1998-2012). Moreover, the economy has been subject to several events leading to a severe political instability which in turn affected production, exports, employment and employment conditions. Indeed, informal and irregular employments have exacerbated in the wake of the political turmoil of 2011. Thus, combining a microeconomic dataset (the Egyptian Labor Market Panel Survey) with macroeconomic variables (tariffs), we try to assess to what extent trade reforms affected informal/irregular workers in Egypt. Our main findings show that there is a positive association between tariffs and both informal and irregular employments in Egypt. While the effect on informality is robust, the one on irregularity is not.

JEL Classification: F10, F26

Keywords: Irregular employment, informal employment, Egypt, trade reforms.

ملخص

تبحث هذه الورقة تأثير الانفتاح التجاري على جودة الوظائف من خلال تطور حصص العمالة الغير رسمية وغير النظامية في إجمالي العمالة. في الواقع، قامت مصر بالعديد من موجات التحرير وإصلاحات سوق العمل (1998-2012). وعلاوة على ذلك، تعرض الاقتصاد لعدة أحداث أدت إلى عدم استقرار سياسي شديد أثر بدوره على الإنتاج والصادرات والعمالة وظروف العمل. والواقع أن التوظيفات الغير رسمية وغير النظامية قد تفاقمت في أعقاب الاضطرابات السياسية في عام 2011. وبالتالي، وبالجمع بين مجموعة بيانات الاقتصاد الجزئي (المسح التتبعي لسوق العمل في مصر) مع متغيرات الاقتصاد الكلي (التعريفات الجمركية)، نحاول تقييم مدى تأثير الإصلاحات التجارية على القطاع غير الرسمي / العمال غير النظاميين في مصر. وتبين نتائجنا الرئيسية أن هناك ارتباطا إيجابيا بين التعريفات الجمركية والوظائف غير النظامية وغير النظامية في مصر. وفي حين أن التأثير على القطاع غير الرسمي قوي، فإن التأثير على عدم انتظامها ليس كذلك.

1. Introduction

Developing countries do not suffer only from participation problems on the labor market, but also from jobs characterized by a low quality. Such a low quality can be translated into jobs without contracts, without social insurance schemes or without any protection of laws and administrative rules covering commercial licensing. Moreover, those economies in general, and Egypt in particular, have been subject to several policy reforms (trade liberalization, privatization, etc) that affected the labor market.

It is important to note that informal employment conventionally defines any job that does not comply with labor market legislation and does not provide worker benefits. It primarily concerns small firms. A broader definition includes temporary or part-time workers employed in formal establishments. At most, it also includes rural households in developing countries.

Trade liberalization is usually believed to lead to a rise in informality: as trade reforms expose formal establishments to increased foreign competition, they reduce labor costs by replacing permanent workers with part-time labor, subcontracting with establishments in the informal sector, or laying off workers who will seek employment in the informal sector (Goldberg and Pavcnik, 2003).

However, informal sector is so diverse in developing countries, that it cannot be just seen as providing inferior jobs. Moreover, many informal jobs are in the non-traded services sector, which should be untouched by a trade reform.

Empirical works are inconclusive. For instance, Goldberg and Pavcnik (2003) test a model with efficiency wage, using household survey data for Brazil and Colombia collected over the 1980s and the 1990s. They find no evidence of any significant relationship between trade liberalization and informality in Brazil, whether positive or negative. For Colombia, they present evidence that informality has increased after trade liberalization. However, this finding appears directly related to the degree of labor market flexibility. More specifically, Goldberg and Pavcnik (2003) reported that prior to labor market reform, when costs of firing formal workers were high, an industry-specific tariff reduction was associated with a greater likelihood of becoming informal. After labor market reform, however, industry-specific tariff reductions were associated with smaller increases in the probability of becoming informal.

On the other hand, Aleman-Castilla (2006) in a heterogeneous firm model, shows that trade liberalization (i.e. lower trade costs) implies that some firms will find it more profitable to enter the formal sector rather to remain informal. The least productive informal firms will be forced to exit the industry and only the most productive (formal) firms will export to international markets. Moreover, both, the exit of the least productive firms and the rise in output of the most productive (formal) firms lead to an aggregate increase in productivity. Therefore, increasing openness may allow the most productive firms to expand their market shares and force the least productive ones to exit, thereby inducing aggregate productivity gains through within industry reallocations (Melitz, 2003). Thus, the rationalization effect of trade is not only driven by competition from imports, but also via the “pull” of the export market: high productivity firms extend their market shares and use of resources at the expense of low-productivity firms, which are forced to exit. Becker (2014) showed that trade liberalization reduces informal employment unambiguously. At the empirical level, Aleman-Castilla (2006) used the NAFTA experience to assess the impact of trade liberalization on informality in Mexico. Using Mexican and US import tariff data and the Mexican National Survey of Urban Labor, the study’s findings suggest that lower import tariffs are related to lower informality in tradable industries. Selwaness and Zaki (2015) combining a microeconomic dataset (the Egyptian Labor Market Panel Survey) with macroeconomic variables (tariffs) examined the effect of trade reforms on informal jobs in Egypt and found that trade liberalization has reduced informality in Egypt’s manufacturing sector.

This paper examines the impact of trade openness on two aspects of employment with bad conditions: informal and irregular one (not informal one only). In fact, Egypt has undertaken several liberalization waves and reforms of the labor market. Moreover, the economy has been subject to several events leading to a severe political instability which in turn affected production, exports, employment and employment conditions. Indeed, informal and irregular employment have exacerbated in the wake of the political turmoil of 2011. Thus, combining a microeconomic dataset (the Egyptian Labor Market Panel Survey) with macroeconomic variables (tariffs), we try to assess to what extent trade reforms affected informal workers in Egypt. Our main findings show that there is a positive association between tariffs and both informal and irregular employment in Egypt. While the effect on informality is robust, the one on irregularity is not.

The remainder of the paper is organized as follows. Section 2 presents some stylized facts on informality and irregular employment in Egypt. Section 3 describes the methodology. Section 4 discusses the empirical results. Section 5 concludes.

2. Stylized Facts

We first present detailed descriptive statistics¹ on informal and irregular employments and conclude this section with some numbers on Egyptian tariffs and their correlations with the 2 kinds of employment. Data on employment are from the Egyptian Labor Market Panel Survey (ELPMS) characterized by three rounds, 1998-2006-2012. Data on industrial tariffs (2 digits), expressed as weighted means, come from WTO online database for the years 1997-2005-2011. These tariffs are the Most-Favored Nation applied rate. Thus, they are normal non-discriminatory tariff actually charged on imports (excludes preferential tariffs under free trade agreements and other schemes or tariffs charged inside quotas).

2.1 The Egyptian labor force

In Figure 1 is reported the repartition of the working-age population (15-64) between formal, informal, irregular employment and unemployment in terms of the labor force². First unemployment is very low, less than 5% for the 3 years, despite its larger defining than the one provided by OIT as we keep people who are not searching for a job. It could be explained to a large extent by the poor knowledge unemployment benefit insurance system as pointed out by Sieverding and Selwaness (2012), in a paper incidentally about the shortcomings of the whole social protection in Egypt. In the remainder of the paper we do not then consider the issue of unemployment as an alternative for informal jobs. The analysis is then focused on the evolution of informal and irregular jobs.

2.1.1 Informal employment in Egypt

The theoretical and empirical literature showed that trade liberalization is always associated to higher levels of employment since each economy specializes in the sector where it has a comparative advantage. However, trade liberalization has not been able to create jobs in the MENA region. One of the reasons might be the segmentation of labor markets in MENA countries and the existence of a large informal sector (Figure 2). Indeed, the MENA region is at the middle of the LAC and ECA regions regarding the share of informal workers, defined as workers who do not benefit from a social security scheme or do not have a working contract. Trade is likely to have different effects on formal vs. informal workers.

¹ We use the panel weights defined for each round, and provide the number of observations, for the sample and the population, in table A1 in appendix.

² We select the market definition and the 3 month-reference for each kind of employment, and unemployment. The shares are simply the ratio of the corresponding frequency to the labor force one: for informal and formal employment, they do not correspond to the definition of employment rate (reported to the working age population). The frequencies are given in table A2 in appendix.

In Egypt, informal employment has increased between 1998 and 2006 and in a less pronounced way between 2006 and 2012 (Figure 3). The share of informal jobs in manufacturing sectors across time is similar to the whole economy, even it is lesser, i.e. there is a majority of informal jobs since 2006³.

At the sectoral level (Figure A2 in appendix) in 1998, seven economic activities over 20 are characterized by a majority of informal jobs. Informality can be observed in all the activities except in sectors of Electricity, Water supply and Financial insurance. Every sector in 2006 is characterized by informal jobs, and the manufacturing sector joins the group of previous sectors with a majority of informal jobs (except the sector of other service activities for which the proportion of informal jobs drops down below 50%). Hence, the big picture remains the same, and informal jobs have increased in almost every sector (16 over 20). It is worthy to note, when focusing only on the industry (Figure A3 in Appendix), that three manufacturing sectors - food products and beverages, wearing apparels and furniture - include more than 40% of the employment while the share of informal jobs in these subsectors is greater than 50%.

The features of Egyptian informal workers, respectively in all sectors and manufacturing sectors, correspond to the usual features (Table A2 in appendix). When considering all sectors, males are more affected since women suffer from a problem of labor force participation: this explains also why being the household head or being married are associated with high frequencies of informal jobs, respectively more than 50% in 2012. As usual age and education protect more against informality: more than half of the young and the less educated people have informal jobs. Living in rural areas and working in private small firms lead to similar probabilities to have informal jobs. Comparing to the whole economy, informal workers in the manufacturing sector only are not so different except that they are older. In fact, the share of the young clearly decreases over the three rounds whereas it increases in the whole economy. Three quarters of the informal workers are wage earners, which is above the average when looking at the non-agriculture employment (less self-employed).

The transition probabilities in table 1 are computed using the panel weights, covering 3 years⁴. The probability to stay formal declines by 16 percentage points whereas the probability to stay informal increases, which corresponds to the evolution of informal jobs. Nevertheless, informal jobs seem to act as a stepping stone for formal jobs, as the probability from informal to formal jobs is 25%, but after 2006 it decreases in the whole economy whereas it remains at 20% in the manufacturing sector.

Table 2a and 2b provide similar transition moves (frequencies and probabilities in italic type) but implying the manufacturing sector, as the entry or the exit sector, in order to obtain some orders of magnitude of the sectoral linkages. There is a higher probability (60%) to get first an informal job (table 2a). Moreover, there is significant rigidity in the labor market since people who were formal remain formal but with a probability decreasing strongly in 2012 comparing to workers already engaged in the manufacturing sector.

The proportion of workers leaving the manufacturing sector (table 2a) has increased across the 2 rounds from 37% to 45% with the same proportion between informal and formal workers in 2006 and a greater proportion of informal workers in 2012.

³There is a problem of consistency of subsectors definition: the waves 1998 and 2006 rely on the ISIC rev 3.1 classification whereas the sectors of 2012 are defined according the ISIC 4 classification. We follow the older version because the tariff data rely on it. According to the correspondence website, we redefine the economic activity in 2 digit in 2012 by using the 4 digit variables but a lot of overlapping correspondences.

⁴It is worthy to note that when using the panel weights covering the corresponding years, the probability to stay in the same status is slightly higher.

2.1.2 Irregular employment in Egypt

Irregular employment is defined as the number of workers with contract duration of less than 12 months, own-account workers and contributing (unpaid) family workers (irregular employment). Irregular jobs seem to be a characteristic of the private sector, as informal jobs, even if regular jobs are the usual ones: the probability of a regular job is 85% (lower in the private sector with a share of more than 70% and higher in the manufacturing sector with a share of 90%) in 1998 and 80% in 2012. Since 2006, it has increased revealing a deterioration of job quality in Egypt which could be associated to different events, such as the financial crisis, the political instability or the continuing effect of trade liberalization (Figure 4). Irregular and informal jobs overlap as irregularity captures job insecurity whatever the job, informal and formal. We assess this connection by Figure A3 in appendix. It reveals that three quarters of the regular jobs are informal in the private sector whereas this share is below 50% in the manufacturing sector. Furthermore, 95% of irregular jobs are informal whatever the sector.

When looking at the individual characteristics of the irregular workers (table A4 in appendix), we found similarities with the ones of the informal workers, but we can point out that 90% of irregular workers are wage earners and more than 70% live in rural area.

The transition probabilities between regular and irregular jobs have more or less the same pattern as the informal one. Indeed, there is a significant rigidity since those who are regular remain regular with a probability greater than 85% whatever the year. Those who are irregular remain also irregular but the probability is above 50% only after 2006. Moreover, these shares have been higher between 1998 and 2006 than between 2006 and 2012 (Table 3a).

Again, we focus on the link between irregularity and informality, by distinguishing between regular informal and regular formal jobs. Irregularity becomes more persistent after 2006 as the probability from irregular to regular jobs decreases drastically (see Table 3b).

2.2 Trade openness

Despite recent liberalization, MENA's trade regimes remain more restrictive than those of comparator countries such as the middle-income countries. MENA countries have lowered tariffs over the past two decades, often in the context of trade agreements with the EU or the United States. However, tariffs remain high (averaging 12 percent, see Table 4). Among our countries of interest, Jordan has reached the lowest levels of tariffs in both the manufacturing and primary sectors, while Tunisia's and Egypt's primary sector remains highly protected with an average tariff of 27 percent and 36 percent respectively.

Industry tariffs and informal employment move in the same direction as indicated by correlations in table 5, whereas the correlation between irregular employment and industry tariff is negative but weak for the years 1998 and 2006. The brutal change in 2012 could be explained rather by the 2011 political events than trade reforms.

In figures A4a, A4b and A4c, we get the evolution of irregular and informal employment shares and the industry tariff for each manufacturing subsector. The global correlation hides the huge heterogeneity existing between these sectors. We get 3 basic cases. First, high degrees of job insecurity are associated with middle tariffs. For example, 3 sectors (wood, tanning and leather, furniture) have informal shares close to 90% whereas their tariff varies in average from 5 to 20. Second, opposite moves between informality and trade openness across time are also present: in the paper sector, the sharp increase in informal and irregular employment shares across is combined with a decrease in the tariff. Finally, the motor vehicle sector illustrates the situation of a huge decrease in informality with stable tariffs. Irregularity in employment follows the evolution of informality but to a lesser extent in those sectors.

Over the same period, as trade liberalization increased, the value of exports has increased between 2006 and 2010, while the number of Egyptian exporting firms has declined by an average of 3.6% during the same period, with the largest decline in 2008, indicating that only competitive firms could compete and stay in the market, following the 2008 financial crisis; with each firm exporting more on average. This shows that a higher level of openness allowed the most productive firms to expand their market shares and force the least productive ones to exit (Melitz, 2003).

After examining the informal and irregular employment in Egypt. we will empirically examine the relationship between such labor characteristics and trade openness.

3. Methodology

To understand the impact of trade effect on labor market informality/irregularity. a two-step analysis approach is adopted. following Goldberg and Pavnick (2003) and Selwaness and Zaki (2015). In this approach. the informality premium is regressed on the tariffs in order to determine the impact of tariffs reduction on informality/irregularity premia. The informality/irregularity premium is the change in the probability of informal/irregular employment that is only due to the industrial affiliation of the workers.

Two steps are undertaken in this approach. In the first step. a probit model for the probability of working in the informal/irregular sector is estimated while controlling for the individual. household and regional variables. and the industry indicators. The first stage regressions are estimated separately for each year in our sample (1998. 2006 and 2012) as follows:

$$Informal_{ijt} = \alpha_1 X_{ijt} + \alpha_2 H_{ijt} + \alpha_3 R_{ijt} + \alpha_4 IP_{jt} + v_{ijt} \quad (1)$$

$$Irregular_{ijt} = \alpha_1 X_{ijt} + \alpha_2 H_{ijt} + \alpha_3 R_{ijt} + \alpha_4 IP_{jt} + v_{ijt} \quad (2)$$

where v_{ijt} is the discrepancy term.

The dependent variable is a binary variable that takes the value of 1 if the individual i employed in sector j at time t is working informally (or irregularly) and 0 otherwise. Remind that an informal worker has no contract and/or is not covered by social security. Irregular workers do not have jobs on a regular basis but might be hired for a specific period of time or a specific task.

The explanatory variables consist of the individual characteristics X_{ijt} which include gender (a dummy for being a female), age, age squared, marital status (a dummy for being married), education level (three dummies for less than intermediate, intermediate, and above intermediate levels). The household characteristics H_{ijt} are mainly captured by the household size, a dummy for being head of household, the share of dependents aged 0 to 14 or above 65 years old in the household. and the share of the out of labor force 15 to 64 years old. We add five regional dummies (Alexandria and Canal Cities, urban Lower Egypt, urban Upper Egypt, rural Lower Egypt, and rural Upper Egypt) to control for regional characteristics R_{ijt} . Finally, industry indicators IP_{jt} are added to control for the unobserved industry-specific characteristics. The coefficient of the industry dummy is considered as being “the informality/irregularity premium” capturing the part of the variation in the probability of being informal/irregular that cannot be explained by the worker characteristics but rather by the workers’ industry affiliation.

In the second step the industry coefficients α_4 retrieved from the first step regressions are pooled over time (for 1998 and 2006) and are then regressed on the tariffs. These coefficients are obtained by filtering out the effects of observable worker characteristics and thus indicate the variation in the probability of informality that is due to the workers’ affiliation to this

industry and known as the industry informality (irregularity) differentials according to Goldberg and Pavnick (2003). Therefore, regressing tariffs on informality (irregularity) differentials permits explaining the change in informality in each industry by trade policy.

$$IP_{jt}^* = \delta_1 Tar_{jt} + \delta_2 D_j + \delta_3 D_t + v_{jt} \quad (3)$$

where v_{jt} is the discrepancy term.

We follow Goldberg and Pavnick (2003) who included lagged values of tariffs to reduce endogeneity and we do not take into account exports and imports⁵.

The dependent variable IP_{jt}^* used in the second step is the estimated industry coefficients after being transformed and expressed as deviations from the employment-weighted average informality (irregularity) differential. Such transformation is undertaken in order to remedy for the sensitivity of the estimated industry informality differentials with respect to the omitted industry dummy. It ensures that both the coefficients and their standard errors are independent of the base industry choice (Haisken-DeNew and Schmidt 1997)⁶. Each normalized informality (irregularity) differential (or industry dummy coefficient) IP_{jt}^* can hereafter, be interpreted as the percentage point difference in the probability of informal (irregular) employment for a worker in a given industry relative to an average worker in all industries with the same observable characteristics (Goldberg and Pavnick 2003, 22).

4. Empirical Findings

Table A5 in appendix reports the first stage of the two-step analysis for informality. We find results similar by those provided in the descriptive statistics section. As mentioned above, since we control for workers characteristics in the first stage (and thus control for industry composition each year), our second stage results are not driven by differences in worker composition across sectors. We run the second stage (tables 6 and 7) for 1998, 2006 and 2012 separately in order to obtain the coefficients. Moreover, we pool both years together including a year dummy for 1998 and 2006 among the regressors to take into account the fluctuations in business cycles that can affect simultaneously the tariff formation and informal employment. Moreover, including the 2006-year dummy controls for the change introduced in the labor market environment following the adoption of the new 2003 labor law (12/2003). The dummy of 2012 controls for the instability that affected Egypt in the wake of the political turmoil. Industry dummies were also controlled for in the pooled regression. Inclusion of these controls additionally reduces the potential estimation biases.

Overall, estimations were fit using two techniques, both yielding similar results. The first one is the ordinary least-squares weighted by the inverse of the estimated transformed variance as presented above (Haisken-DeNew and Schmidt 1997). The second one is the variance-weighted least squares which differs from ordinary least-squares (OLS) regression in that it does not assume homogeneity of variance, but requires that the conditional variance of the dependent variable be estimated prior to the regression. The estimated variance needs not be constant across observations. This method treats the estimated variance as if it was the true variance when computing the coefficients standard errors. Tables 9 and 10 present the results

⁵ Egypt experienced two waves of trade liberalization. The first one took place early 1990s with the implementation of the Economic Reform and Structural Adjustment program imposed by the World Bank and the International Monetary Fund. Such a program was relatively exogenous. The second one, in 2004, was part of a larger reform programs aiming at improving the investment climate in Egypt by reducing tariffs, simplifying administrative barriers and increasing the ease of doing business. For these reasons, tariffs in Egypt are less likely to be endogenous than in other countries.

⁶ The normalization procedure of the industry coefficients and their standard errors are adopted following Haisken-DeNew and Schmidt (1997) and this procedure is known as the two-step restricted least squares procedure (Haisken-DeNew and Schmidt 1997). It consists of transforming each industry coefficient, estimated through equation 1, to a deviation from the employment-share weighted average of all other estimated industry coefficients. Thus, each industry coefficient is not affected by the choice of the reference industry omitted.

of the second step and show that tariffs are positively associated with the informality premium for both wage workers and all workers of the manufacturing sector. Indeed, the coefficient on tariff is significantly positive, yet small in magnitude. These results imply that trade liberalization has a positive effect on the labor market in terms of decreasing informal employment. This is in line with the heterogeneous firm model of Aleman-Castilla (2006) where trade liberalization (i.e. lower trade costs) implies that some firms will find it more profitable to enter the formal sector rather than to remain informal. The least productive informal firms will be forced to exit the industry and only the most productive (formal) firms will export to international markets. Thus, lower tariffs imply less informality.

While the results for the first step of the probability of working in an irregular job are reported in table A6 in appendix, both Tables 8 and 9 show the results of the second step. It is worthy to note that the effect of tariffs on the irregularity premium is less robust than the one of informality. Indeed, while table 11 shows that the effect of tariffs is negative for 2006 but insignificant for the others. Moreover, when the regressions are limited to wage workers, the effect of tariff for 2006 and the panel are significantly negative and positive respectively. Yet, all the other years and regression techniques are insignificant. Consequently, informal employment is more connected to trade policy issues more than irregular one.

5. Conclusion

This paper examines the impact of trade openness on two aspects employment with bad conditions: informal and irregular one. In fact, Egypt has undertaken several liberalization waves and reforms of the labor market. Moreover, the economy has been subject to several events leading to a severe political instability which in turn affected production, exports, employment and employment conditions. Indeed, informal and irregular employment have exacerbated in the wake of the political turmoil of 2011. Thus, combining a microeconomic dataset (the Egyptian Labor Market Panel Survey) with macroeconomic variables (tariffs), we try to assess to what extent trade reforms affected informal workers in Egypt.

Our main findings show that there is a positive association between tariffs and informal employment. The effect of tariffs on irregular employment is less robust. Such an effect is attributed to the fact that the least productive informal firms will be forced to exit the industry and only the most productive (formal) firms will export to international markets. Therefore, increasing openness may allow the most productive firms to expand their market shares and force the least productive ones to exit, thereby inducing aggregate productivity gains through within industry reallocations. It is important to note also that the demand for formal that are usually more skilled workers increases after openness. Indeed, the skill-biased technical change favors skilled over unskilled labor to face the fierce competition. Hence, the relative demand of formal and skilled workers is likely to increase leading to a declining informal employment.

From a policy perspective, as trade liberalization leads to a reduction in informal employment, there is a need to consider the existence of an informal sector and the economic environment jointly in policy decisions on trade. Therefore, the government is called to ensure a sound macroeconomic framework that provides enough incentives for firms to expand in the wake of trade openness periods. These incentives include mainly tax exemptions, better investment climate conditions, simplified procedures since all these factors are likely to affect the firms' productivity and consequently their expansion and their increasing labor demand. Second, as the demand for formal and skilled workers increases after trade liberalization periods, providing technical training for these workers is crucial to increase their productivity to better face the fierce competition once the economy is more exposed to the rest of the world. Finally, a more flexible legal setting would amplify the effect of trade reforms on employment. Indeed, more flexible labor markets shall facilitate

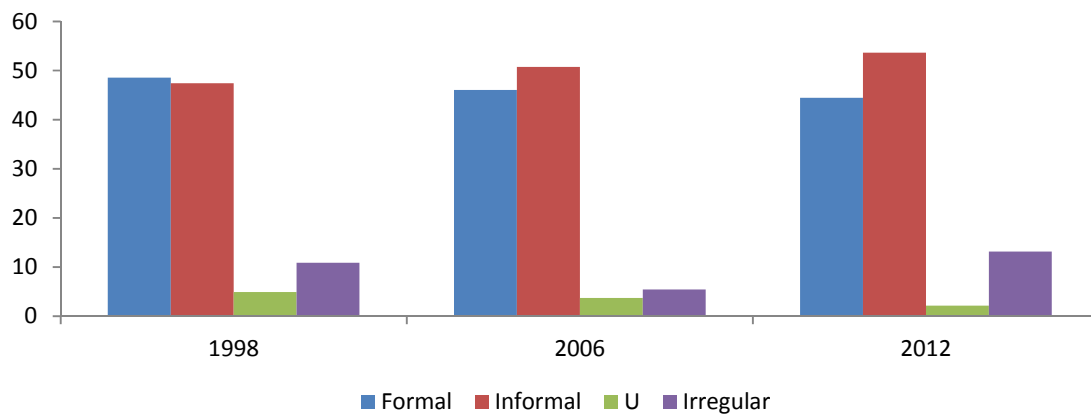
the transition from informal to formal employment and amplify the benefits of trade openness on employment in terms of jobs quality and job quantity.

References

- Aleman-Castilla B (2006). The effect of Trade liberalization on informality and wages: Evidence from Mexico. CEP Discussion Papers dp 0763. Centre for Economic Performance. LSE. December.
- Andersen T W (2004). Trade reforms and informality: The role of labor market imperfections in macroeconomic adjustments in developing countries. Master's Thesis. Institute of Economics. University of Copenhagen.
- Assaad R (2009). Labor supply, employment and unemployment in the Egyptian economy, 1988-2006. In *The Egyptian labor market revisited*. ed. R. Assaad. Cairo: American University in Cairo Press.
- Assaad R, Roushdy R (2009). Analysis of sample attrition in the Egypt labor market panel survey. In: Assaad R (ed) *The Egyptian labor market revisited*. American University in Cairo Press. Cairo.
- Barsoum G (2007). Egypt Labor Market Panel Survey (2006) Report on methodology and data collection. ERF Working Papers 0704.
- Becker, D. (2014). Heterogeneous Firms and Informality: The Effects of Trade Liberalization on Labor Markets, No 180124, Working Papers, Cornell University,
- Bosch M, Goni-Pacchioni E, Maloney W (2012). Trade liberalization, labor reforms and formal-informal employment dynamics. *Labor Economics* 19(5): 653–67.
- Currie J, Harrison A. E (1997). Sharing the costs: The impact of trade reform on capital and labor in Morocco. *Journal of Labor Economics* 15(3) (July): 44–71.
- AlAzzawi S (2013). Did Trade Liberalization Benefit Female Workers? Evidence on Wage and Employment Effects from Egypt. ERF Working Paper 787.
- AlAzzawi S, Said M. (2009). Trade liberalization, inter-industry wage differentials and job quality in Egyptian manufacturing. Gender and Work in the Mena Region. Working Paper Series 6 (August). The Population Council.
- El-Hamidi F (2008). Trade liberalization, gender segmentation, and wage discrimination: Evidence from Egypt. ERF Working Papers 0414.
- El Mahdi A, Rashed A (2009). The Changing Economic Environment and The Development of Micro-and Small Enterprises in Egypt, 2006. In *The Egyptian labor market revisited*. ed. R. Assaad. Cairo: American University in Cairo Press.
- Fugazza M, Fiess N M (2008). Trade liberalization and informality: New stylized facts. Tech. Rep. 43. UN Policy Issues in International Trade and Commodities Study Series.
- Goldberg P, Pavcnik N (2003). The response of the informal sector to trade liberalization. *Journal of Development Economics* 72: 463–96.
- Haisken-De New J, Schmidt C M (1997). Inter-industry and inter-region differentials: Mechanics and interpretation. *Review of Economics and Statistics* 79(3): 516–21.
- Hendy, R. and Zaki, C. (2014). “Trade Facilitation and Firms’ Exports: The Case of Egypt”, ERF Working Paper No. 850, July.
- Heid B, Larch M, Riaño A (2011). Maquiladoras and Informality: A mixed blessing. CESifo Working Paper Series 3689.

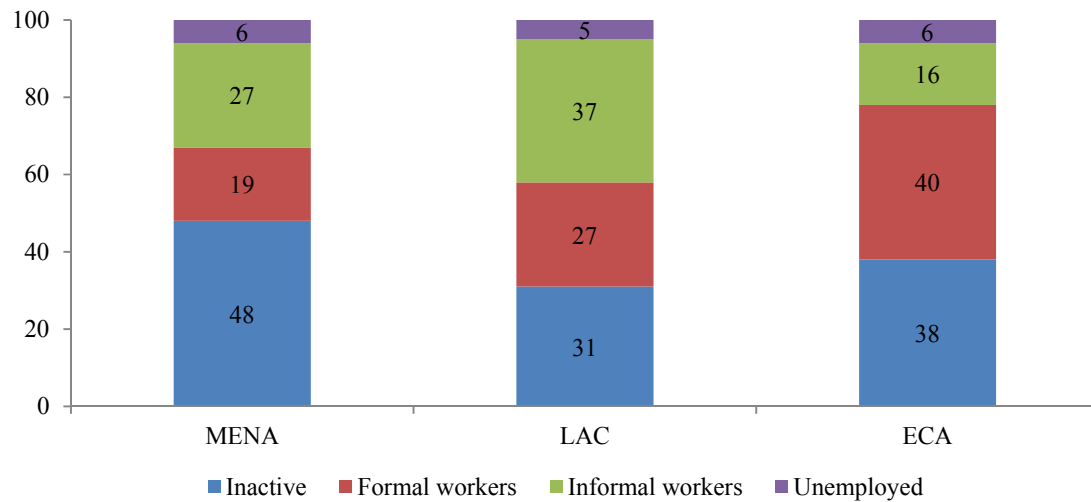
- ILO International Labor Office (2002). Decent work and the informal economy. Report VI. International Labor Conference. 90thSession. International Labor Office. Geneva. Switzerland.
- Cazes. S. Nešporová. A (2007). Flexicurity: A relevant approach in Central and Eastern Europe. International Labor Office. Geneva 2007.
- ILO International Labor Office (2012). Statistical update on employment in the informal economy. International Labor Office. Geneva. Switzerland. June. (Available at http://laborsta.ilo.org/applv8/data/INFORMAL_ECONOMY/2012-06-Statistical%20update%20-%20v2.pdf)
- Maddala GS (1987). Limited dependent variable models using panel data. *Journal of Human Resources* 22(3): 307–38.
- Melitz, M. (2003). “The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity”, *Econometrica*, Vol. 71, No. 6., pp. 1695-1725.
- Moulton BR (1990). An illustration of a pitfall in estimating the effects of aggregate variables on micro unit. *The Review of Economics and Statistics* 72(2) (May): 334–38.
- Paz L (2012). The impacts of trade liberalization on informal labor markets: An evaluation of the Brazilian case. MPRA Paper 38858. University Library of Munich. Germany. March.
- Selwaness. I. and Zaki. C. (2015). “Assessing the Impact of Trade Reforms on informal employment in Egypt”. *The Journal of North African Studies*. vol. 20. issue 3. pages 391-414
- Wahba J (2009). The impact of labor market reforms on informality in Egypt. Working Papers 3. The Population Council.
- Wahba J. Mokhtar M (2002) Informalization of labor in Egypt. In *The Egyptian Labor Market in an Era of Reform*. ed. R. Assaad. Cairo: American University in Cairo Press.

Figure 1: Composition of Employment in the Egyptian Labor Force



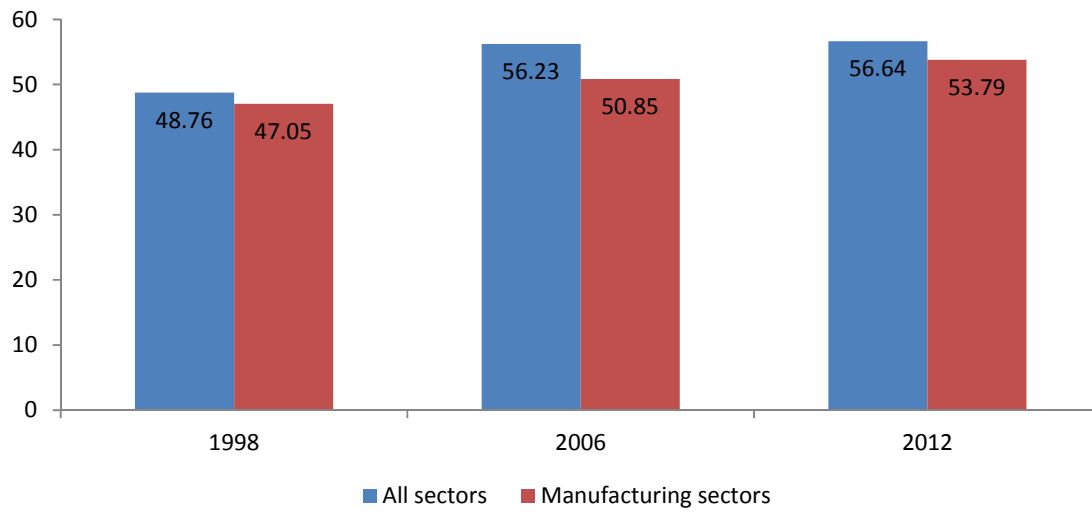
Source: Constructed by the authors using the ELMPS (1998, 2006, 2012).

Figure 2: Composition of the Working-Age Population in Selected MENA, Latin America and the Caribbean, and Eastern Europe and Central Asia, 2010



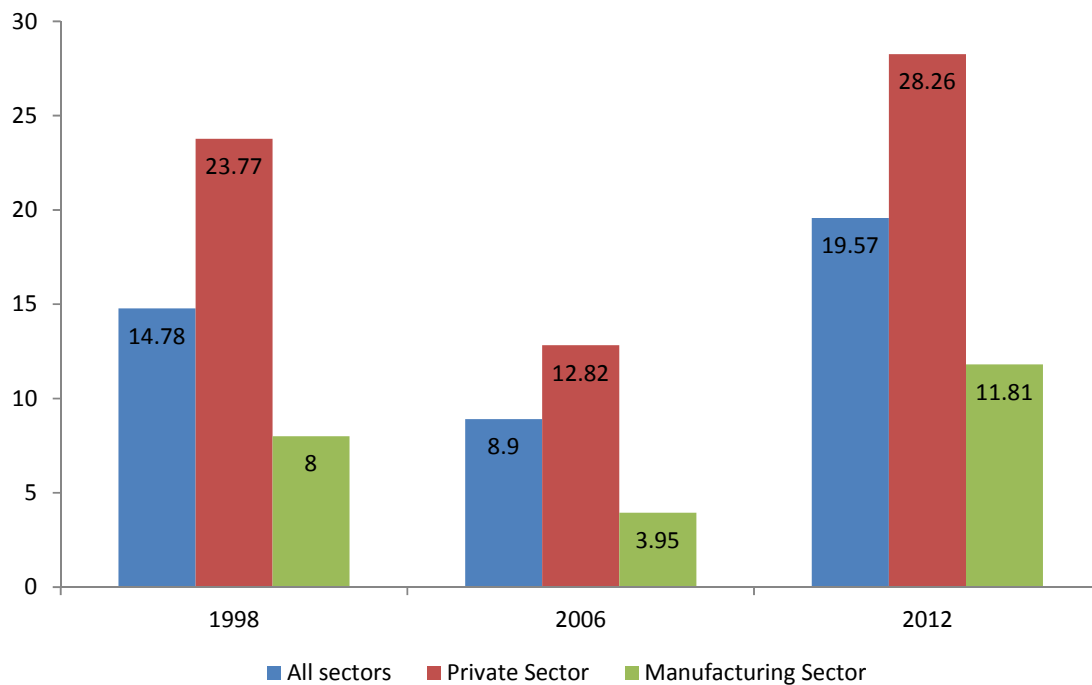
Source: World Bank 2013, based on ILO

Figure 3: Share of Informal Workers in Total Employment, in 1998, 2006 and 2012



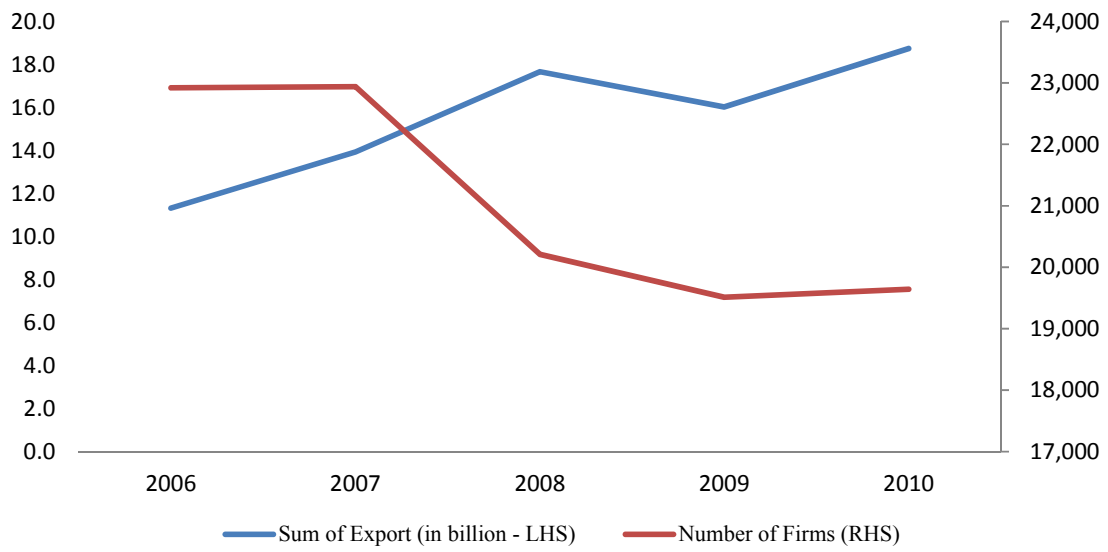
Source: Constructed by the authors using the ELMPS (1998, 2006, 2012).

Figure 4: Share of Irregular Workers in Total Employment, in 1998, 2006 and 2012



Source: Constructed by the authors using the ELMPS (1998, 2006, 2012).

Figure 5: Exports and Number of Firms



Source: Hendy and Zaki (2015)

Table 1: Transition Probabilities between Formal and Informal Jobs

All sectors		2006	
		Formal	Informal
1998	Formal	90.76	9.24
	Informal	24.82	75.18
		2012	
2006	Formal	81.95	18.05
	Informal	17.94	82.06
Within the manufacturing sector		2006	
		Formal	Informal
1998	Formal	89.51	10.49
	Informal	19.39	80.61
		2012	
2006	Formal	76.13	23.87
	Informal	20.36	79.64

Source: Constructed by the authors using the ELMPS (1998, 2006, 2012).

Table 2a: Transitions between Formal and Informal Jobs Implying the Manufacturing Sector

Outside Manuf. → Inside Manuf.		2006		
		Formal	Informal	Total
1998	Formal	50 <i>84.08</i>	9 <i>15.92</i>	59 <i>100.00</i>
	Informal	23 <i>37.60</i>	37 <i>62.40</i>	60 <i>100.00</i>
	Not working	100 <i>32.18</i>	211 <i>67.82</i>	311 <i>100.00</i>
	Total (all flows)	173 <i>20.62</i>	257 <i>30.63</i>	430 <i>51.25</i>
				2012
2006	Formal	54 <i>68.60</i>	25 <i>31.40</i>	79 <i>100.00</i>
	Informal	44 <i>41.68</i>	62 <i>58.32</i>	106 <i>100.00</i>
	Not working	92 <i>32.07</i>	195 <i>67.93</i>	287 <i>100.00</i>
	Total (all flows)	190 <i>20.81</i>	282 <i>30.89</i>	472 <i>51.70</i>

Notes: Lecture: numbers in italic type represent percentages from the total in row. For example, 84.08 is the proportion of formal workers remaining formal, between 1998 and 2006 among formal workers in 2006. The other numbers are frequencies: for example, 50 formal workers outside the manufacturing sector remain formal but enter the manufacturing sector.

Source: Constructed by the authors using the ELMPS (1998, 2006, 2012).

Table 2b: Transition Probabilities between Formal and Informal Jobs Implying the Manufacturing Sector

Inside Manuf. → Outside Manuf.		2006			
		Formal	Informal	Not working	Total (all flows)
1998	Formal	44 <i>12.26</i>	28 <i>7.80</i>	67 <i>18.66</i>	139 <i>38.72</i>
	Informal	24 <i>8.33</i>	46 <i>15.97</i>	29 <i>10.07</i>	99 <i>34.38</i>
	Total	68 <i>100</i>	74 <i>100</i>	96 <i>100</i>	238 <i>36.79</i>
				2012	
2006	Formal	50 <i>13.33</i>	50 <i>13.33</i>	55 <i>14.67</i>	155 <i>4.,33</i>
	Informal	31 <i>7.89</i>	88 <i>22.39</i>	85 <i>2.63</i>	204 <i>5.91</i>
	Total	81 <i>100</i>	138 <i>100</i>	138 <i>100</i>	357 <i>44.74</i>

Notes: Lecture: numbers in italic type represent percentages from the total in column. For example, 12.26 is the proportion of formal workers remaining formal, between 1998 and 2006 among formal workers in 2006. The other numbers correspond to frequencies: for example, 44 formal workers inside the manufacturing sector remain formal but exit the manufacturing sector.

Source: Constructed by the authors using the ELMPS (1998, 2006, 2012).

Table 3a: Transition Probabilities between Regular and Irregular Jobs

All sectors		2006	
		Regular	Irregular
1998	Regular	97.67	2.33
	Irregular	72.59	27.41
		2012	
2006	Regular	87.32	12.68
	Irregular	42.16	57.84
Within the manufacturing sector		2006	
1998	Regular	98.27	1.73
	Irregular	87.35	12.65
		2012	
2006	Regular	91.48	8.52
	Irregular	53.13	46.87

Source: Constructed by the authors using the ELMPS (1998, 2006, 2012).

Table 3b: Transition Probabilities between Formal, Informal and Irregular Jobs

All sectors		2006			
		Regular Formal	Regular Informal	Irregular	Total
1998	Regular Formal	1965 <i>91.23</i>	173 <i>8.03</i>	16 <i>0.74</i>	2154 <i>100</i>
	Regular Informal	326 <i>26.00</i>	864 <i>68.90</i>	64 <i>5.10</i>	1254 <i>100</i>
	Irregular	128 <i>21.02</i>	314 <i>51.56</i>	167 <i>27.42</i>	609 <i>100.00</i>
	Total	2419 <i>60.22</i>	1351 <i>33.63</i>	247 <i>6.15</i>	4017 <i>100.00</i>
			2012		
2006	Regular Formal	2011 <i>81.45</i>	344 <i>13.93</i>	114 <i>4.62</i>	2469 <i>100</i>
	Regular Informal	373 <i>18.49</i>	1190 <i>59.00</i>	454 <i>22.51</i>	2017 <i>100</i>
	Irregular	47 <i>10.42</i>	143 <i>31.71</i>	261 <i>57.87</i>	451 <i>100</i>
	Total	2431 <i>49.24</i>	1677 <i>33.97</i>	829 <i>16.79</i>	4937 <i>100</i>

Lecture: numbers in italic type represent percentages from the total in row. For example, 91.23 is the proportion of regular formal workers remaining regular formal. between 1998 and 2006 among regular formal workers in 2006. The other numbers are frequencies: for example, 1965 formal regular workers remain formal regular.

Source: Constructed by the authors using the ELMPS (1998, 2006, 2012).

Table 4: Tariff Rates by Country

	1995	2000	2005	2008
<i>Applied Tariff rate (simple mean)</i>				
Egypt	24.3	19.65	19.09	12.52
Jordan	..	23.82	12.35	10.62
Tunisia	29.67	29.38	13.28	21.88
Middle income	13.99	14.4	10.2	8.7
<i>Applied Tariff rate. Manufacturing (simple mean)</i>				
Egypt	24.12	..	12.04	9.5
Jordan	..	23.26	11.9	10.03
Tunisia	29.77	..	12.1	21.41
Middle income	13.99	14.2	9.83	8.49
<i>Applied Tariff rate. Primary (simple mean)</i>				
Egypt	25.88	..	85.16	36.14
Jordan	..	27.86	15.54	14.43
Tunisia	28.68	..	26.63	26.76
Middle income	13.95	15.84	13.16	10.33

Source: World Development Indicators online database.

Table 5: Correlation between Informal/Irregular Employment and Industry Tariffs

	Industry tariffs rates (weighted mean)		
	1998	2006	2012
Informal employment	0.347	0.339	0.307
Irregular employment	-0.016	-0.055	0.106

Source: Constructed by the authors using the ELMPS (1998, 2006, 2012).

Table 6: All Workers Manufacturing Sector: Informality Premium

	1998		2006		2012		Panel	
	OLS	WLS	OLS	WLS	OLS	WLS	OLS	WLS
tariff	0.0193 (0.0119)	0.0193*** (0.00107)	0.0242 (0.0163)	0.0242*** (0.000985)	0.0381** (0.0178)	0.0381*** (0.000803)	0.0184 (0.0132)	0.0184*** (0.00188)
Constant	-0.475* (0.260)	-0.475*** (0.0234)	-0.676** (0.299)	-0.676*** (0.0180)	-0.675** (0.253)	-0.675*** (0.0114)	-0.547 (0.388)	-0.547*** (0.0550)
Industry dum	YES	YES	YES	YES	YES	YES	YES	YES
Year dum.	NO	NO	NO	NO	NO	NO	YES	YES
Observations	22	22	21	21	21	21	64	64
R-squared	0.116		0.103		0.194		0.905	
df_m	1	1	1	1	1	1	24	24
df_r	20		19		19		39	
F	2.623		2.183		4.584		15.49	
r2	0.116		0.103		0.194		0.905	
rmse	0.534		0.587		0.601		0.241	
mss	0.747		0.752		1.656		21.54	
rss	5.697		6.542		6.864		2.260	
r2_a	0.0718		0.0558		0.152		0.847	
ll	-16.35		-17.55		-18.06		16.18	
ll_0	-17.71		-18.69		-20.33		-59.16	
rank	2	2	2	2	2	2	25	25
chi2_gf		2467		5233		9333		1938
chi2		323.6		601.2		2252		18472
df_gf		20		19		19		39

Notes: Standard errors in parentheses. *** p<0.01. ** p<0.05. * p<0.1

Table 7: Wage Workers Manufacturing Sector: Informality Premium

	1998		2006		2012		Panel	
	OLS	WLS	OLS	WLS	OLS	WLS	OLS	WLS
tariff	0.0130 (0.0174)	0.0130*** (0.00162)	0.0366* (0.0205)	0.0366*** (0.00204)	0.0243 (0.0184)	0.0243*** (0.00126)	0.0141 (0.0138)	0.0141*** (0.00301)
Constant	-0.334 (0.349)	-0.334*** (0.0326)	-0.350 (0.402)	-0.350*** (0.0401)	-0.227 (0.269)	-0.227*** (0.0184)	-0.435 (0.391)	-0.435*** (0.0854)
Indus. dum	YES	YES	YES	YES	YES	YES	YES	YES
Year dum.	NO	NO	NO	NO	NO	NO	YES	YES
Observations	22	22	21	21	21	21	64	64
R-squared	0.027		0.144		0.085		0.913	
df_m	1	1	1	1	1	1	24	24
df_r	20		19		19		39	
F	0.561		3.204		1.754		16.98	
r2	0.0273		0.144		0.0845		0.913	
rmse	0.717		0.750		0.725		0.280	
mss	0.289		1.801		0.922		31.86	
rss	10.29		10.68		9.986		3.049	
r2_a	-0.0214		0.0993		0.0363		0.859	
ll	-22.86		-22.70		-21.99		6.603	
ll_0	-23.17		-24.33		-22.92		-71.41	
Rank	2	2	2	2	2	2	25	25
chi2_gf		2291		1914		4047		817.9
chi2		64.23		322.7		373.5		8547
df_gf		20		19		19		39

Notes: Standard errors in parentheses. *** p<0.01. ** p<0.05. * p<0.1

Table 8: All Workers Manufacturing Sector: Irregularity Premium

	1998		2006		2012		Panel	
	OLS	WLS	OLS	WLS	OLS	WLS	OLS	WLS
Tariff	-0.000133 (0.00153)	-0.000133 (0.000508)	-0.00383 (0.00331)	-0.00383*** (0.00106)	0.000674 (0.00312)	0.000674 (0.000492)	0.000598 (0.00444)	0.000598 (0.00112)
Constant	0.0272 (0.0295)	0.0272*** (0.00983)	0.234*** (0.0528)	0.234*** (0.0169)	-0.0695 (0.0498)	-0.0695*** (0.00786)	0.0243 (0.124)	0.0243 (0.0310)
Industry dum	YES	YES	YES	YES	YES	YES	YES	YES
Year dum.	NO	NO	NO	NO	NO	NO	YES	YES
Observations	22	22	21	21	21	21	64	64
R-squared	0.000		0.066		0.002		0.637	
Rank	2	2	2	2	2	2	25	25
ll_0	29.24		13.59		10.85		37.14	
Ll	29.24		14.30		10.88		69.58	
r2_a	-0.0496		0.0168		-0.0500		0.414	
Rss	0.0902		0.315		0.436		0.426	
Mss	3.41e-05		0.0222		0.00107		0.748	
Rmse	0.0672		0.129		0.152		0.105	
r2	0.000378		0.0660		0.00245		0.637	
F	0.00756		1.343		0.0467		2.853	
df_r	20		19		19		39	
df_m	1	1	1	1	1	1	24	24
df_gf		20		19		19		39
chi2		0.0682		13.09		1.876		1087
chi2_gf		180.4		185.2		762.6		619.3

Notes: Standard errors in parentheses. *** p<0.01. ** p<0.05. * p<0.1

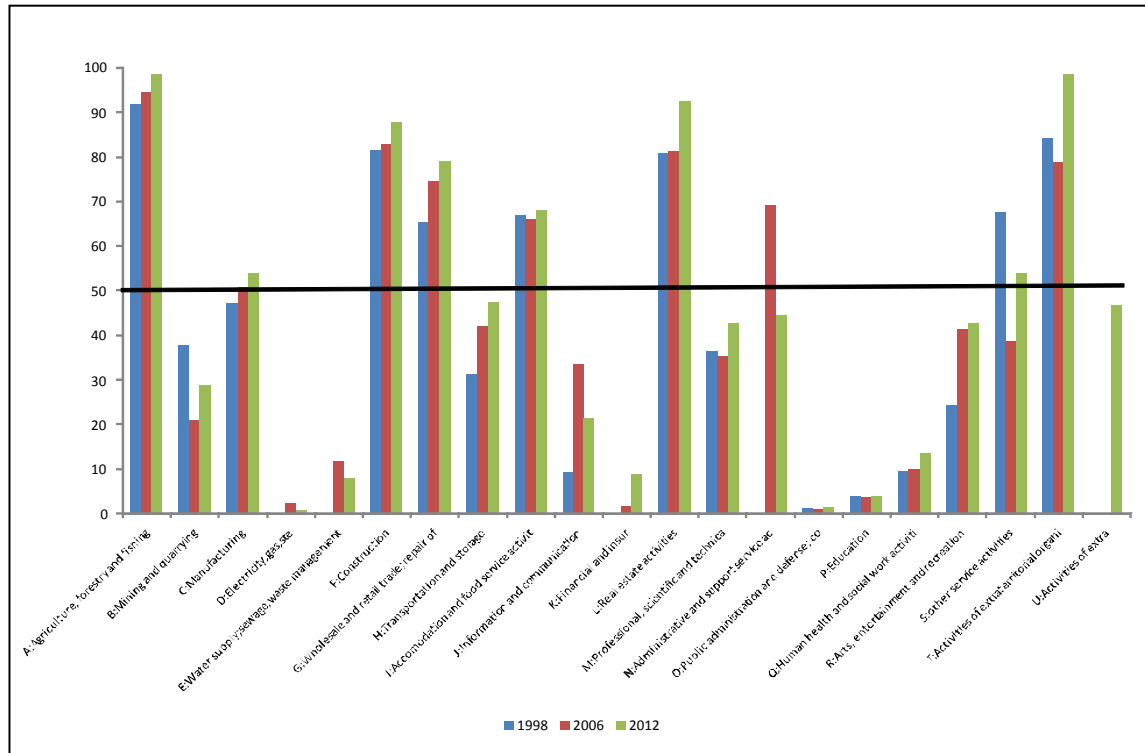
Table 9: Wage Workers Manufacturing Sector: Irregularity Premium

	1998		2006		2012		Panel	
	OLS	WLS	OLS	WLS	OLS	WLS	OLS	WLS
Tariff	-0.000588 (0.00159)	-0.000588 (0.000600)	-0.00384 (0.00342)	-0.00384*** (0.00112)	-0.000349 (0.00536)	-0.000349 (0.000663)	0.00301 (0.00529)	0.00301** (0.00129)
Constant	0.0366 (0.0302)	0.0366*** (0.0114)	0.253*** (0.0531)	0.253*** (0.0174)	-0.0823 (0.0839)	-0.0823*** (0.0104)	-0.0320 (0.149)	-0.0320 (0.0364)
Indus. dum	YES	YES	YES	YES	YES	YES	YES	YES
Year dum.	NO	NO	NO	NO	NO	NO	YES	YES
Observations	22	22	21	21	21	21	64	64
R-squared	0.007		0.062		0.000		0.704	
Rank	2	2	2	2	2	2	25	25
ll_0	28.68		13.58		-0.0355		17.76	
LI	28.75		14.26		-0.0332		56.74	
r2_a	-0.0428		0.0129		-0.0524		0.522	
Rss	0.0943		0.316		1.233		0.636	
Mss	0.000649		0.0210		0.000275		1.515	
Rmse	0.0687		0.129		0.255		0.128	
r2	0.00683		0.0622		0.000223		0.704	
F	0.138		1.261		0.00424		3.869	
df_r	20		19		19		39	
df_m	1	1	1	1	1	1	24	24
df_gf		20		19		19		39
chi2		0.963		11.77		0.277		1552
chi2_gf		140.0		177.3		1242		651.8

Notes: Standard errors in parentheses. *** p<0.01. ** p<0.05. * p<0.1

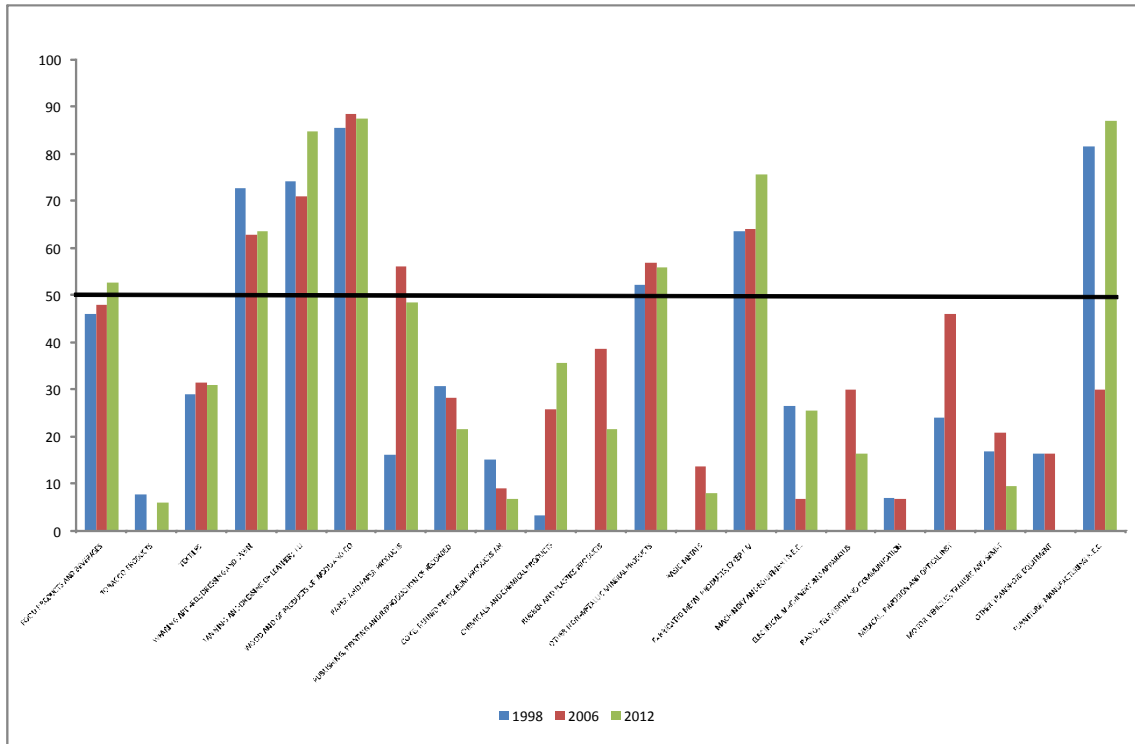
Appendix

Figure A1: Share of Informal Workers by Economic Activity Sector in 1998, 2006 and 2012



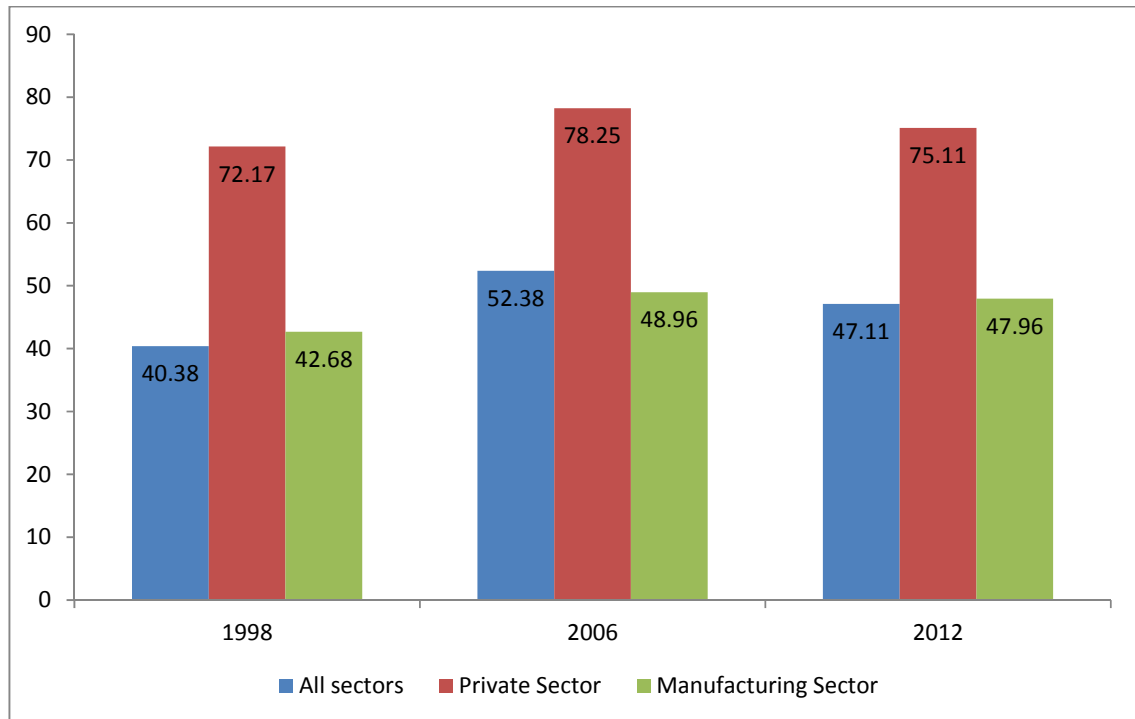
Source: Constructed by the authors using the ELMPS (1998, 2006, 2012).

Figure A2: Share of Informal Workers within the Manuf. Sector in 1998, 2006 and 2012



Source: Constructed by the authors using the ELMPS (2012).

Figure A3: Share of Informal Jobs in Regular Employment in 1998, 2006 and 2012



Source: Constructed by the authors using the ELMPS (1998, 2006, 2012).

Figure A4a: Informal, Irregular Shares and Industry Tariffs in 1998

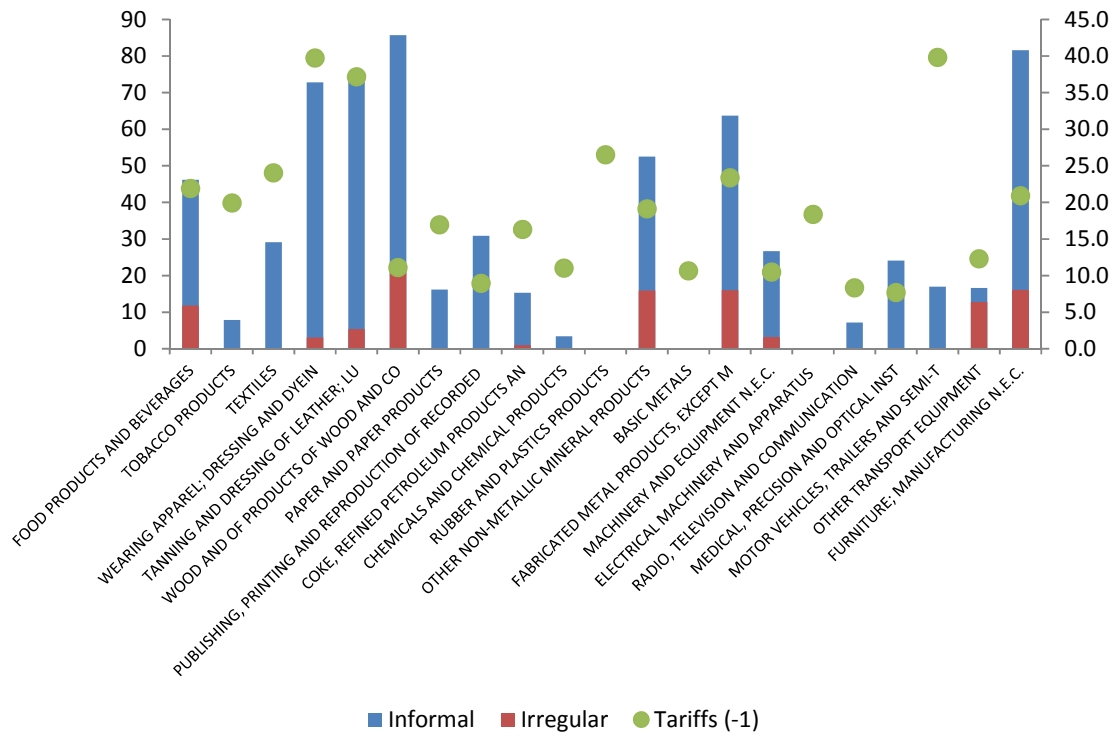


Figure A4b: Informal, Irregular Shares and Industry Tariffs in 2006

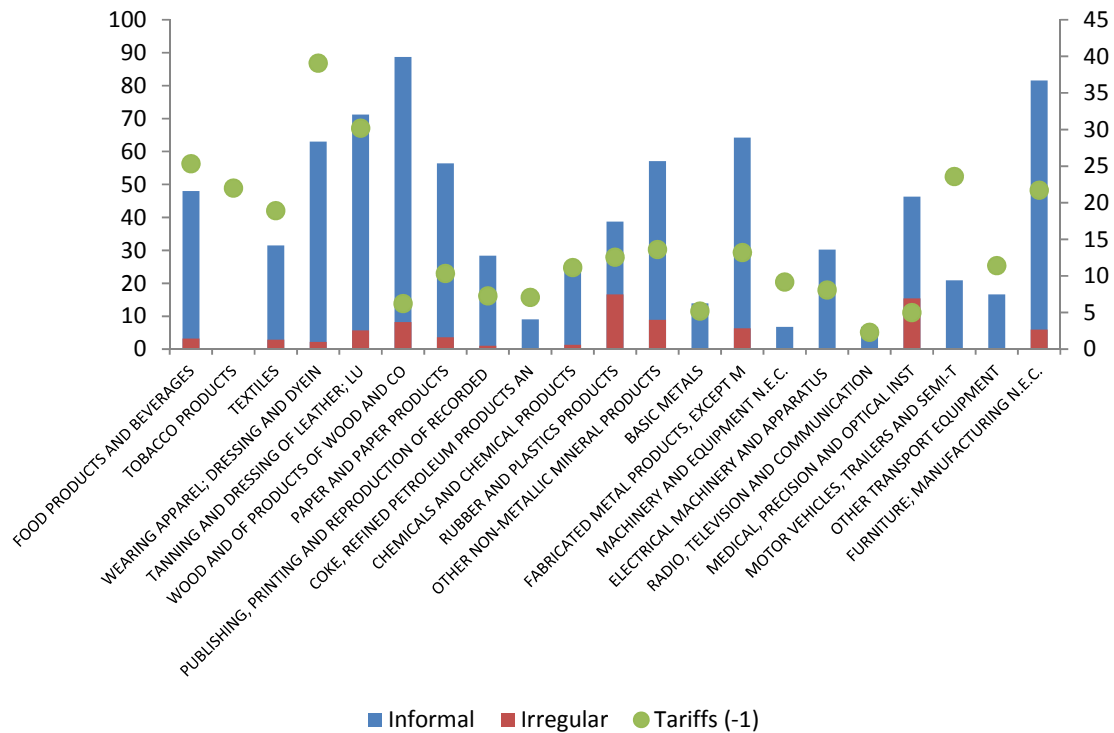


Figure A4c: Informal Irregular Shares and Industry Tariffs in 2012

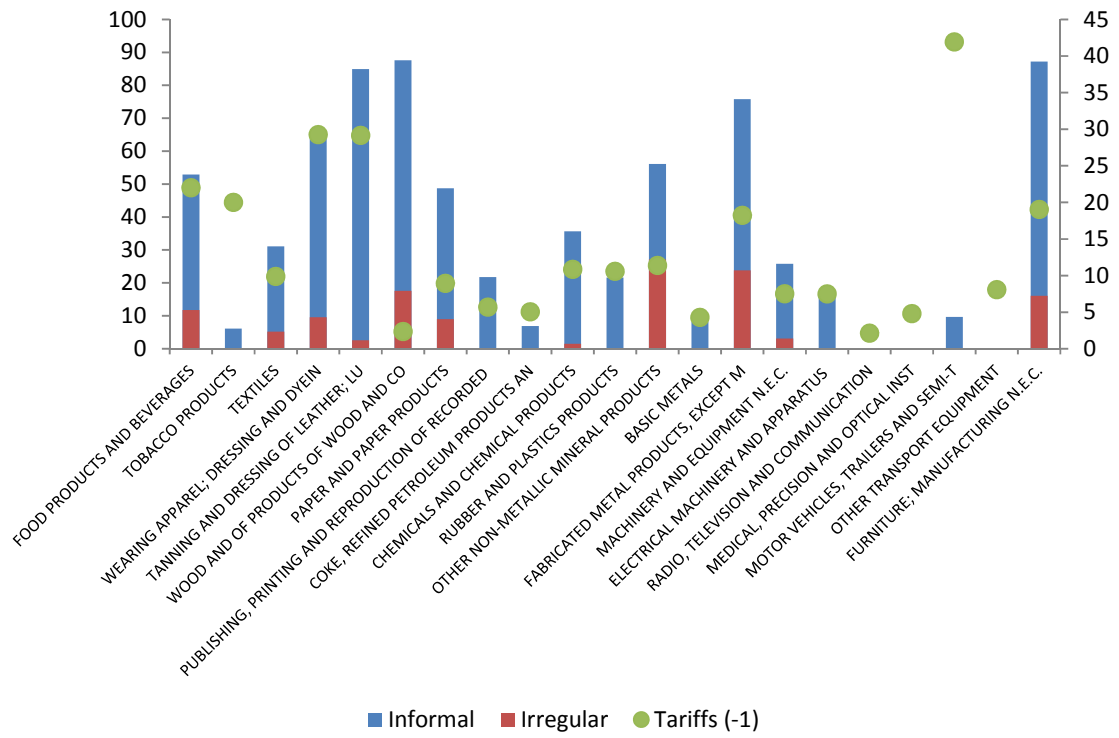


Table A1: Number of Observations across Sectors and Employment

Employment (number of workers)	Sample	1998	
		cross-section	Population panel
All sectors	6422	15675422.8	4.782.8986
Informal	2741	7.642.606	2.246.3325
Irregular	789	2.314.254	721.9966971
Manufacturing sector	1.055	2.470.067	681.098637
Informal	466	1.162.205	309.735358
Irregular	77	197.501.17	63.009349
Private Sector	3.639	9.619.830.1	2.776.6248
Informal	2.693	7.522.307	2.213.9361
Irregular	777	2.286.235	715.685992
		2006	
All sectors	11.485	21.480.825	6.441.1262
Informal	6.154	12079338.1	3.423.7963
Irregular	936	1.910.039	521.9004076
Manufacturing sector	1.552	2.848.126	843.016621
Informal	799	1.451.187	440.899054
Irregular	62	112.539.27	31.97569938
Private Sector	7.702	14843669.9	4.218.51
Informal	6.082	11951926.6	3.368.8889
Irregular	931	1.902.356	515.953171
		2012	
All sectors	14.095	22676446.2	7.035.9844
Informal	8.185	12842983.6	3.939.9768
Irregular	2.882	4.433.867	1.364.0234
Manufacturing sector	1.723	3.018.832	919.208084
Informal	953	1.626.123	519.699041
Irregular	214	356.480.8	109.788887
Private Sector	9.725	15.616.362	4.725.8873
Informal	8.073	12643986.9	3.880.5869
Irregular	2.871	4.413.524	1.359.0192

Source: Constructed by the authors using the ELMPS (1998; 2006, 2012).

Table A2: Labor Force

Frequencies	Formal E.	Informal E.	Irregular E.	Unemployment	In	Out
1998	1465995.3	1432182.2	328142.4	148066.5	3019369	770971.17
2006	1716317.8	1890278.8	202317.6	138165.6	3726382	890482.23
2012	1694644.9	2044938.6	500822.6	82369.31	3810781	435866.44

Table A3: Characteristics of Informal Workers Working Age-Population (15-64)

	1998		2006		2012	
	All sectors	Manuf.	All sectors	Manuf.	All sectors	Manuf.
Gender						
Male	85.50	85.79	76.01	81.29	85.55	89.17
Female	14.50	14.21	23.99	18.71	14.45	10.83
Age						
15-29	49.47	59.99	41.91	57.69	54.77	43.33
30-49	37.42	31.03	44.50	35.48	37.45	46.99
50-64	13.12	8.98	13.60	6.83	7.78	9.69
Education						
Ill. R & W	53.43	46.39	46.79	35.93	35.56	35.09
Less than Intermediate	21.54	28.57	18.56	24.56	21.93	26.12
Intermediate	18.75	20.66	27.14	31.32	32.43	30.68
Above Intermediate	6.05	4.26	7.49	8.15	9.93	8.12
Marital Status						
Married	53.86	42.98	59.88	51.11	67.02	54.43
Non married	46.14	57.02	40.12	48.89	32.98	45.57
Household position						
Head	40.66	33.88	39.43	37.32	54.80	49.66
Non-Head	59.34	66.12	60.57	62.68	45.20	50.34
Region						
Gr. Cairo	12.98	16.74	11.44	20.71	12.85	16.26
Alx. Sz C.	4.66	4.75	5.00	6.58	5.68	8.26
Urb Lwr	8.18	15.82	7.79	13.96	8.88	11.66
Urb Upp	6.05	5.18	6.05	6.10	6.53	5.34
Rur Lwr	37.13	37.81	32.53	32.00	34.38	33.29
Rur Upp	31.00	19.71	37.19	20.65	31.68	25.19
<i>Urban</i>	<i>31.87</i>	<i>44.60</i>	<i>30.28</i>	<i>47.35</i>	<i>33.77</i>	<i>40.94</i>
<i>Rural</i>	<i>68.13</i>	<i>55.40</i>	<i>69.72</i>	<i>52.65</i>	<i>66.23</i>	<i>59.06</i>
Employment status						
Wage worker	54.45	75.76	44.19	70.93	57.38	74.33
Employer	14.40	5.83	18.26	10.14	15.00	10.01
Self-employed	14.50	12.54	14.49	13.42	15.21	12.59
Unpaid family worker	16.64	5.88	23.06	5.51	12.41	3.08
Size of firms						
1-4	28.89	26.32	57.71	36.74	68.52	51.90
5-9	4.97	9.06	5.95	10.22	6.36	8.11
10-29	1.20	3.08	1.87	4.96	2.08	5.03
30-49	11.82	19.45	14.75	14.89	16.39	17.98
50 and more	2.45	9.57	2.18	10.62	4.44	10.92
DK	50.67	32.52	17.53	22.58	2.21	6.05
Nature of firms						
Public	1.32	1.01	0.78	1.09	1.20	1.81
Private	98.50	98.68	98.98	97.96	98.45	97.53
Other	0.18	0.30	0.24	0.95	0.35	0.65
Proportion of Informal Population	48.76 7,642,606	47.05 2,470,067	56.23 12,079,338.1	50.82 28,555,042.2	56.64 12,842,983.6	53.80 30,211,522.9

Source: Constructed by the authors using the ELMPS (1998, 2006, 2012).

Table A4: Characteristics of Irregular Workers Working Age-Population (15-64)

	1998		2006		2012	
	All sectors	Manuf.	All sectors	Manuf.	All sectors	Manuf.
Gender						
Male	91.66	88.50	91.69	82.45	93.82	89.65
Female	8.34	11.50	8.31	17.55	6.18	10.35
Age						
15-29	53.07	62.95	53.70	43.90	48.46	50.32
30-49	37.07	35.05	37.31	41.13	42.85	40.78
50-64	9.86	2.00	9.00	14.97	8.69	8.90
Education						
Ill. R & W	57.05	52.90	46.77	40.84	33.62	36.86
Less than Intermediate	22.88	21.30	21.47	27.61	25.52	36.86
Intermediate	16.61	23.44	28.41	30.24	35.83	33.10
Above Intermediate	2.88	2.37	3.34	1.31	4.86	1.81
Marital Status						
Married	51.50	42.54	56.68	63.78	63.53	59.77
Non married	48.50	57.46	43.32	36.22	36.47	40.23
Household position						
Head	41.26	26.84	43.29	43.46	53.77	51.27
Non-Head	58.74	73.16	56.71	56.54	46.23	48.73
Region						
Gr. Cairo	8.15	11.40	8.37	15.63	10.73	14.95
Alx. Sz C.	5.24	6.79	5.97	5.07	4.53	2.99
Urb Lwr	5.85	12.33	5.71	17.89	6.43	13.59
Urb Upp	5.79	5.42	6.89	11.38	8.01	12.78
Rur Lwr	35.72	36.96	27.60	27.50	30.07	26.62
Rur Upp	39.26	27.11	45.46	22.54	40.23	29.07
<i>Urban</i>	25.02	35.94	26.94	49.96	29.48	44.31
<i>Rural</i>	74.98	64.06	73.06	50.04	70.52	55.69
Employment status						
Wage worker	88.91	87.16	90.09	79.96	88.01	86.64
Employer	1.15	4.08	1.45		2.21	0.97
Self-employed	2.95	4.68	5.54	17.66	5.99	10.66
Unpaid family worker	6.99	4.08	2.92	2.38	3.79	1.73
Size of firms						
1-4	49.00	33.65	49.42	52.38	61.70	56.09
5-9	8.15	11.69	11.48	8.24	9.43	7.35
10-29	1.75	3.74	3.03	8.38	2.17	5.28
30-49	19.34	25.69	21.43	10.75	20.55	14.06
50 and more	1.49	7.26	1.73	10.07	2.74	5.09
DK	20.28	17.97	12.91	10.19	3.40	12.14
Nature of firms						
Public	0.90	0.86	0.35	1.29	0.39	2.26
Private	99.03	98.39	99.60	97.80	99.54	97.10
Other	0.07	0.75	0.05	0.91	0.07	0.63
Proportion of Irregular Population	14.78 2.314.254	8 197.501.17	8.90 1.910.039	3.95 112.539.27	19.57 4.433.867	11.81 356.480.8

Table A5: Results for Informality – First Step

	All workers manufacturing sector			Wage-workers manufacturing sector		
	1998	2006	2012	1998	2006	2012
	Probability to be informal			Probability to be informal		
Female	0.347** (0.153)	0.176 (0.198)	0.146 (0.133)	0.0962 (0.262)	-0.126 (0.230)	-0.135 (0.146)
Non-married	0.343* (0.199)	0.133 (0.142)	0.304** (0.131)	0.269 (0.285)	0.0624 (0.137)	0.428** (0.187)
Age	-0.101** (0.0485)	-0.000216 (0.0472)	-0.0620** (0.0253)	-0.140*** (0.0409)	-0.00597 (0.0420)	-0.0767*** (0.0277)
age squared	0.000819 (0.000588)	-0.000468 (0.000556)	0.000462* (0.000260)	0.00121** (0.000522)	-0.000530 (0.000563)	0.000569* (0.000291)
Less than interm.	-0.257* (0.137)	-0.443*** (0.113)	-0.218** (0.111)	-0.279 (0.197)	-0.486*** (0.153)	-0.204 (0.135)
Intermediate	-0.735*** (0.189)	-0.856*** (0.116)	-0.675*** (0.116)	-0.802*** (0.236)	-1.050*** (0.124)	-0.741*** (0.131)
Above Intermediate	-0.775*** (0.224)	-0.988*** (0.151)	-0.982*** (0.130)	-0.804*** (0.240)	-1.210*** (0.229)	-1.053*** (0.134)
Alx. Sz C.	-0.377** (0.167)	-0.362** (0.145)	-0.255 (0.189)	-0.514*** (0.140)	-0.277 (0.181)	-0.250 (0.205)
UrbLwr	0.159 (0.214)	0.165 (0.166)	0.321** (0.160)	0.258 (0.306)	0.158 (0.169)	0.380** (0.183)
UrbUpp	0.401** (0.182)	0.267** (0.131)	0.305 (0.194)	0.279 (0.246)	0.285 (0.184)	0.285 (0.197)
RurLwr	0.673*** (0.167)	0.0988 (0.185)	0.198 (0.140)	0.633*** (0.206)	0.0784 (0.228)	0.170 (0.174)
RurUpp	0.649** (0.296)	0.534** (0.213)	0.603*** (0.152)	0.437 (0.333)	0.394 (0.303)	0.446** (0.196)
Non-Head	0.123 (0.172)	0.308 (0.205)	0.0323 (0.161)	-0.0771 (0.182)	0.252 (0.202)	-0.120 (0.215)
Household size	-0.00837 (0.0279)	-0.00958 (0.0279)	-0.00436 (0.0243)	0.00688 (0.0292)	0.0160 (0.0317)	0.0178 (0.0348)
Share 15-	-0.462 (0.441)	-0.138 (0.349)	0.116 (0.314)	-0.414 (0.531)	-0.342 (0.347)	0.0349 (0.301)
Share 15-64 old	-0.648 (0.434)	-0.672* (0.351)	-0.226 (0.244)	-0.0726 (0.503)	-0.698** (0.351)	-0.0375 (0.305)
Share 65+	-1.683*** (0.630)	-0.247 (0.789)	-0.422 (0.377)	-1.813* (1.048)	0.0801 (0.704)	-0.363 (0.458)
Constant	2.449** (0.992)	0.976 (0.975)	1.851*** (0.538)	3.140*** (0.809)	1.167 (0.849)	2.138*** (0.601)
Industry dummies	YES	YES	YES	YES	YES	YES
Observations	992	1.545	1.715	811	1.205	1.430

Notes: Robust standard errors in parentheses (clustered by economic activity, one-digit, ISIC4). *** p<0.01. ** p<0.05. * p<0.1

Table A6: Results for Irregularity – First Step

	All workers manufacturing sector			Wage-workers manufacturing sector		
	1998	2006	2012	1998	2006	2012
	Probability to be irregular			Probability to be irregular		
Female	0.477 (0.308)	0.0414 (0.167)	0.322* (0.180)	0.358* (0.194)	-0.184 (0.178)	0.394 (0.250)
Non-married	0.249 (0.271)	-0.113 (0.235)	0.175 (0.159)	0.0740 (0.384)	-0.291 (0.252)	0.238** (0.105)
Age	0.0829** (0.0342)	-0.0107 (0.0548)	-0.0415* (0.0226)	0.0802** (0.0334)	-0.0474 (0.0601)	-0.0141 (0.0229)
age squared	-0.00144*** (0.000433)	0.000159 (0.000638)	0.000466* (0.000240)	-0.00146*** (0.000431)	0.000659 (0.000735)	0.000170 (0.000288)
Less than intermediate	-0.436*** (0.154)	-0.0573 (0.137)	0.0286 (0.133)	-0.327** (0.134)	-0.00943 (0.230)	0.0409 (0.142)
Intermediate	-0.286 (0.282)	-0.347 (0.215)	-0.149 (0.146)	-0.209 (0.288)	-0.315 (0.328)	-0.161 (0.140)
Above Intermediate	-0.898** (0.388)	-1.270** (0.563)	-0.857*** (0.268)	-0.769* (0.408)	-1.186* (0.668)	-1.064*** (0.297)
Alx. Sz C.	0.229 (0.341)	-0.149 (0.275)	-0.466 (0.296)	0.184 (0.331)	-0.149 (0.340)	-0.685** (0.270)
UrbLwr	0.246 (0.231)	0.235 (0.191)	0.254 (0.306)	0.108 (0.203)	0.410* (0.221)	0.224 (0.307)
UrbUpp	0.232 (0.285)	0.487* (0.263)	0.798*** (0.263)	0.245 (0.301)	0.799*** (0.245)	0.785*** (0.272)
RurLwr	0.269 (0.276)	0.125 (0.163)	0.00794 (0.203)	0.0619 (0.298)	0.136 (0.247)	-0.151 (0.220)
RurUpp	0.495 (0.340)	0.164 (0.210)	0.587** (0.270)	0.438 (0.371)	0.249 (0.256)	0.651** (0.271)
Non-Head	0.0269 (0.246)	0.344*** (0.0994)	0.211 (0.138)	-0.0248 (0.281)	0.436* (0.227)	0.301** (0.121)
Household size	-0.0171 (0.0370)	-0.0323 (0.0264)	-0.00345 (0.0393)	-0.00584 (0.0430)	-0.0345 (0.0314)	0.0146 (0.0472)
Share 15-	0.358 (0.294)	-0.122 (0.341)	0.512 (0.353)	0.228 (0.381)	-0.308 (0.595)	0.766*** (0.269)
Share 15-64 old	0.530 (0.529)	-0.482 (0.368)	0.120 (0.348)	0.523 (0.712)	-0.759 (0.544)	0.515 (0.462)
Share 65+	0.541 (0.512)	1.338*** (0.495)	0.0368 (0.501)	0.0330 (0.783)	1.246* (0.671)	0.0623 (0.697)
Constant	-2.709*** (0.911)	-1.163 (1.029)	-0.799 (0.609)	-2.385** (1.087)	-0.468 (1.103)	-1.612*** (0.531)
Industry dummies	YES	YES	YES	YES	YES	YES
Observations	775	1.363	1.433	593	1.028	1.151

Notes: Robust standard errors in parentheses (clustered by economic activity, one-digit). *** p<0.01. ** p<0.05. * p<0.1